

# ADEQUACY OF THE DIET AND NUTRIENT SOURCE

## CALORIES

The caloric requirement for all Eskimos and Indians reported in this study was estimated to be the same as that for other United States residents of similar age and sex<sup>(4)</sup>. However, the requirement may be significantly greater for the majority of these people for they live where arctic weather conditions prevail the greater part of the year.

Caloric intake data by age and sex are presented in Table 1. At no age level is the mean daily caloric intake equal to that recommended by the National Research Council and the percentage of caloric intakes deficient by these standards is high at all age levels.

One of the most striking features of the Alaskan Indian and Eskimo diet is the extreme range in the individual's mean daily nutrient intake. This might be expected in an economy essentially dependent on hunting and fishing, for in spite of efforts to plan ahead, adverse weather, lack of game and other factors often upset the best laid plans. (Table 1)

Since the preschool years constitute an especially critical growth period more detailed information was sought concerning dietary patterns in this age group, particularly with reference to geographical differences in the nutrient adequacy of the diet. The lowest mean caloric intakes at the 2-5 year age level were found among southwestern Eskimo children. About two-thirds of their dietary records showed intakes less than the NRC recommended levels. The highest mean caloric intakes at these same age levels were found among Athapascan Indian children; however, even in this group only slightly more than half of their diets were adequate according to NRC standards. At six years of age the mean caloric intake was comparable for all geographic areas with a high percent showing caloric deficiency (Table 2).

## SOURCE OF CALORIES IN THE DIET:

Per capita calorie source by village is presented in Tables 3 and 4. Over one-third of the mean per capita caloric intake in all villages came from cereal and bread products, with approximately another third provided by meat and fish combined.

Meat was a greater source of calories in northern diets and fish in those from the southwest, except at the village of Akiak. This village is located in a forested area where moose, ground squirrel and beaver are available. At the other southwest villages meat sources were rather meager, consisting primarily of limited seasonal supplies of mink, wildfowl, rabbit and muskrat. Seal was available at Hooper Bay and Newtok, but their yearly take of this animal is considerably less than at the northern coastal villages.

Calories from the fats 'as such' category include only those obtained from fats served as a spread for bread, crackers and hotcakes, and oil used as a dip for dried or frozen meat or fish. Newtok had the highest number of calories per capita from this food group, Kasigluk the lowest. Both are southwest tundra villages, but Newtok is located near the coast and the people spend part of the year at coastal camps hunting seal. Consequently they have excellent supplies of seal oil, much of which is used as a dip for dried fish, the most important food in their winter dietary.

TABLE 1.—CALORIC INTAKES OF ALASKAN ESKIMO AND INDIAN DIETS: ALL AREAS AND VILLAGES, ALL SEASONS, BY AGE AND SEX

Age Sex Category	Number of Records	Caloric Intakes		
		Mean Daily Intake	Intake Range	Percent Under N.R.C. (*)
Adult male 20-60 yrs.....	746	2649	1006-5740	73.2
Adult male 60 + yrs.....	112	2258	893-3820	71.4
Adult female 20-60 yrs.....	633	2185	930-4503	60.4
Adult female 60 + yrs.....	120	1681	739-3381	65.3
Adult female Pregnant.....	121	2196	1093-4300	73.6
Adult female Lactating.....	193	2443	1197-5263	83.8
Male 13-19 yrs.....	303	2386	1174-4161	87.0
Female 13-19 yrs.....	298	1992	893-3820	81.1
School child 7-12 yrs.....	916	1966	737-4174	72.7
Preschool 2-6 yrs.....	843	1543	529-3262	53.0

TABLE 2.—CALORIC INTAKES OF ESKIMO AND INDIAN CHILDREN 2 TO 6 YEARS OF AGE<sup>(1)</sup>  
By Area, By Age Level

Area	2 to 3 Years			4 To 5 Years			6 Years		
	No. Records	Mean Daily Intake	Percent Under NRC	No. Records	Mean Daily Intake	Percent Under NRC	No. Records	Mean Daily Intake	Percent Under NRC
Northcentral Athapascan.....	41	1519	32	61	1720	46	31	1772	45
Northern Eskimo.....	86	1393	42	111	1641	63	48	1742	52
Southwestern Eskimo.....	187	1261	61	160	1560	67	118	1747	51

**TABLE 3.—PROPORTION OF CALORIES FROM SELECTED FOOD GROUPS  
All Age and Sex Groups, All Seasons, By Village**

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
Dairy.....	155	203	196	187	183	104	174	93	110	121	97
Egg.....	12	16	7	19	26	7	9	5	5	16	15
Meat.....	301	427	444	507	442	536	435	43	32	143	78
Fish.....	198	109	303	53	113	271	506	599	778	532	585
Fats as such.....	110	121	230	195	270	195	131	135	32	96	348
Fruits.....	147	70	98	32	157	57	97	86	80	86	15
Vegetables.....	39	97	22	36	63	45	54	13	11	25	17
Breads & Cereals.....	764	709	721	929	407	528	692	715	767	841	597
Sugar Products.....	210	238	194	153	161	144	156	135	88	92	140
Miscellaneous.....	27	23	16	11	26	7	7	5	5	4	
Mean Per Capita Intake.....	1963	2013	2231	2122	1848	1894	2261	1829	1903	1956	1892
Percent Under NRC (4).....	77	67	57	64	70	79	59	82	71	69	80
Number of Records.....	257	369	462	362	372	285	228	422	351	1212	247

TABLE 4.—PROPORTION OF CALORIES FROM LOCAL AND IMPORTED FOODS  
By Village

Village	No. Records	Per Capita Intake	Calorie Source			
			Local	Imported	School	Mixed Food Preparations
<i>N. Central Athapascan</i>						
Allakaket.....	257	1963	491	1375	22	75
Hushia.....	369	2013	408	1530	.....	75
<i>Northern Eskimo</i>						
Point Hope.....	362	2122	641	1349	81	51
Noatak.....	462	2231	848	1212	66	105
Shishmaref.....	372	1848	759	899	132	58
Shungnak.....	285	1894	873	849	92	80
<i>Southwestern Eskimo</i>						
Akiak.....	228	2261	841	1148	82	190
Napaskiak.....	422	1829	653	1021	66	89
Kasigluk.....	351	1903	782	949	68	104
Hooper Bay.....	1212	1956	717	1100	58	81
Newtok.....	247	1892	855	972	57	8

Kasigluk is located far inland and their seal oil supplies, obtained by cash purchases, are quite limited. Their preferred use of this product is in the preparation of various agutuk or dessert mixtures.

Calorie sources in adult male and female diets were quite similar on the whole. Females obtained slightly more calories from dairy products, fruits and vegetables, and the males slightly more from other food categories (Tables 3 and 4).

Calorie sources in the young person's diet varied from adult sources in several significant respects. Milk, for example, supplied less than 3 percent of the total calories in adult diets, but furnished 14 percent in the diet of children 2 to 6 years of age. The schoolchild's diet contained fewer milk calories than did that of the preschool child, in spite of the fact that most of them received milk at the school lunch. However, a significant number of young preschool children continued to be bottle-fed well beyond two years of age.

Calories from meat and fish were highest in adult diets. These foods were much less important as a calorie source in the adolescent child's diet and even less so in the 2 to 6 year-old's diet.

The same pattern holds true for calories from fats 'as such', and from sugar products. On the other hand, the diet of the adolescent and school child contained more calories from fruits, vegetables and bread and cereal products, generally through the school lunch which is served in the Eskimo villages only.

Imported foods provided more calories than local foods in all the study villages. Their use was somewhat higher in the Athapascan Indian villages, probably because these villages are located in good mining and trapping areas where the people have had closer and more continuous daily association with Caucasians over a longer period of time than have most Eskimos. Their diets were similar to those of the average American family except that moose and beaver were their primary meat sources, and their use of fruits and vegetables was more limited, primarily because of cost. The two Indian villages had fewer total calories from local food sources and more sugar calories per capita.

In general, approximately equal amounts of calories came from local and imported foods on adult diets, while on the adolescent and preschool child's diet local foods provided about one-third of the calories and slightly less than one-third on the school child's diet (Tables A-1 through A-3, Appendix).

## **PROTEIN**

Mean daily protein intakes were high at all age and sex levels and the percents with a deficiency in this nutrient were quite low (Table 5). Slightly less than one-third of the total calories in the overall adult diet came from protein. There was very little difference due to sex, except that from 17 to 19 years of age, females obtained fewer protein calories than did the males (Table A-1 Appendix).

Adult males under 60 years of age in the northern village of Shungnak had the highest percentage of calories from protein. This village is admirably situated for the hunting of caribou as well as for obtaining good supplies of fish.

In the southwest, the interior tundra village of Kasigluk had a consistently higher percentage of calories from protein than did the other area study villages with one exception: the 17 to 19 year old males obtained less than one-fifth of their total calories from protein. Food intakes at this age level were very erratic in all the villages, especially during those periods when they were not actively engaged in hunting, fishing and hauling wood.

