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ALASKA NATIVE DIET AND NUTRITION: AN ETHNOHISTORICAL VIEW.

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ALASKA NATIVE DIET AND NUTRITION:
AN ETHNOHISTORICAL VIEW

A

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ALASKA NATIVE DIET AND NUTRITION:

AN ETHNOHISTORICAL VIEW

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ABSTRACT

The aboriginal diet of Alaska Eskimos and Athapaskans contained all the required nutrients necessary to sustain a healthy population. At the turn of this century and with contact with Euro-Americans, the diet began to change. The change has been an increase of carbohydrates in the Native diet at the expense of proteins derived primarily from animals. Recent studies and surveys indicate that the changed diet is now creating substantial health problems which include such disorders as cardiovascular diseases, tooth caries, diabetes and other disorders of carbohydrate metabolism. These nutritional disorders, coupled with apparent acculturative stress leading to endemic alcoholism with concomitant social problems, have affected the Native Alaskan population in an adverse way.

This information indicates that if Native Alaskans are to have a life expectancy comparable with white Americans, their diet must consist of higher quality food substances which include more protein and less carbohydrate.

TABLE OF CONTENTS

LIST OF TABLES

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CHAPTER I. INTRODUCTION

This thesis is a study of traditional Alaska Native (Eskimo and Indian) dietary patterns and changes in these patterns. Specific examples of dramatic changes in the health status of these populations that seem to be related to dietary changes, at least in part, will be examined.

The traditional diet is described in general terms, for no quantitative dietary data exist for precontact or early-contact times. Data are based on ethnographic work and historical records regarding diet and health at time of contact between Alaska Natives and white man. An ethnohistoric approach is suited to extracting data from records of traditional culture and its subsequent changes. This method was used by Leda Milan (1974:15) in her study of health and disease of the Aleut. Resource material from the University of Alaska Rasmuson Library Skinner Collection amd Archives, the Biomedical Library, and State Historical Library in Juneau has been used. Several key studies on contemporary village diets were consulted (Draper 1977a; Draper 1977b; Heller and Scott 1967; Milan 1964; Parran et al. 1954; U.S. Interdepartmental

Committee on Nutrition for National Defense 1959). In addition, I visited several villages and gathered dietary data through observation and discussion with residents and people in public health and education. For example, in July 1975, one day each was spent at Wainwright, Tanana, Ft. Yukon, and Mentasta. Two days were spent at Point Barrow. Key informant data came from Jimmy and Sara Albert of Tanana for Lower Tanana, with whom one day was spent in July; Frank and Annie Sam of Northway for Upper Tanana with whom one day was spent in August; Laura Hancock of Nabesna Road for Ahtna, who gave generously of her time for four days in August; and, finally, Katherine Peter for Kutchin and Eliza Jones for Koyukon, both of the Alaska Native Language Center, both of whom gave hours of their time off-and-on during the 1975-76 school term. The time I spent talking with some of these people was short, but all were recommended as people who were interested and who could give quality information. This field method, while very limited, offered possibilities for gathering cross-cultural data primarily on one topic: diet. Obviously, this research method would not be appropriate for other broader research topics which would involve more in-depth interviewing. This method proved for me, however, to not only be efficient but fruitful. This topic had the advantage of consisting of two subjects that these respondents loved to talk about--food and health--which aided me in abstracting data.

CHAPTER 2. DIET

In the ethnographic literature, researchers divide Eskimos and Athapaskans by area and/or by cultural-economic similarities. Eskimos will here be referenced by area, such as northern coastal, northern interior, Pacific, southwest coastal and riverine, etc. Some of the literature was found to be village specific. The Athapaskan groups used in this thesis are those which are ethnographically similar to Osgood's classification (1936:1-19). The primary groups referenced are Ahtna, Han, Ingalik, Koyukon, Kutchin, Tanaina, Upper Tanana (Nabesna) and Lower Tanana (Tanana). Differences in diet occurred between groups that were located further up river or further into the mountains. Distinctions also took place between north-south and east-west. For example, among the riverine groups, there is a difference in resource emphasis, as those in the north utilized more caribou and those in the southerly areas utilized more fish.