**TABLE 5.—PROTEIN INTAKES ON ALASKAN ESKIMO  
AND INDIAN DIETS**  
All Areas and Villages  
All Seasons, By Age and Sex

Age and Sex Category	Number of Records	Protein Intakes		
		Mean Daily Intake (gm)	Intake Range (gm)	Percent Under NRC(*)
Male 20-60.....	746	202.6	28.2-759.3	2.9
Male 60 +.....	112	179.9	46.9-438.0	4.2
Male 13-19.....	303	161.9	23.7-482.7	15.6
Female 20-60.....	633	171.9	27.5-618.3	2.6
Female 60 +.....	120	133.8	36.0-365.4	3.2
Female Pregnant.....	121	172.1	39.4-454.1	8.0
Female Lactating.....	193	182.8	29.8-495.5	14.7
Female 13-19.....	298	136.0	46.9-438.0	14.0
Child 7-12.....	916	120.2	13.2-361.3	10.2
Child 2-6.....	843	94.5	20.2-324.8	7.5

The per capita intake of protein by village was high; most of it was of local origin, primarily meat and fish. Meat was a more important source in the northern areas and fish in the southwest.

The only other significant sources of protein in these diets were milk, bread and cereal products. Together they provided from as little as 8 percent of the total protein in Shungnak diets to about 28 percent at Point Hope (Tables 6 and 7).

The school child's diet contained about twice as much milk protein as the adult diet. Most of it was from milk served at school. But even in the children's diets, meat and fish were the major sources of this nutrient (Tables B-2 through B-4 Appendix).

## FAT

Approximately one-third of the total calories in adult diets came from fat. The proportion was slightly less for adolescent males than for females (Table C-1, Appendix). A comparison of per capita fat intakes in Eskimo and Indian diets shows that, in

TABLE 6.—PROPORTION OF PROTEIN FROM SELECTED FOOD GROUPS  
All Age and Sex Groups, All Seasons, By Village  
In Grams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
Dairy.....	8.9	9.4	10.2	10.0	9.9	5.0	8.2	4.6	7.0	6.2	4.9
Eggs.....	0.6	0.9	0.3	1.4	1.4	0.3	0.4	0.3	.....	1.1	1.2
Meat.....	58.7	60.7	79.2	77.4	95.3	90.2	53.0	7.9	6.3	27.0	16.1
Fish.....	40.4	18.0	61.5	10.3	19.8	52.3	66.6	102.4	153.4	84.1	97.1
Fats.....	0.3	0.8	1.0	0.7	0.7	0.2	0.5	0.1	.....	0.1	0.1
Fruits.....	0.9	0.4	0.9	0.2	1.1	0.5	0.4	0.4	1.7	0.7	0.1
Vegetables.....	1.3	3.1	1.2	1.7	2.7	1.9	2.5	0.6	0.7	1.3	1.0
Breads et al.....	15.1	15.1	15.4	18.3	9.3	9.0	13.9	12.7	15.5	14.1	9.2
Sugar et al.....	0.1	0.2	0.3	0.1	0.1	0.2	0.1	.....	.....	.....	.....
Miscellaneous.....	1.3	0.9	0.7	0.5	1.1	0.3	0.6	0.3	0.2	0.1	.....
Per Capita Intake.....	127.6	109.5	170.7	120.6	141.4	159.9	146.2	129.3	184.8	134.7	129.7
Number of Records.....	257	369	462	362	372	285	228	422	351	1212	247
Percent under NRC(*).....	12.3	6.7	4.2	14.5	6.8	4.3	3.5	9.2	2.1	13.6	8.6

**TABLE 7.—PROPORTION OF PROTEIN FROM LOCAL  
AND IMPORTED FOODS  
By Village  
In Grams**

Village	No. Records	Total Per Capita Intake	Protein Source			
			Local	Import	School	Mixed
<i>N. Central Athapascan</i>						
Allakaket.....	257	127.6	70.2	48.5	2.2	6.7
Huslia.....	369	109.5	66.8	34.9	.....	7.8
<i>Northern Eskimo</i>						
Noatak.....	462	170.7	127.5	27.7	2.0	13.5
Point Hope.....	362	120.6	81.4	29.8	3.6	5.8
Shishmaref.....	372	141.4	109.8	20.9	5.5	5.2
Shungnak.....	285	159.9	129.6	15.4	4.1	10.8
<i>Southwestern Eskimo</i>						
Akiak.....	228	146.2	110.8	25.3	3.2	6.9
Hooper Bay.....	1212	134.7	109.6	20.4	2.3	2.4
Napaskiak.....	422	129.3	107.9	16.4	2.3	2.7
Newtok.....	247	129.7	113.7	13.6	2.4	.....
Kasigluk.....	351	184.8	152.9	21.1	2.3	8.5

general, fat intakes are higher among the Eskimos. Imported fats appear to be equally important for both racial groups; however, Eskimos obtain and use larger amounts of local varieties of fat (Tables 8 and 9).

The kinds and amounts of local fats used are determined by a number of factors, chiefly: village location, season, village population in relation to total local supplies, sex, and acculturation experiences. Napaskiak and Newtok, for example, are both located in southwest Alaska and they are of comparable size. Napaskiak is located on the banks of the Kuskokwim River approximately 40 miles from the coast, while Newtok is located on the banks of a tidal slough near Hazen Bay. The people at the latter village spend about five and one-half months out of every year at various coastal hunting and fishing sites where they obtain, successively, seal, herring, wildfowl and their eggs, and flounder. Although the sealing season is relatively short—about 4 to 6 weeks—the seal oil supplies obtained are usually sufficient to meet their yearly needs. It is used almost daily in their diets.

By comparison, in Napaskiak the seal oil supply is quite limited since most of it is purchased from coastal Eskimos. According to village informants, only a few Napaskiak families now

TABLE 8.—PROPORTION OF FAT FROM SELECTED FOOD GROUPS  
All Age and Sex Groups, All Seasons, By Village

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasiigluk	Hooper Bay	Newtok
Dairy.....	7.0	10.2	10.7	10.9	11.1	5.8	9.8	5.4	5.5	7.0	5.6
Egg.....	.....	1.2	.....	1.6	2.4	.....	.....	.....	.....	1.3	1.1
Meat.....	12.9	19.4	13.3	20.5	7.8	15.4	30.8	2.0	1.0	3.0	2.0
Fish.....	2.9	2.8	6.2	1.1	4.9	4.2	20.9	17.9	24.9	18.8	19.8
Fats*	12.1	12.3	24.8	21.9	35.1	22.0	13.7	15.3	3.6	10.9	39.2
Fruits.....	.....	.....	2.2	.....	3.6	.....	6.5	6.7	5.6	6.3	.....
Vegetables.....	1.5	.....	.....	.....	1.9	.....	.....	.....	.....	.....	.....
Bread and cereal.....	.....	.....	29.6	37.8	19.6	25.4	25.6	31.4	34.2	38.5	35.6
Sugar.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Per Capita Intake.....	67.6	76.9	86.8	93.8	86.4	72.8	107.3	78.7	74.8	85.8	103.3
Number of Records.....	257	369	462	362	372	285	228	422	351	1212	247

\* Served as a separate food item.

TABLE 9.—PROPORTION OF FAT FROM LOCAL  
AND IMPORTED FOODS  
By Village  
In Grams

Village	Number of Records	Fat Source			
		All Food Sources	Local Foods	Import Foods	Mixed Foods
<i>N. Central Athapaskan</i>					
Allakaket.....	257	67.6	15.1	50.4	2.1
Huslia.....	369	76.9	16.6	57.1	3.2
<i>Northern Eskimo</i>					
Point Hope.....	362	93.8	34.0	57.7	2.1
Noatak.....	462	86.8	34.6	50.7	1.5
Shungnak.....	285	72.8	32.3	39.2	1.3
Shishmaref.....	372	86.4	40.2	42.6	3.6
<i>Southwestern Eskimo</i>					
Akiak.....	228	107.3	43.7	49.8	13.8
Napaskiak.....	422	78.7	21.6	50.2	6.9
Kasigluk.....	351	74.8	25.9	42.6	6.3
Hooper Bay.....	1212	85.8	26.2	53.1	6.5
Newtok.....	247	103.3	42.1	60.4	0.8

migrate to the coast to do their own sealing as in former years. Much of their seal oil supply is used preferentially in the preparation of agutuk (dessert) mixtures which are not daily food items but are served as occasional treats throughout the year.

At one time salmon oil was an important item in the Napaskiak diet, but the extraction of oil from salmon is another of the old-time customs that is rapidly disappearing.

As a result of differences in location, the per capita intake of fat from local foods at Newtok is about twice that at Napaskiak. Furthermore, almost 40 percent of the fat in Newtok diets is served as a separate food item while at Napaskiak less than one-fifth of the total is used in this way. (Tables 8 and 9).

Hooper Bay is perhaps the best example of a village that has reached a size which puts a strain on local food supply. It is a coastal village located on Norton Sound about halfway between the Yukon and Kuskokwim river deltas. The locally available foods are similar to those of Newtok to the south. The most important food resources common to these two villages are seal, wildfowl, needlefish, blackfish, herring, tom cods and muskrats. The villages differ in that Newtok people also obtain flounder and a larger number of muskrat and mink per capita, while at Hooper

Bay there is a limited salmon run most years, and clams, whitefish, wild berries and greens are available. Both villages were probably using their local food resources to the maximum at the time food records were collected (1957-58). However, Newtok was the smallest of all the study villages (population 117) and Hooper Bay the largest (population 431). The per capita fat intake at Hooper Bay was not only less than that at Newtok but Newtok diets contained almost half again as much fat from local sources.

The high percentage of fat from local sources at Akiak may be somewhat misleading as the records for this village were representative of two seasons only—fall and winter. A data collection trip was made at the time when beaver, a very fat animal, was a prominent food in their diets. This food is only available for about a month to six weeks.

Akiak is located about 30 miles upriver from Napaskiak in a wooded area with easy access to both the foothills of the Alaska Range and tundra areas. Moose and beaver were important animal foods and occasionally bear and caribou meat and fat appeared on the village dietary. Also, several families still seriously hunt ground squirrels, rabbits and other small rodents.

In general, the intake of fat from local sources was higher in the northern Eskimo villages all of which have access to good local supplies. In three of these villages—Point Hope, Noatak, and Shishmaref—the people hunt sea mammals (bowhead whale, ugruk and seal at Point Hope; beluga whale and ugruk at Noatak\*; and seal and ugruk at Shishmaref). In addition at Point Hope, Noatak and Shungnak they hunt caribou. All of these animals are good sources of fat.

Shungnak people no longer journey to the coast (Kotzebue Sound) to hunt ugruk and obtain additional supplies of oil by barter as in the past; instead, seal oil supplies are now shipped in. Porcupine, marmot and bear were once important seasonal sources of fat in the diet of these people, but both the hunting area and activities have been greatly restricted, and are now confined for the most part to a limited area near the village. Consequently, these animals now serve only as a very occasional fat source.

The two Athapascan Indian villages—Huslia and Allakaket—are both located on the banks of the Koyukuk River in north-central Alaska in a predominantly spruce-birch forest area. Moose and beaver are their primary local sources of fat, although caribou

---

\* Noatak village is about 40 miles inland on the banks of the Noatak River but the people still migrate to the coast in late May and remain there throughout the summer.

are available at Allakaket about once every three years. They were not available the year diet records were collected.

Because of current hunting and trapping regulations, moose and beaver fat are probably included in the Indian diet less often than in the past. The use of other animals such as bear, porcupine and rabbits has also been curtailed, primarily because most of the families stay in the village the year round and the supply in the village environs is dwindling. Muskrats which are available near the village, are still a prominent food in the late winter or early spring diets. They are hunted by men, women, and children, in fact, by anyone who can handle a .22 rifle. The total amount of fat from all local sources in the present day Indian diet is considerably less than in the Eskimo diet. Like the Kuskokwim Eskimo, interior Indians used to extract salmon fat from fish heads but this is no longer a common practice.

A comparison of mean daily fat intakes in the diets of adult males, adult females and school children reveals that males have somewhat higher fat intakes, including more from both local and imported sources. The child from 7-12 years of age obtains only about one-fourth of his total fat intake from local sources (Tables C-2 through C-4, Appendix).

Another very important change that has taken place in the diets of these people, especially that of the majority of the Eskimos, is the increase in the use of the more saturated varieties of fats. These are primarily imported butter, margarine, hydrogenated fat and edible beef tallow.

## **CARBOHYDRATE**

Another of the major changes in the Indian and Eskimo diet brought about by closer association with Caucasians is the increased content of carbohydrate. Carbohydrate sources were negligible in aboriginal times and consisted primarily of that obtainable from such meat and fish products as the livers, fish roe, whale muktuk, the stomach contents of moose and caribou and limited supplies of plant products such as wild edible greens, roots and berries. At best these were meagre sources of this nutrient in the overall dietary.

## **CALORIES FROM CARBOHYDRATE**

Carbohydrate supplied approximately one-third of the calories in adult diets and slightly more in the adolescent diet. In the overall dietary of all areas and villages combined, there was very

TABLE 10.—PROPORTION OF CARBOHYDRATE  
FROM LOCAL AND IMPORTED FOODS  
By Village  
In Grams

Village	Number of Records	Carbohydrate Source				
		Mean Per Capita Intake	Local	Import	School	Mixed
<i>N. Central Athapascan</i>						
Allakaket.....	257	217.0	4.8	202.5	3.2	6.5
Huslia.....	369	224.6	6.1	217.0	.....	1.5
<i>Northern Eskimo</i>						
Point Hope.....	362	212.7	1.1	200.7	8.9	2.0
Noatak.....	462	182.8	6.2	161.7	9.7	5.2
Shishmaref.....	372	182.1	2.1	153.7	22.7	3.6
Shungnak.....	285	141.5	3.2	121.9	11.5	4.9
<i>Southwestern Eskimo</i>						
Akiak.....	228	176.0	3.2	156.2	9.1	7.5
Hooper Bay.....	1212	157.5	2.4	144.4	7.0	3.8
Napaskiak.....	422	143.8	0.6	130.5	8.5	4.2
Newtok.....	247	111.7	1.4	102.8	7.1	0.4
Kasigluk.....	351	151.0	0.4	135.9	9.2	5.5

little variation in percentage of calories obtained from carbohydrate by males and females at different ages (Table D-1, Appendix).

There were, however, significant variations among the villages in per capita carbohydrate intake, with the Athapascan Indians having the highest intake. In general, the northern Eskimo had a higher intake than those living in the southwest (Tables 10 and 11).

#### SOURCE OF CARBOHYDRATE

Breads and cereals were the primary source of carbohydrate in the diets studied, accounting for one-half or more of the total per capita intake in all villages except Shishmaref where they furnished only one-third. Sugar products—refined sugar, candy, syrup and soft drinks—were a significant but variable source of carbohydrate in all villages. They provided a somewhat higher percentage in the northern study villages, especially in the Indian villages. The percentage of carbohydrate provided by milk and fruit products was also higher in the north.

TABLE 11.—PROPORTION OF CARBOHYDRATE FROM SELECTED FOOD GROUPS  
All Age and Sex Groups, All Seasons, By Village  
In Grams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allaka-ket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
	Dairy.....	13.5	15.9	13.7	13.4	16.4	7.9	11.4	6.3	9.1	8.3
Egg.....					0.2						0.1
Meat.....	2.0	2.2	4.4	4.9	1.7	4.2	4.8	0.9	0.8	1.0	
Fish.....	0.4	0.4	0.2		0.7	0.4	0.9	0.3	1.9	0.8	
Fats as such.....	0.2	0.2	0.2	0.2	0.2	0.1	0.4	0.1			1.2
Fruits.....	35.8	18.6	19.6	8.5	38.9	14.4	9.9	6.8	6.9	8.0	0.2
Vegetables.....	5.2	15.7	3.9	6.4	9.3	7.4	8.1	2.0	1.9	3.5	2.9
Grain Products.....	103.5	106.5	94.3	137.6	64.3	69.3	101.4	93.2	105.9	111.0	62.6
Sugar Products*.....	52.1	60.6	43.9	40.0	45.7	36.5	38.4	33.2	23.4	23.9	35.7
Miscellaneous.....	4.3	4.5	2.6	1.7	4.7	1.3	0.7	1.0	1.1	1.0	0.1
Per Capita Intake.....	217.0	224.6	182.8	212.7	182.1	141.5	176.0	143.8	151.0	157.5	111.7
Number of Records.....	257	369	462	362	372	285	228	422	351	1212	247

\* Candy, soft drinks.

These four major food groups accounted for 90 percent or more of the carbohydrate in all villages, most of it from imported food products. Local berries were used when available in all villages except the most northerly village, Point Hope. The few Point Hope families who still make summer and fall camps along the Kukpuk and other mainland rivers, may collect limited quantities.

The use of canned and dried fruits was limited by cost. They appeared more frequently in northern diets than in those from the southwestern area where the per capita monetary income is considerably lower. According to the 1960 census report, the average yearly family income in the Wade Hampton election district in which Hooper Bay is located was approximately \$900, while in the northern district it was estimated to be about \$2,400<sup>(13)</sup>.

A comparison of the per capita carbohydrate intakes from fruit by age categories showed that the school and teen-age child's intake was highest, with about one-third of the intake provided by the school lunch. However, this applied only to the diets of children from the Eskimo villages who participated in a school lunch program. Canned and stewed dried fruit were quite frequently served at school.

The percentage of carbohydrate provided by the various food sources at different age levels and by sex is presented in Tables D-2 through D-4, Appendix.

## **CALCIUM**

Mean daily calcium intake levels among Alaskan Eskimos and Indians were considerably below those recommended by the National Research Council for all age, sex, and metabolic status groups. Three-fourths or more of the diets for each of the above categories were deficient by these standards. The ranges in mean intake level of this nutrient were extremely wide.

Adult males and females over 60 years of age had lower mean daily intake levels than did younger adults. This may have been due either to a smaller intake of food or to stricter adherence to old and well established dietary patterns in which milk was lacking. The addition of evaporated milk to coffee is now a fairly common practice especially for younger adults (Table 12).

TABLE 12.—CALCIUM INTAKES ON ALASKAN ESKIMO  
AND INDIAN DIETS  
All Areas and Villages, All Seasons, By Age and Sex

Age-Sex Category	Number of Records	Calcium Intakes		
		Mean Daily Intake (mg)	Intake Range (mg)	Percent Under NRC (*)
Adult male 20-60 yrs. ....	746	576	399-3813	75
Adult male 60 + yrs. ....	112	461	381-2010	87
Adult female 20-60 yrs. ....	633	481	254-2197	87
Adult female 60 + yrs. ....	120	322	87-886	95
Adult female Pregnant. ....	121	561	279-3115	97
Adult female Lactating. ....	193	531	197-2027	99
Male 13-19 yrs. ....	303	660	372-1880	96
Female 13-19 yrs. ....	298	580	381-2010	97
School Child 7-12 yrs. ....	916	684	250-1936	80
Preschool Child 2-6 yrs. ....	843	641	33-2319	85

There appeared to be only a moderate increase in mean daily calcium intake during pregnancy and lactation. About 18 percent of the records for women in these two groups showed mean daily calcium intake levels of less than 500 mg.; over half had mean intake levels under 600 mg. daily; and only 3 percent of those for pregnant women and 1 percent for lactating women showed a mean intake level equal to or exceeding the National Research Council recommendations.