FOOD RESOURCES

1. Traditional Sources

Eskimos along the northwest coast lived and hunted over wet, lowland tundra and some alpine tundra. The sea provided much of their food. Temperatures were low all year. The terrain along the Bering Sea was similar to the more northern regions but temperatures were somewhat milder. Riverine and interior groups of Eskimos and Indians in both areas were furnished with spruce and birch forests from which land animals were hunted and snared. Fish were taken from the lakes and streams. The higher alpine areas provided addi-

tional large game animals. Temperatures in the interior reached extremes of cold in the winter and heat in the summer. The mild southerly climate and open water of the Pacific provided the Eskimos and Athapaskans with plentiful food resources, such as sea mammals, fish and shellfish year round. The forest and higher areas supplemented the diet here with a variety of land animals.

The northwest coastal Eskimo concentrated on hunting whale (Delphinapterus leucas, Monadon monoceros, Balaena mysticetus, Grampus rectipinna, Eschrichtus glaucus, Balaenoptera acutorostrata, Balaenopterus phylsalus, Megaptera novaeangliae), seal (Phoca vitulina, Histriophoca fasciata, Pusa hipida, Erignathus barbatus) and walrus (Odobenus rosmarus). Among the whales, bowhead (Balaena mysticetus) has been most important. Caribou (Rangifer arcticus) and other land animals, such as hare (Lepus arcticus), marmot (Marmota caligata), ground squirrel (Citellus parryi), grizzly bear (Ursus arctos), polar bear (Thalarctos maritimus), wolverine (Gulo luscus), lynx (Felis lynx) and musk ox (Ovibos moschatus) were utilized plus waterfowl, such as loons (Gavia artica, G. stellata, G. immer), cormorants (Phalacrocorax pelagicus, P. urile, P. auritus), geese (Branta nigricans, Philacte canagica, Chen hyperborea, Anser albifrons), ducks (Anas platyrhynchos, Anas acuta, Mareca americana, Spatula clypeata, Bucephala clangula, Clangula hyemalis, Polysticta stelleri, Somateria mollissima, Somateria spectabalis, Somateria fischeri, Lampronetta fischeri, Melanitta deglandi, Melanitta perspicillata), grebes (Podiceps auritus, Podiceps grisegena), red breasted merganser (Mergus serrator), whistling swan, (Olor columbianus) and phalaropes (Phalaropus fulicarius, Lobides lobatus). Less extensively used were gulls (Xema sabini,

Rhodostethia rosea, Pagophila eburnia, Larus canus, Larus hyperboreus, Larus argentatus), terns (Sterna paradisaea), murres (Uria lomvia) and jaegers (Stercorarius pomarinus, S. parisiticus S. longicaudus). Shorebirds as plovers (Squatorola squatorola, Pluvialis dominica), sandpipers (Erolia alpine, E. melanatus, E. minutilla) and other small birds were rarely used. Eggs of geese, ducks and gulls were gathered whenever possible. The primary species of fish used were blackfish (Dallia pectorlis), Ling cod (Lota lota leptura), tomcod (Boreogadus saida), grayling (Thymallus arcticus), needlefish (Pungitius pungitius), jackfish or pike (Esox lucius), smelt (Osmerus dentex, Hypomeus olidus, Mallotus villosus), sculpin (Myoxocephalus sp.), arctic char (Salvelinus alpinus), sheefish or inconnu (Stenodus leucichtyhys), whitefish (Coregonus sp.), and lake trout (Cristivomor namaycush).

St. Lawrence Island and other islands and the Bering Sea coast were also areas for hunting walrus and whale. The coastal Eskimo around Bering Strait were diversified in emphasis but utilized sea mammal, fish and caribou. The diet was supplemented with small land animals, such as hare, ground squirrel, red squirrel (Tamiasciurus hudsonicus, beaver (Castor canadensis), muskrat (Ondatra zibethica), porcupine (Erethizon dorasatum), marten (Martes americana), mink (Mustela vison),least weasel Mustela rixosa) and river otter (Lutra canadensis).

The riverine Eskimos utilized a wide variety of land animals, but caribou and fish were most important. The northern interior Eskimo or Nunamiut were definitely caribou oriented and hunted other land animals; fish played a minor part in their total diet.