A comparison of calcium intake levels for the preschool child, 2 to 5 years of age, by geographic area, showed that three-fourths of the diet records for the two-year olds had mean daily intake levels less than that recommended by the NRC and that intake levels were highest for the North Central Athapascan Indian child. At 3 to 5 years of age, in all areas, mean daily intake levels had not only decreased but the percentage of children with intakes under NRC recommended levels had increased significantly. Continued formula feeding of some children well into the second year of life probably accounts for the higher intake level at two years of age. The extreme variance between low and high calcium intakes in all villages might be interpreted, at least in part, as evidence of the variable importance given to milk as an item in the young child's diet. Family economics may also be a factor (Table E-1 Appendix).

TABLE 13.—PROPORTION OF CALCIUM FROM SELECTED FOOD GROUPS  
All Age and Sex Groups, All Seasons, By Village  
In Milligrams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noutak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
Dairy.....	315	349	342	334	379	191	306	169	232	226	172
Egg.....	3	5	2	7	10	2	2	2	.....	5	5
Meat.....	29	34	30	34	37	42	31	4	3	11	7
Fish.....	28	21	53	8	30	43	55	104	136	95	356
Fats as such.....	3	4	2	2	3	1	3	3	1	1	2
Fruit.....	18	11	17	5	23	10	8	8	6	7	2
Vegetables.....	7	20	7	10	18	11	14	5	5	5	7
Grain Products.....	214	193	194	246	118	163	158	217	265	253	212
Sugar Products.....	4	13	10	4	8	3	4	.....	.....	2	.....
Miscellaneous.....	8	7	4	2	8	2	1	2	1	2	.....
Per Capita Intake.....	629	657	661	652	634	468	582	514	649	607	763
Number of Records.....	257	369	462	362	372	285	238	422	351	1212	247
Percent Under NRC(4).....	99	100	99	100	100	99	100	100	99	100	100

TABLE 14.—PROPORTION OF CALCIUM FROM LOCAL  
AND IMPORTED FOODS  
By Village  
In Milligrams

Village	Number of Records	Mean Daily Intake	Local Foods	Import Foods	School Lunch	Vita- mins	Mixed Foods
<i>N. Central Athapascan</i>							
Huslia.....	369	657	39	609			9
Allakaket.....	257	629	52	481	79	9	8
<i>Northern Eskimo</i>							
Noatak.....	462	661	81	533	40		7
Point Hope.....	362	652	41	532	76		3
Shishmaref.....	372	634	68	448	112		6
Shungnak.....	285	468	75	342	42	2	7
<i>Southwestern Eskimo</i>							
Akiak.....	228	582	77	416	79		10
Napaskiak.....	422	514	108	332	69		5
Kasigluk.....	351	649	132	463	43		11
Hooper Bay.....	1212	607	105	453	44		5
Newtok.....	247	763	368	341	54		0

#### SOURCE OF CALCIUM IN THE DIET

On a per capita basis, dairy products, chiefly canned evaporated milk, and grain products, both imported, accounted for three-fourths or more of the total dietary calcium at eight of the Eskimo and both Athapascan Indian villages. At the remaining Eskimo village of Newtok, fish was almost equally important as a source of this nutrient (Table 13).

As a matter of fact, fish was the only outstanding calcium source of local origin in these diets. It appeared to be a significant source on southwestern Eskimo diets particularly, supplying from about one-tenth of the total per capita intake at Akiak to almost one-half at Newtok. One or both of two small fishes, blackfish and needlefish, the latter sometimes mixed with fingerling of smelts, are available in varying amounts throughout the winter and early spring in this area. These fish, eaten whole, are more important in the diet of adults than that of children.

The only other significant source of fish calcium in most of the study villages was fish heads, chiefly salmon and whitefish. The cooked fresh product is popular during the summer and fall fish runs. Dried fish heads are used mostly as dog feed.

Small spicules of bone adhering to the flesh of dried fish may also be a source of some calcium in the diet, particularly in the southwest where dried fish is eaten almost daily during the greater part of the year. Unfortunately, there was no accurate way of measuring and recording this source.

Animal blood was a minor source of calcium on the diets. Some of the records in which it appeared were collected at Hooper Bay at a time when fresh seal blood was being used in the preparation of special soups. It did not appear in any of the other village records.

Blood soups and gravies are apparently not used as often today in the Eskimo and Indian diet as they were in the past. Although they may still be used in time honored ways at the hunting camps, it was not possible to collect dietary records there.

Milk was, of course, the primary imported source of calcium. It accounted for about one-fourth of the calcium in adult female diets; one-fifth in those of the adult male; about one-half in adolescent diets; and for more than one-half in diets of the 2 to 6 year old child (Tables E-2 through E-5, Appendix).

Bread and cereal products were also good sources of calcium. Pilot Bread and Jersey Creams, two types of ship's crackers, provided some calcium; the former appeared in the diets frequently. In addition, baking powder containing calcium was used in the preparation of some of the homemade breads, particularly in the southwest Eskimo villages.

The question which most often came to mind when reviewing calcium intakes was: what was the probable intake level in aboriginal times? Comparison of the calcium content of adult female diets at Hooper Bay (southwestern Eskimo) and Point Hope (northern Eskimo) showed fairly comparable mean daily intake levels, but Hooper Bay women obtained more than three times as much from local foods, chiefly from whole blackfish and needlefish. If we assume that Hooper Bay women are still using these foods to the maximum of their availability then the calcium intake must have been still lower in the Point Hope diet where these particular fish are not available and other calcium sources are limited. It should be pointed out that even at Hooper Bay the above mentioned fish sources are not continuously available throughout the year, nor are they so abundant that significant supplies can be dried or otherwise preserved for off-season use (Table E-2, Appendix).

According to older Eskimos in all the study villages greater use was made in the past of foods such as animal blood (mainly seal and caribou), crushed animal bones, fish heads, wildfowl eggs

including the developing embryo, immature wildfowl, putrified fish products, stomach contents of moose and caribou and wild edible greens. These would have provided larger intakes of calcium for some Eskimos and Indians than they do in current diets. None of these foods, however, were constant or daily sources of dietary calcium but appeared on diets at specific seasons of the year, usually for relatively short periods. Even when available in storable quantities, they were used mostly as occasional food items. Further, the calcium present in some of the wild edible greens, such as sourdock, which contains oxalic acid, would not be completely available<sup>(20)</sup>.

## IRON

Mean daily iron intakes for all age groups and both sexes were well above the recommended levels. There was, however, a wide range in mean individual intakes—from less than 2 mg. to over 300 mg. daily. Adolescents of both sexes, and adult females had the highest percentage with intakes below the NRC standards (Table 15).

Data on iron intakes among children 2 to 5 years of age are presented separately in Table 16, in order to illustrate area dif-

TABLE 15.—IRON INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS  
All Areas and Villages, All Seasons, By Age and Sex

Age-Sex Category	Number of Records	Iron Intakes		
		Mean Daily Intakes (mg)	Intake Range (mg)	Percent Under NRC <sup>(4)</sup>
Adult male 20-60 yrs. ....	746	36.8	1.7-288.8	11.2
Adult Male 60 + yrs. ....	112	26.2	3.8-197.5	15.1
Male 13-19 yrs. ....	303	29.4	1.4-282.5	31.8
Adult Female 20-60 yrs. ....	633	31.5	1.7-194.9	18.2
Adult Female 60 + yrs. ....	120	24.1	2.0-119.5	39.5
Adult Female Pregnant. ....	121	32.7	4.0-175.2	36.8
Adult Female Lactating. ....	193	31.3	2.6-340.4	37.1
Female 13-19 yrs. ....	298	24.4	3.8-197.5	43.6
School child 7-12 yrs. ....	916	21.7	1.6-197.4	20.0
Preschool 2-6 yrs. ....	843	15.5	1.5-189.0	17.8

ferences in adequacy of intake. About one-third of the diets for the southwestern Eskimo child were iron deficient by NRC standards, while diets of the northern preschool child showed less deficiency.

The highest percentage of diet records showing a deficiency in iron was found in the southwestern tundra villages of Napaskiak and Kasigluk where fish was the primary source of protein (Tables 17 and 18).

Scott et al<sup>(21)</sup> and Porter and Scott<sup>(22)</sup> found that the hemoglobin levels in both southwestern and northern Eskimo men and women were generally below accepted standards. The ICNND survey team<sup>(23)</sup> also found this to be true. In general, Scott and Heller<sup>(24)</sup> found iron therapy ineffective in raising hemoglobin levels except for a few cases in southwestern Alaska.

The consequences of the high iron intakes found in some of these diets are not known.

### SOURCE OF IRON IN THE DIET

Meat was the major source of this nutrient at all the northern villages. It was a good but more limited source at Akiak, Hooper Bay, and Newtok in the Southwest. At the two remaining villages—Napaskiak and Kasigluk—the use of meat was limited to short seasonal periods when mink and wildfowl were available. For the major portion of the year the chief protein food was fish, much of it quite low in iron content.

There are, however, two small fishes—blackfish and needlefish—which are good sources of iron since they are eaten whole.

TABLE 16.—IRON INTAKES OF THE ALASKAN ESKIMO AND INDIAN CHILD 2-5 YEARS OF AGE  
By Area  
In Milligrams

Area	Number of Records	Iron Intake		
		Mean Daily Intake	Intake Range	Percent Under NRC(4)
Southwestern Eskimo.....	347	11.9	1.5-98.3	34
Northern Eskimo.....	197	23.7	3.8-88.1	5
Northcentral Athapascan.....	102	13.9	2.6-44.9	9
Totals.....	646	14.7	1.5-98.3	22

TABLE 17.—PROPORTION OF IRON FROM SELECTED FOOD GROUPS  
All Age and Sex Groups, All Seasons, By Village  
In Milligrams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allaka- ket	Huslia	Noatak	Point Hope	Shish- maref	Shung- nak	Akiak	Napask- iak	Kasig- luk	Hooper Bay	Newtok
Dairy.....	0.2	0.3	0.4	0.3	0.4	0.2	0.3	0.1	0.2	0.2	0.2
Egg.....	0.2	0.2	.....	0.3	0.3	.....	0.1	.....	.....	0.2	0.3
Meat.....	10.7	8.2	17.6	29.4	48.7	20.9	7.9	1.5	1.8	14.7	7.4
Fish.....	0.7	0.4	2.6	0.3	0.6	0.8	2.5	2.5	3.7	3.2	8.5
Fats as such.....	.....	0.1	0.1	0.2	.....	.....	.....	.....	.....	.....	.....
Fruits.....	1.3	0.4	0.7	0.3	1.2	0.5	0.3	0.2	0.3	0.3	.....
Vegetables.....	0.5	0.9	0.5	0.6	0.9	0.6	0.7	0.2	0.2	0.4	0.4
Breads & Cereals.....	7.3	4.1	4.1	6.0	2.6	2.9	3.1	5.3	6.8	6.0	3.4
Sugar Products.....	0.2	1.0	0.5	0.3	0.7	0.2	0.3	.....	.....	0.1	.....
Miscellaneous.....	0.3	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	.....
Per Capita Intake.....	21.4	15.8	26.6	37.8	55.6	26.2	15.3	9.9	13.1	25.2	20.2
Number of Records.....	257	369	462	362	372	285	228	422	351	1212	247
Percent Under NRC (*).....	21	15	11	9	6	12	35	63	47	26	41

TABLE 18.—PROPORTION OF IRON FROM LOCAL  
AND IMPORTED FOODS  
All Age and Sex Groups, All Seasons, By Village  
In Milligrams

Village	Number of Records	Per Capita Intake	Iron Supply				
			Local Foods	Import Foods	School Lunch	Vita- mins	Mixed Foods
<i>N. Central Athapascan</i>							
Allakaket.....	257	21.4	7.3	7.3	.....	6.1	0.7
Huslia.....	369	15.8	7.1	7.9	.....	.....	0.8
<i>Northern Eskimo</i>							
Point Hope.....	362	37.8	27.9	7.5	0.5	.....	1.9
Noatak.....	462	26.6	18.2	5.6	0.4	.....	2.4
Shishmaref.....	372	55.6	48.7	5.2	1.2	.....	0.5
Shungnak.....	285	26.2	19.5	4.1	0.6	0.1	1.9
<i>Southwestern Eskimo</i>							
Akiak.....	228	15.3	8.7	4.6	0.5	.....	1.5
Napaskiak.....	422	9.9	3.8	5.4	0.5	.....	0.2
Kasigluk.....	351	13.1	5.1	6.9	0.5	.....	0.6
Hooper Bay.....	1212	25.2	17.4	6.7	0.4	.....	0.7
Newtok.....	247	20.2	16.1	3.6	0.5	.....	.....

One or both are available during part of the winter at all southwestern villages.

The richest source of iron in these diets was the flesh of the various sea mammals: seal, ugruk, beluga whale, bowhead whale and walrus. The muscular tissue of these diving animals has a very high myoglobin content and therefore a high iron content. The use of these animals accounts for most of the extraordinarily high iron intake levels found in some of these diets. In general, these animals were an important food source only in coastal villages—Point Hope, Shishmaref and Hooper Bay—or villages whose inhabitants spend a significant part of the year on the coast (Noatak and Newtok). They were the most important meat source in the year round diet at Point Hope and Shishmaref.

Bread and cereal products were the only other significant sources of iron in these diets. The homemade breads were made with enriched flour; oatmeal was the most popular of the breakfast cereals; and macaroni, also made with enriched flour, was commonly used as a soup ingredient.

Local foods are still the major source of iron in the diets of all age groups and both sexes (Tables F-1 through F-3, Appendix).

## VITAMIN A

Mean daily intakes of vitamin A were more than adequate in all age and sex categories, except for pregnant and lactating women (Table 19).

Individual mean daily intakes of this vitamin, however, were extremely variable—from a low of 40 to a high of 124,308 I.U. indicating that although there were excellent sources of vitamin A they were not consistently available throughout the year. A comparison of seasonal intake levels reveals that mean daily intakes during summer were significantly lower than at other seasons and that they were often below the National Research Council recommended intake levels. Mean daily intakes for adolescent boys and girls and for children 7 to 12 years of age were highest during the winter months. The greater share of their increased intakes at this season came from a multiple vitamin preparation given to those attending school in the Eskimo villages. Although the mean intake levels for the groups as a whole were found adequate, about 33 percent of the diets for the 7 to 12 year old children and 85 percent of those for lactating women were deficient in vitamin A content when compared with NRC recommendations (Table 19 and G-1, Appendix).

TABLE 19.—VITAMIN A INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS  
All Areas and Villages, All Seasons, By Age and Sex Level

Age-Sex Category	Number of Records	Vitamin A Intake		
		Mean Daily Intake (I.U.)	Intake Range (I.U.)	Percent Under NRC(*)
Adult male 20-60 yrs.....	746	6800	83-106758	50.4
Adult male 60 + yrs.....	112	6459	583-31109	48.7
Male 13-19 yrs.....	303	7203	605-84882	47.4
Adult female 20-60 yrs.....	633	6445	241-124308	57.3
Adult female 60 + yrs.....	120	5279	605-27852	65.3
Adult female Pregnant.....	121	6292	355-31166	66.4
Adult female Lactating.....	193	4904	151-28919	85.3
Female 13-19 yrs.....	298	6587	583-31109	42.3
School child 7-12 yrs.....	916	6463	17-37383	36.7
Preschool 2-6 yrs.....	843	3771	40-33064	43.0

TABLE 20.—PROPORTION OF VITAMIN A FROM SELECTED FOOD GROUPS  
All Age and Sex Groups, All Seasons, By Village  
In International Units

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
Dairy.....	482	563	588	508	533	295	494	344	342	352	292
Egg.....	95	113	33	143	155	50	55	51	.....	119	115
Meat.....	1031	1659	1116	3458	3262	2012	851	183	112	1003	626
Fish.....	1088	325	2112	304	877	1135	988	1542	2826	1798	1764
Fats as such.....	515	477	1062	644	1409	959	536	862	132	317	1157
Fruits.....	1111	233	340	186	1276	395	330	246	406	281	29
Vegetables.....	236	430	741	81	2142	508	298	14	122	1344	.....
Breads and Cereal.....	123	137	51	74	33	25	37	8	10	30	.....
Sugar Products.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous*	43	4	641	799	1409	890	988	998	939	729	798
Per Capita Intake.....	4729	3941	6684	6197	11096	6269	4577	4248	4889	5973	4781
No. of Records.....	257	369	462	362	372	285	228	422	351	1212	247
Percent Under NRC <sup>(1)</sup> .....	59	65	31	44	10	37	58	76	46	48	59

\* Includes vitamin preparations.

Since prolonged dietary deficiencies in the early years of life may have a profound effect on the growth rate and well being of the child, it was considered important to determine the vitamin A adequacy of the young child's diet at various age levels (2 to 3, 4 to 5 and 6 years).

Southwest Eskimo children were found to have the highest rate of deficiency. More than half of the diet records of Southwest Eskimo children 2 to 5 years of age were deficient in vitamin A. Although deficiency decreased at the 6 year age level, it was still higher in this area than in the North (Table G-2, Appendix).

## **SOURCE OF VITAMIN A**

At the village level meat, fish, fats 'as such', fruits, vegetables, and dairy products provided most of the vitamin A. Meat was an important source in the North; fish in the Southwest. These two foods combined contributed from 40 to 60 percent of the total vitamin A intake with 90 percent or more from local foods. In addition, a portion of the vitamin A from fats 'as such' also came from these two food products. In adult male and female diets, almost three-fourths of the vitamin A from fats 'as such' was of local origin, most of it being derived from sea mammal oils. When handled carefully to prevent rancidity, these oils are a good source of vitamin A.

Sea mammal oils were in greater supply at the coastal villages. Some of the vitamin A attributed to fish and most of it from the fruit category actually came from this source as seal oil is often used in special preparations of these foods.

Seal and fish livers are other excellent local sources of vitamin A and salmon is the best fish source of this nutrient. In the southwest village of Napaskiak salmon appeared almost daily on the diet throughout the greater part of the year. It was an important vitamin A source, although to a lesser extent, in the other southwest villages except Newtok.

The most popular fish liver sources of this nutrient were whitefish (Kasigluk), pike (Akiak), blackfish (all 5 southwest villages), ling cod (often called mudshark at Shungnak), and tom cod liver (Hooper Bay and Newtok).