The coastal Eskimo of the southwest hunted caribou in addition to

sea mammals. Fish was important in this area also. The Nunivak Island people hunted sea mammals but rarely obtained whale. The Chugach-Koniag or Pacific Eskimo were very diversified with a rich habitat, but for the most part, were sea oriented--sea mammals (whales, seals, etc.), fish and shellfish, such as crab (Paralitthodes kamchaticus, Hyas coarctatus alutaceus), limpet (Acmaea pelta), chiton (Katharina tunicata), shrimp (Pandalus sp.), sea urchin (Strongylocentrotus purpuratus), cockles (Clinocardium nuttalli), whelk (Argobuccium oregonense), mussels (Nytilus sp.) and clams (Saxidomus muttalle, Spisula alaskana, Cardum ciliatos). Some species of wildfowl appear here that do not appear in more northerly areas. These are Canada goose (Branta canadensis), emperor goose (Philacte canagica), shovler duck (Spatula clypeata). Other species of fish utilized here were herring (Clupea harengus pallasi), halibut (Hippoglossus stenolepsis), red snapper (Sebastodes rimberromus), black bass (Sebastodes melanops), eulachen or candlefish (Thaleichthys pacificus), lamprey or eel (Entosphenus tridentatus) and Dolly Varden (Salvelinus malma). Land animals were more diverse here in the sense that Mountain Sheep (Ovis dalli) and Mountain Goat (Oreamnos americanus) were present. Groups in the south did not have access to polar bear and musk ox. Sea otter (Enhydra lutris) was specific to the Pacific Coast; however, sea lion (Eumetopias jubata) ranged along the Pacific and north into the Bering Sea.

Interior and riverine groups hunted black bear (Ursus americanus) and beaver and porcupine. Sheep were hunted in the high ranges of mountains. The southern Pacific Tanaina diet can be compared to the Pacific Eskimo in that they were both sea oriented. Diverse ecology in the

Tanaina area made land animals more important for those living away from the sea. Salmon (Oncorhynchus kisutch, O. tscharwytcha, O. nerka, O. keta, O. gorbuscha) was most important for the Tanaina and Ingalik. Salmon was also important to the Eskimos along the southwest Pacific coast and riverine groups.

The Koyukon, Lower Tanana and Ahtna groups relied heavily on salmon as a predictable food source. Caribou and other land animals were also taken. The Chandalar Kutchin and the Upper Tanana did not have access to salmon. They relied instead upon both large and small game animals. Caribou, sheep and fish, other than salmon, were important. Sheep was important to Ahtna also. The Han used a variety of resources--large and small game animals and fish, including some salmon.

In general, hunters and gatherers have found plant resources valuable to sustain the population, especially when meat was scarce (Laughlin 1968: 318; Lee 1968:30). In the Arctic, hunter-gatherers relied on hunting for more than 50% of their diet, but gathering contributed about 10% (Lee 1968: 48). Most writers (Murdoch 1892:59; Stoney 1900; Ford 1959; Spencer 1959: 24, Chance 1966:9) concur that plant use in the diet was probably unimportant; however, the fact that plants added variety to the diet and supplied nutrition indicates they were important. The most commonly used berries consisted of bearberry (Arctostaphylos uva-ursi), crowberry (Empetrum nigrum), red current (Ribes triste), rose hips (Rosa acicularis), cloudberry (Rubus chameaemorus), red raspberry (Rubus idaeus), bog cranberry (Vaccinium oxycoccus), blueberry (Vaccinium uliginosum), lowbush cranberry (Vaccinium vitis idaea), salmonberry (Rubus spectabilis) and high bush cranberry (Viburnum edule). Greens consisted primarily of pink plumes (Polygonum bis-

torta), wild celery (Angelica lucida), buttercup (Ranunculus pallasii), coltsfoot (Petasites frigida), marsh marigold (Caltha palustris), sourdock (Rumex arcticus) beach greens (Honckenya peploides), scurvy grass (Cochlearia officinalis), fireweed (Epilobium sp.) sorrel (Oyria digyna), stonecrop (Sedum rosea), brook saxifrage Saxifrage punctata), and willow leaves (Salix sp.) Roots and shoots were collected from onion (Allium schoenoprasum), spring beauty (Claytonia acutifolia, C. tuberosa), potato (Hedysarum alpinum), Parry's Wall-flower (Parrya naudiculus), lousewort (Pedicularis lanata), sweet potato (Potentilla pacifica), mousenuts (Eriophorum angustifolium), pink plumes (Polygonum bistorta) and stonecrop (Sedum rosea). The northern coast had fewer species to choose from than the south and southwest. The interior groups had several plant species and caribou rumen was noted by Spencer (1959:24) and Murdoch (1892:61). Stomach contents of certain marine mammals and birds were utilized as a supplemental source of greens (Murie, 1977). Sinclair (1953:71) reports the Canadian Eskimos used feces directly or in soup, so quite possibly feces might have been used here also. Seaweeds (Iridea laminoides, Porphyra laciniata, Rhodymenia palmata) and kelp (Nero-cystis integrifolia) was eaten along the Pacific coast and some species were gathered as far north as St. Lawrence Island (Young and Hall 1969:45; Lantis 1959: 431).