Milk was a moderate source of vitamin A at most villages but vegetables were important at only two villages—Shishmaref and Hooper Bay. Sourdock was an important green vegetable in both villages, and willow leaves provided an additional source in Shishmaref. The use of canned vegetables was limited in all vil-

lages but they appeared more frequently in Indian than in Eskimo diets. The preferred canned vegetable was corn.

A multiple vitamin preparation, given school children as part of the school lunch in Eskimo villages, was an important source of vitamin A for them. Occasionally vitamin preparations were used by other family members but only on an erratic basis. Most of the vitamin A in home diets in Allakaket was obtained from such preparations, due to the efforts of the resident missionary nurse who dispensed them and encouraged their use.

The percentage of diets deficient in vitamin A was fairly high in all villages except Shishmaref. In addition to the greens already mentioned this village had excellent supplies of ugruk oil which they used generously throughout the year. This village obtained twice as much or more vitamin A from local food resources than the other villages (Tables 20 and 21).

Local foods were the major source of vitamin A in adult diets. They accounted for about one-third of the vitamin A in the adolescent's and the school child's diets—and for about one-half of it in the 2 to 6 year old child's diet (Tables G-3 through G-5, Appendix).

TABLE 21.—PROPORTION OF VITAMIN A FROM LOCAL AND IMPORTED FOODS  
All Age and Sex Groups, All Seasons, By Village  
In International Units

Village	Number of Records	Per Capita Intake	Vitamin A Source				
			Local Foods	Import Foods	School Lunch*	Vita-mins**	Mixed Foods
<i>Northcentral Athapascan</i>							
Allakaket.....	257	4729	1393	1732	4	1460	140
Huslia.....	369	3941	1628	1889	.....	243	181
<i>Northern Eskimo</i>							
Point Hope.....	362	6197	3928	1055	900	110	204
Noatak.....	462	6684	3963	1020	1012	560	129
Shishmaref.....	372	11096	7085	1960	1872	30	149
Shungnak.....	285	6269	3437	1111	939	611	171
<i>Southwestern Eskimo</i>							
Akiak.....	228	4577	1734	1011	1507	64	261
Napaskiak.....	422	4248	1730	988	1322	.....	208
Kasigluk.....	351	4889	2868	439	1180	46	356
Hooper Bay.....	1212	5973	3941	541	1092	103	296
Newtok.....	247	4781	3464	322	917	63	15

\* Includes pharmaceutical source given at school.

\*\* Pharmaceutical source given at home.

The ICNND nutrition survey team<sup>(23)</sup> found very few of those tested with deficient or low serum vitamin A and carotene values.

## THE B-VITAMINS

The results of the thiamine, riboflavin and niacin excretion tests performed by the ICNND survey team<sup>(23)</sup> indicate that most had values within the "acceptable" or "high" range. Newtok people, who were subsisting almost entirely on stored dried fish products at the time of the ICNND visit, had the lowest recorded values for thiamine. Our study shows that the mean per capita intake of thiamine was also lowest at this village (Table 23).

### I. Thiamine

The mean daily thiamine intake for all age and sex groups was equal to or exceeded that recommended by the National Research Council. However, about one-third of the diets of children 7 to 12 years of age, and almost three-fourths of those for lactating women were deficient by these standards. As in the case of some of the other nutrients, although some excellent sources of thiamine were available their availability was not consistent (Table 22).

TABLE 22.—THIAMINE INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS  
All Areas and Villages, All Seasons by Age and Sex

Age-Sex Category	Number of Records	Thiamine Intake		
		Mean Daily Intake (mg.)	Intake Range (mg.)	Percent Under NRC(4)
Adult male 20-60 yrs. ....	746	1.625	.035-13.906	55.1
Adult male 60 + yrs. ....	112	1.308	.048-6.700	58.8
Male 13-19 yrs. ....	303	2.160	.245-5.847	45.8
Adult Female 20-60 yrs. ....	633	1.399	.073-10.603	44.4
Adult Female 60 + yrs. ....	120	1.188	.208-11.088	54.8
Adult Female Pregnant. ....	121	1.573	.274-10.124	56.0
Adult Female Lactating. ....	193	1.462	.032-4.977	70.1
Female 13-19 yrs. ....	298	2.088	.048-6.700	37.1
School Child 7-12 yrs. ....	916	2.140	.035-5.609	32.5
Preschool 2-6 yrs. ....	843	1.210	.033-5.075	37.5

TABLE 23.—PROPORTION OF THIAMINE FROM SELECTED FOOD GROUPS  
All Age and Sex Groups, All Seasons, By Village  
In Milligrams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allaka- ket	Huslia	Noatak	Point Hope	Shish- maref	Shung- nak	Akiak	Napask- iak	Kasig- luk	Hooper Bay	Newtok
	Dairy.....	.131	.072	.069	.065	.073	.040	.053	.030	.050	.039
Egg.....	.008	.007	.002	.012	.012	.004	.003	.001	.....	.010	.010
Meat.....	.384	.289	.482	.435	.392	.631	.228	.052	.034	.156	.108
Fish.....	.265	.082	.115	.017	.111	.234	.342	.452	.545	.352	.134
Fats as such.....	.004	.017	.015	.007	.010	.004	.007	.....	.....	.002	.001
Fruits.....	.060	.023	.043	.010	.048	.022	.036	.016	.027	.046	.005
Vegetable.....	.045	.069	.023	.031	.051	.038	.043	.006	.011	.021	.009
Breads & Cereals.....	.952	.549	.593	.722	.351	.411	.541	.547	.685	.668	.426
Sugar Products.....	.004	.002	.003	.005	.001	.002	.003	.....	.....	.....	.....
Miscellaneous.....	.024	.009	.301	.394	.656	.442	.462	.340	.418	.334	.370
Per Capita Intake.....	1.877	1.119	1.646	1.698	1.705	1.828	1.718	1.444	1.770	1.628	1.097
Percent Under NRC (*).....	52	63	35	38	44	38	43	54	33	43	78
No. of Records.....	257	369	462	362	372	285	228	422	351	1212	247

## SOURCE OF THIAMINE

Analysis of per capita village sources revealed that imported foods were a major source of this nutrient in most Eskimo and Indian diets, primarily from bread and cereal products. They provided from about one-fourth of the total per capita intake in Shungnak to about one-half of it in Allakaket (Tables 23 and 24).

Meat and fish were the chief local sources of this nutrient. Meats were the important source in the north, and fish in the southwestern villages.

Vitamin preparations were a major source of thiamine in the Eskimo villages (coded under miscellaneous on Table 23), but only for the child who received a multiple vitamin preparation in the school lunch program.

From our records, it appeared that neither meat nor fish was an outstanding thiamine source in Newtok. However, very few records were collected at the time of the year when meat was available in this area. Yet, muskrat, seal and wildfowl were seasonally important foods in this village. Most of the Newtok diet records were collected in late fall and winter when dried or "poke" fish (herring) were the most common protein foods, accounting

TABLE 24.—PROPORTION OF THIAMINE FROM LOCAL AND IMPORTED FOODS  
All Age and Sex Groups, All Seasons, By Village

Village	Number of Records	Per Capita Intake	Thiamine Source				
			Local Foods	Import Foods	School Foods	Vita-mins*	Mixed Foods
<i>N. Central Athapascan</i>							
Allakaket.....	257	1.877	0.327	0.653	0.021	0.844	0.032
Huslia.....	369	1.119	0.288	0.694	.....	0.105	0.032
<i>Northern Eskimo</i>							
Point Hope.....	362	1.698	0.409	0.808	0.418	0.032	0.031
Noatak.....	462	1.646	0.495	0.644	0.317	0.104	0.086
Shishmaref.....	372	1.705	0.489	0.468	0.705	0.009	0.034
Shungnak.....	285	1.828	0.691	0.420	0.452	0.195	0.070
<i>Southwestern Eskimo</i>							
Akiak.....	228	1.718	0.521	0.630	0.509	.....	0.058
Napaskiak.....	422	1.444	0.494	0.569	0.362	.....	0.019
Kasigluk.....	351	1.770	0.563	0.716	0.422	0.018	0.051
Hooper Bay.....	1212	1.628	0.492	0.689	0.347	0.055	0.045
Newtok.....	247	1.097	0.238	0.444	0.403	0.011	0.001

\* From vitamin preparations taken at home. Those given at school are included under school.

for three-fourths of the total protein intake on adult diets (Tables 23 and 24).

Unequal distribution and use of local food resources throughout the year probably accounts for some of the variable thiamine intakes in all villages. High intakes were recorded more frequently when supplies of fresh meat were abundant. Fresh foods are especially relished after prolonged periods of dried products on the menu, or when rations have been limited for some time. When first plentiful, the fresh foods are often eaten in larger than normal quantities. Extremely low thiamine intakes occurred chiefly in the southwest tundra villages, usually during periods when dried fish was the major protein food. In this area fish provided from about 46 percent of the total protein at Akiak to about 83 percent at Kasigluk. In contrast, at the northern villages fish protein provided as little as 9 percent of the total at Point Hope to about 36 percent at Noatak.

Several of the food fishes used in significant amounts on southwestern Eskimo diets, namely blackfish, herring and smelts, were found to be low in thiamine. The most common specie of herring used in Alaskan Eskimo diets, *Chupea harrengus*, has been found to contain thiaminase, the enzyme which destroys thiamine. Certain species of whitefish, smelt and ling cod, belonging to the same genus as those found in Alaska have also been found to contain the enzyme<sup>(25)</sup>. This is of particular interest since some of these fish are usually eaten raw frozen or raw dried. In southwest Eskimo diets, for example, one-half or more of the fish protein came from the raw, dried product (Napaskiak-salmon, Kasigluk-salmon and whitefish, Newtok-herring), mostly the fillet portion although the skin was also eaten. At Hooper Bay and Akiak one-fourth or more of the fish protein came from the raw, frozen product, the greater share of it from a combination of whitefish, blackfish, or needlefish. At the northern villages of Allakaket, Noatak and Shungnak, approximately one-third of the protein came from fish and at Allakaket and Shungnak one-half or more of it came from the raw product (Table 76, Chapter V).

According to the ICNND Study<sup>(23)</sup>, urinary thiamine excretion values were found to be within the acceptable to high range except for women at the tundra village of Newtok who had extreme low values. Generally, the values for children were higher than for adults in all study villages except at the two Indian villages of Huslia and Allakaket. The multiple vitamin preparation given the Eskimo children as part of their school lunch undoubtedly accounted for this.

The only significant regional differences in thiamine intake

noted in the 2 to 6 year age group were (1) occasional extremely low thiamine intakes in the southwestern area, especially in Newtok as has been pointed out and (2) much lower mean daily intakes and higher percentages of deficiency among Athapascan Indian children at the six year age level. The school lunch served at the Eskimo schools and the multiple vitamin preparation given them probably accounts for their higher mean daily intake (Table H-1, Appendix).

Imported foods accounted for over half of the mean daily thiamine intake at all age and sex levels. Breads and cereal products were the most important source for all groups except children attending school. For them pharmaceutical vitamin preparations contributed the greatest amount. The only other significant thiamine sources were meat and fish which served as important sources for all age and sex groups, but especially for the adult male (Tables H-2 and H-3, Appendix).

## II. Riboflavin

Mean daily intakes of riboflavin at the various age levels and for both sexes were also more than adequate when compared with the National Research Council recommended allowances.

TABLE 25.—RIBOFLAVIN INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS  
All Areas and Villages, All Seasons, By Age and Sex  
In Milligrams

Age-Sex Category	Number of Records	Riboflavin Intake		
		Mean Daily Intake (mg)	Intake Range (mg)	Percent Under NRC(*)
Adult male 20-60 yrs.....	746	2.990	.357-17.372	28.9
Adult male 60 + yrs.....	112	2.541	.488-9.329	36.1
Male 13-19 yrs.....	303	3.122	.201-10.312	40.6
Adult Female 20-60 yrs.....	633	2.625	.309-11.231	25.7
Adult Female 60 + yrs.....	120	2.093	.388-11.365	44.4
Female Pregnant.....	121	2.727	.528-11.688	41.6
Female Lactating.....	193	2.481	.447-10.124	61.4
Female 13-19 yrs.....	298	2.922	.488-9.329	37.5
School Child 7-12 yrs.....	916	2.981	.250-7.975	25.6
Preschool 2-6 yrs.....	843	1.914	.306-7.483	25.6

**TABLE 26.—PROPORTION OF RIBOFLAVIN FROM SELECTED FOOD GROUPS  
All Age and Sex Groups, All Seasons, By Village  
In Milligrams**

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaakiak	Kasigluk	Hooper Bay	Newtok
	Dairy.....	.697	.494	.370	.470	.529	.267	.423	.242	.358	.312
Egg.....	.020	.021	.006	.030	.038	.008	.011	.006	.....	.028	.025
Meat.....	.667	.603	1.333	1.518	1.441	2.449	.540	.102	.091	.415	.276
Fish.....	.354	.108	.671	.161	.158	.353	.870	.572	1.124	.730	1.302
Fats.....	.002	.009	.006	.006	.006	.004	.005	.....	.....	.....	.....
Fruits.....	.074	.017	.026	.012	.057	.023	.019	.016	.024	.027	.005
Vegetables.....	.028	.047	.020	.018	.095	.026	.033	.006	.007	.058	.008
Breads et al.....	.428	.288	.243	.430	.192	.214	.352	.352	.426	.403	.279
Sugars et al.....	.004	.005	.006	.006	.003	.004	.005	.....	.....	.....	.....
Miscellaneous.....	.025	.016	.211	.379	.649	.410	.469	.347	.419	.330	.378
Per Capita Intake.....	2.299	1.608	2.892	3.030	3.168	3.758	2.727	1.643	2.449	2.303	2.534
No. of Records.....	257	369	462	362	372	285	228	422	351	1212	247
Percent Under NRC (*).....	44	57	2	16	13	11	20	64	28	31	34

However, one-fourth or more of the riboflavin intakes for all age groups and both sexes were below the National Research Council recommendations, with lactating women having the highest per cent deficiency by these standards (Table 25).

### Source of Riboflavin in the Diet

Meat was the major source of this nutrient in the northern villages and fish in the Southwest. Milk and bread products were also significant sources of this nutrient in most villages although their use varied from village to village. Judicious use of four food groups—milk, meat, fish and bread products—should assure an adequate intake for all age and sex groups. The use of dried milk powder in the preparation of the varieties of homemade bread, including hotcakes, would be particularly desirable in villages like Napaskiak, where the supply of fresh meat and fish products is limited during the greater part of the year (Tables 26 and 27).

Pharmaceutical vitamin preparations were an important source of this vitamin for the Eskimo school child (Tables I-1 through I-3, Appendix).

TABLE 27.—PROPORTION OF RIBOFLAVIN FROM LOCAL AND IMPORTED FOODS  
All Age and Sex Groups, All Seasons, By Village  
In Milligrams

Village	Number of Records	Per Capita Intake	Riboflavin Source				
			Local Foods	Import Foods	School Lunch	Vitamins	Mixed Foods
<i>Northcentral Athapascan</i>							
Allakaket.....	257	2.299	0.634	0.735	0.120	0.757	0.053
Huslia.....	369	1.608	0.575	0.889	.....	0.088	0.056
<i>Northern Eskimo</i>							
Noatak.....	462	2.892	1.808	0.620	0.179	0.059	0.226
Point Hope.....	362	3.030	1.559	0.862	0.458	0.032	0.119
Shishmaref.....	372	3.168	1.606	0.686	0.792	0.008	0.076
Shungnak.....	285	3.758	2.359	0.452	0.486	0.249	0.242
<i>Southwestern Eskimo</i>							
Akiak.....	228	2.727	1.288	0.756	0.580	.....	0.103
Napaskiak.....	422	1.643	0.657	0.521	0.437	.....	0.028
Kasigluk.....	351	2.449	1.174	0.732	0.462	0.015	0.066
Hooper Bay.....	1212	2.303	1.150	0.669	0.383	0.052	0.049
Newtok.....	247	2.534	1.585	0.477	0.460	0.011	0.001

### III. Niacin

Mean daily niacin intakes were high for all age groups and both sexes, and relatively few diets showed deficiencies of this nutrient (Table 28).

Meat was the major source of niacin in northern diets and fish in those of the Southwest. Bread products contributed significantly to the total intake in all villages since enriched flour was used in the preparation of the homemade varieties (Tables 29 and 30). Pharmaceutical vitamin preparations were an important source but their use was largely confined to the Eskimo child of school age (Tables J-1 through J-3, Appendix).

### ASCORBIC ACID

Mean ascorbic acid intakes below National Research Council recommendations were high at all age and sex levels. Three-fourths or more of all diets were deficient by these standards (Table 31). A review of the ascorbic acid intake level in the diet of the child aged 2 to 5 years, revealed that deficiencies were high in all three geographical areas but that the percent with "no" ascorbic acid was highest among southwest Eskimos (36 percent) (Table 32).

TABLE 28.—NIACIN INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS  
All Areas and Villages, All Seasons, By Age and Sex

Age-Sex Category	Number of Records	Niacin Intake		
		Mean Daily Intakes (mg)	Intake Range (mg)	Percent Under NRC(*)
Adult male 20-60 yrs. ....	746	41.1	8.6-136.8	10.3
Adult male 60 + yrs. ....	112	35.3	4.7-96.2	13.4
Male 13-19 yrs. ....	303	37.4	6.2-102.7	15.9
Adult Female 20-60 yrs. ....	633	34.6	6.8-131.7	10.7
Adult Female 60 + yrs. ....	120	29.2	8.8-119.0	15.3
Adult Female Pregnant. ....	121	37.9	10.1-112.1	15.2
Adult Female Lactating. ....	193	37.4	28.4-158.8	11.7
Female 13-19 yrs. ....	298	32.6	4.7-96.2	10.4
School Child 7-12 yrs. ....	916	30.2	3.9-77.3	10.9
Preschool 2-6 yrs. ....	843	19.9	1.6-85.5	13.0

TABLE 29.—PROPORTION OF NIACIN FROM SELECTED FOOD GROUPS  
All Age and Sex Groups, All Seasons, By Village  
In Milligrams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Hushia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
Dairy.....	0.4	0.3	0.4	0.3	0.4	0.2	0.3	0.1	0.3	0.2	0.2
Eggs.....											
Meat.....	13.3	12.1	13.7	16.0	20.8	18.2	10.4	2.2	1.5	7.9	4.7
Fish.....	8.0	3.8	10.9	1.3	2.5	9.5	16.5	24.9	28.7	12.7	15.4
Fats.....	0.1	0.1	0.2	0.2	0.2	0.1	0.2				
Fruits.....	0.7	0.3	0.5	0.2	0.9	0.3	0.2	0.2	0.5	0.3	
Vegetables.....	0.5	0.9	0.3	0.3	0.6	0.5	0.7	0.1	0.1	0.3	0.1
Breads.....	5.4	3.4	4.6	5.9	2.6	3.4	3.4	5.1	6.9	6.3	4.7
Sugar.....		0.1	0.3				0.1				
Miscellaneous.....	0.4	0.2	1.9	2.6	4.4	2.5	3.0	2.3	2.8	2.2	2.5
Per Capita Intake.....	28.8	21.2	32.8	26.8	32.4	34.7	34.8	34.9	40.8	29.9	27.6
Number of Records.....	257	369	462	362	372	285	228	422	351	1212	247
Percent Under NRC(*).....	23	22	11	23	13	8	10	7	3	21	22