Resources specific to certain regions and lacking in others were the basis for widespread trading networks in the whole area. Trade before contact consisted, chiefly, of caribou and other land animal hides in exchange for products on the coast, such as seal oil, whale oil,

and sea mammal skins. Most information on trade is from post contact records.

Because condiments and stimulants were frequent trade items after contact and have directly had an effect on diet of natives in Alaska, special consideration is given to them here. Prior to contact, stimulants, as we call them, and condiments utilized were of native origin and were important to the people in terms of overall psychological value.

Grease or oil was the principal condiment used among Eskimos and Indians. Seal oil was used extensively among all the Eskimo people. Dry fish and meat was dipped into it and it was a source of fuel and light. Stefansson (1960:37) and Stoney (1900:100) report for northern coastal Eskimos the use of seal oil before the evening meal. It was drunk like an appetizer. Interior groups of Eskimos, riverine and Nunamiut, the Tanaina, Ingalik, Koyukon, and Kutchin traded for seal oil to the coast. The lower Kuskokwim and Yukon and the Ingalik preferred lamprey oil for many purposes. The Upper and Lower Tanana and Ahtna preferred bear grease amd salmon or whitefish oil (Olson 1968:34; McKennan 1959:32 Morehouse, field notes).

Jenness (1957:53) says that Eskimos eating codfish found it so salty that they had to soak it in water first. Physiological needs for salt were satisfied through seal, whale, polar bear and fish. Salt was indirectly obtained through these sources.

One other substance in the diet deserves some discussion here. Stoney (1900:100) in his explorations noted the use of clay in the diet

of northern coastal and interior Eskimos. It was obtained from the Colville and Putnam Valley rivers and was mixed with berries and leaves. The people told him it was, "the thing which they retain til spring." His impression was that they used this substance in times of scarce food to ward off hunger. Bourke (1892:539) says that clay eating was common for various groups in the world, mostly for ceremonial purposes. The 'Tenneh' Indians of the Mackenzie River used clay when starving, according to Bourke (ibid.). The Tungus ate it in the Ural Mountains and the Siberians carried it while traveling (ibid.). Nickerson et al. (973:22) noted use of clay by northern Eskimos. The clay comes from Umiat. It is sweet and absorbs toxic substances. It was once more commonly used than at present.

Aboriginally, alcoholic beverages were unknown. Whalers introduced whiskey to northern Eskimos in 1888-89 (Gubser 1965:7; Murdoch 1892:53). Birket-Smith (1936:29) says the Chugach replaced vodka in 1867 with whiskey indicating that Russian liquor was available here early. Steller (VanStone 1959:103) refers to a liquor made of cow parsnip on Kodiak. The Chugach and the Kodiak Eskimo also learned to brew their own liquor from sourdough, raspberries, and whortleberries (Vaccinium sp.) (Birket-Smith 1936:43; Weyer 1969:57). The Tanaina fermented flour (Townsend 1974:13). The Koyukon used a fermented sugar, flour, and dried fruit called "nododorone", a liquor which was introduced by the Russians. Later, the Koyukon brewed their own "hootch", which was used until American whiskey was available (Loyens 1966:130). "Hootchinoo" made from molasses is reported by Osgood (1971:129) for the Han. Schmitter (1910:7) observed "hootchinoo" made of huckleberry [probably

of Vaccinium sp. or Viburnum edule]. No mention of distillants is given for the other Athapaskans. According to Sniffen and Carrington (1914) in 1914, alcohol was becoming a severe problem along the Yukon and Tanana rivers.

Plants used for various purposes predates the white man's coming. It is not known whether Ledum tea was a dietary item or used as a medicine. After contact, several species have been listed by various authors. Lantis (1959:51) notes that Ledum decumbens as a tea was used along northern coasts. Ledum groenlandium was used at St. Lawrence Island (Young and Hall 1969:44). Both of these species are listed for Athapaskans (Andrews 1975:67; McKennan 1965:18,30; Anderson 1956:11; McKennan 1959:36; Morehouse, field notes). No references were found for Ledum among the Chugach, Tanaina and Ingalik. Osgood (1966:41) does mention rosehips (Rosa acicularis) for tea and this probably was used by others as well. The Ledum tea is reported to be extremely bitter and was quite readily replaced by foreign tea, suggesting, perhaps, the primary use was medicinal. Before the introduction of foreign tobaccos, the Alaskan natives used ash from birch bark fungus (Fomes pinicula) added to various wood barks. These substances served to ward off hunger and added to the general satisfaction of the natives, but because they added nothing in terms of nutrition, they will not be discussed here.