TABLE 30.—PROPORTION OF NIACIN FROM LOCAL AND IMPORTED FOODS  
All Age and Sex Groups, All Seasons, By Village  
In Milligrams

Village	Number of Records	Per Capita Intake	Niacin Intake				
			Local Foods	Import Foods	School Lunch	Vita-mins	Mixed Foods
<i>N. Central Athapascan</i>							
Allakaket.....	257	28.8	16.5	6.1	0.1	5.4	0.7
Huslia.....	369	21.2	13.9	5.9	.....	0.7	0.7
<i>Northern Eskimo</i>							
Point Hope.....	362	26.8	15.6	6.9	2.9	0.3	1.1
Noatak.....	462	32.8	21.8	5.9	2.1	0.7	2.3
Shishmaref.....	372	32.4	22.5	4.2	4.8	0.1	0.8
Shungnak.....	285	34.7	24.1	3.9	3.4	1.3	2.0
<i>Southwestern Eskimo</i>							
Akiak.....	228	34.8	25.6	4.7	3.6	.....	0.9
Napaskiak.....	422	34.9	26.8	5.2	2.5	.....	0.4
Kasigluk.....	351	40.8	29.5	6.9	3.0	0.1	1.3
Hooper Bay.....	1212	29.9	19.5	6.2	2.5	0.3	1.4
Newtok.....	247	27.6	19.8	4.9	2.8	0.1	.....

It should be pointed out that our figures are based on 'measurable' ascorbic acid only. The flesh and vital organs of both sea and land mammals, in many of these diets, may be a source of this nutrient. They should have ascorbic acid values at least equivalent to that normally present in the blood of the particular species used. There is at present no satisfactory method for determining the ascorbic acid content of these products.

Fall and summer diets had the highest ascorbic acid content. During these seasons the mean daily intake for children 2 to 6 years of age was equal to that recommended by the National Research Council. This was not true of other age groups whose diets showed a high rate of deficiency at all seasons (Table K-1, Appendix).

Boys and girls age 7 to 19 had the highest mean daily intakes during the winter season, equal to twice that for adults. The majority of children in this age group were attending village schools. In the Eskimo villages, a multiple vitamin preparation was included as part of the school lunch program. Most of the ascorbic acid credited specifically to the school lunch was from this source. Except in the Indian village of Allakaket such vitamin preparations were not an important ascorbic acid source in the

TABLE 31.—ASCORBIC ACID INTAKES ON ALASKAN  
ESKIMO AND INDIAN DIETS  
All Areas and Villages, All Seasons, By Age and Sex  
In Milligrams

Age-Sex Category	Number of Records	Ascorbic Acid Intake		
		Mean Daily Intake (mg)	Intake Range (mg)	Percent Under NRC(*)
Adult male 20-60 yrs.....	746	30	0-388	86.6
Adult male 60 + yrs.....	112	24	0-392	86.6
Male 13-19 yrs.....	303	47	0-387	86.4
Adult Female 20-60 yrs.....	633	31	0-301	84.9
Adult Female 60 + yrs.....	120	23	0-294	94.4
Adult Female Pregnant.....	121	32	0-456	90.4
Adult Female Lactating.....	193	28	0-441	97.0
Female 13-19 yrs.....	298	49	0-392	85.0
School Child 7-12 yrs.....	916	44	0-442	75.1
Preschool 2-6 yrs.....	843	30	0-441	75.8

home. At Allakaket they provided almost half of the per capita village intake of this vitamin.

Mean per capita intakes of ascorbic acid by village were extremely variable. The highest values, and they were fairly comparable, were at three widely separated villages—Allakaket, Shishmaref and Hooper Bay. At the latter village more than three-fourths of the ascorbic acid came from local food sources; these sources provided about one-half of the total intake in Shishmaref. In both villages wild edible greens and berries are available in good quantities most years. At Shishmaref many families still store good supplies of greens, chiefly willow leaves and sourdock. At Hooper Bay only small amounts of greens are stored for winter use, but most families manage to store considerable quantities of cloudberry. These foods provided four-fifths of the per capita ascorbic acid in Hooper Bay diets and about one-half at Shishmaref. These two villages had the highest per capita ascorbic acid intake—about 50 mg. (Table 34).

Local foods appeared to be a negligible source of ascorbic acid at Point Hope. Wild edible greens, mostly from *Parrya nudicaulis* at the village site, and sourdock at inland camp sites, and berries are used nowadays in minimal amounts only. Point

TABLE 32.—ASCORBIC ACID INTAKES OF ALASKAN  
ESKIMO AND INDIAN CHILDREN 2-5 YEARS OF AGE  
By Area, By Age Level

Geographical Area	Number of Records	Number and Intake Level			
		No Measurable Ascorbic Acid	Under 15 mg.	Total Under NRC(4)	Percent Under NRC(4)
Northcentral Athapascan . . . . .	102	2	56	76	75
Northern Eskimo . . . . .	197	42	127	159	81
Southwestern Eskimo . . . . .	347	126	211	274	78
Total . . . . .	646	170	394	509	79

Hope, however, has about the best year-round supply of fresh meat products of any of the 11 study villages. Seal, ugruk, bow-head whale, polar bear, caribou, wild fowl and in some years, beluga whale and walrus are available. At any given time throughout the year, one or more of these foods is usually available fresh (Table 34).

In spite of the dietary changes that have taken place, scurvy is rarely seen. The very few cases reported in the past two decades have been in neglected infants.

From a comparison of ascorbic acid sources among the various age groups and for both sexes, we find that local foods provided most of the adult intake of this vitamin. Local foods provided about one-half of the intake of adolescent females and children 2 to 6 years of age. About one-third of the total ascorbic acid intake of youngsters 7 to 12 years and of males 13 to 19 years of age came from these foods. Multiple vitamin preparations given at school (in Eskimo villages only) provided almost half of the ascorbic acid in the diets of children 7-19 years of age (Tables K-1 through K-4, Appendix).

The ICNND survey team<sup>(23)</sup> found that about one-third of those tested in southwest Alaska and about one-tenth of those tested in northern Alaska had low serum ascorbic acid values. Over half of the individuals tested at Kasigluk, and about one-third each at Newtok and Hooper Bay and approximately one-fourth each at Akiak, Point Hope and Huslia, had serum ascorbic acid values of less than 0.2 mg/100 ml.

**TABLE 33.—PROPORTION OF ASCORBIC ACID FROM SELECTED FOOD GROUPS**  
**All Age and Sex Groups, All Seasons, By Village**  
**In Milligrams**

Food Group	Northcentral Athapascan		Northern Eskimo			Southwestern Eskimo					
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
	Dairy.....	0.5	0.4	0.2	0.3	0.3	0.1	0.3	0.2	0.3	0.3
Eggs.....											
Meat.....	0.3	0.1	0.1	1.0	0.1	0.2	0.5	0.3			
Fish.....									1.5	0.1	
Fats as such.....											
Fruits.....	36.8	6.2	31.0	2.5	21.4	10.2	17.5	7.3	15.4	43.0	3.4
Vegetable.....	5.0	6.9	5.8	2.2	17.8	4.3	6.5	0.5	1.2	5.9	
Breads and Cereals.....											
Sugar Products.....											
Miscellaneous.....	6.0	3.3	6.0	6.9	12.3	9.1	9.1	6.7	7.6	5.9	6.6
Per Capita Intake.....	49	17	43	13	52	24	34	15	26	55	10
Number of Records.....	257	369	462	362	372	285	228	422	351	1212	247
Percent Under NRC(*).....	72	96	77	98	72	90	80	97	90	70	96

TABLE 34.—PROPORTION OF ASCORBIC ACID FROM  
 LOCAL AND IMPORTED FOODS  
 All Age and Sex Groups, All Seasons, By Village  
 In Milligrams

Village	Number of Records	Mean Per Capita Intake	Ascorbic Acid Source			
			Local Foods#	Import Foods	School Lunch*	Vita- mins**
<i>Northcentral Athapaskan</i>						
Allakaket.....	257	49	5	24	.....	20
Huslia.....	369	17	3	11	.....	3
<i>Northern Eskimo</i>						
Point Hope.....	362	13	1	4	7	1
Noatak.....	462	43	22	9	10	2
Shishmaref.....	372	52	27	8	16	1
Shungnak.....	285	24	4	4	11	5
<i>Southwestern Eskimo</i>						
Akiak.....	228	34	16	5	13	.....
Napaskiak.....	422	15	6	2	7	.....
Kasigluk.....	351	26	15	2	8	1
Hooper Bay.....	1212	55	44	2	8	1
Newtok.....	247	10	3	<1	7	<1

\* Includes vitamin preparations given at school.

\*\* Vitamins given at home, only.

# Includes that from mixed food preparations since it is from local food sources.