Based on references of meals in the literature, a hypothetical diet, barring regional differences, might consist of the following menu for a day: [C=cup]

Breakfast or Lunch:
1 C of dried tom cod or salmon with
1/4 C seal oil
1 C of lingenberries with 1/4 C of oil

Dinner:
1/2 C putrified fish such as salmon
1 C of meat, such as caribou
1-1/2 C blood soup, consisting of 1/2 C blood,
1/2 C mousenuts, 1/2 C seal oil, and 1/2 C roe (salmon)
1/2 C willow leaves in seal oil

Based on tabulations of food values from Heller and Scott's Dietary Survey 1956-61, such a diet would give the values listed in Table 1. This diet is only slightly low in calories and vitamin C, according to National Research Council Standards (NRC) as listed in Appendix I. These values would be brought up by 1/2 cup of cloudberries which yields 158 mg of vitamin C and 1/2 cup of seal oil which yields 900 calories. This menu is minimal in quantity and food sources. Calcium is the only value which is lower than minimal standards.

In comparison, in Table 2 is a diet listed for Greenlanders in 1855 (Sinclair 1953:73). Fifty per cent is imported food but contact was earlier here. This survey is an Oxford Nutrition Survey which has standards different from NRC. Sinclair (ibid.) thinks that calcium is underestimated because no allowance is given for sea water [?] or bones. Vitamin C levels are high. Overall, the diet is adequate and falls within acceptable ranges. Oxford quantities of food items listed appear high, but given variation for season and individuals, it may be correct. Heller and Scott's nutritional values for foods do not agree with the Oxford Survey. For example, Heller and Scott give a value of 51.4 gm/100 gm of protein for salmon, while the Oxford survey gives 105 gm/100 gm. Vitamin C amounts appear higher than normal since generally meat contains little vitamin C. This diet does not account for the cooking and preservation methods, so it is difficult to say whether vitamin C was conserved.

Table 1. Heller and Scott's Dietary Amounts 1956-61

Food Item	Protein gm	Fat gm	CHO gm	Phos. mg	Iron mg	Ca. mg	Vit.A I.U.	Thia-mine mg	Ribo-flavin mg	Nia-cin mg	Vit. C mg
1 c. dried salmon or tomcod	130.0	4.0	--	1,340	1.8	--	2,440	.28	0.35	4.2	--
1/2 c. seal oil	--	50.0	--	--	--	--	2,430	--	--	--	--
1/2 c. lingenberries	0.4	0.4	12.2	26	0.4	0.2	90	.02	0.08	0.4	21
2 T. seal oil	--	25.0	--	--	--	--	1,215	--	--	--	--
1/2 c. fermented fish	15.9	10.6	2.7	467	--	--	780	.13	0.15	1.9	--
1 c. meat	42.4	2.4	--	560	3.8	0.3	6,374	.48	0.06	10.0	--
1/2 c. blood	18.6	3.3	2.9	279	13.5	13.0	36,600	.18	--	--	--
1/2 c. mousenuts	3.9	1.0	16.1	175	--	22.0	150	.01	0.04	0.1	16
1/2 c. roe	29.2	12.4	2.9	390	--	--	--	.14	0.36	0.7	--
willow and 1/2 c. oil	2.6	61.0	8.1	--	3.3	58.0	--	--	--	--	--
TOTAL	243.0	170.0	45.0	3,237	21.0	129.0	41,639	.24	1.04	17.0	37
	2,683 Kcal										
NRC	2,700 Kcal			800	10.0	800.0	5,000	1.40	1.60	18.0	45

Table 2. Dietary Survey of Greenlanders Taken in 1855 (Sinclair 1953:73)

Food Item	Protein gm	Fat gm	CHO gm	Phos. mg	Iron mg	Ca. mg	Vit.A I.U.	Thia-mine mg	Ribo-flavin mg	Nia-cin- mg	Vit.C mg
Seal flesh, 860 gm	163	103	26	1,686	23.2	95	7,740	0.95	1.20	42.1	69
Other flesh, 225 gm	43	27	7	441	6.1	25	2,025	0.25	0.32	11.0	78
Salmon,620 gm	105	19	--	1,500	6.2	155	500	1.30	0.87	46.1	56
Other fish, 370 gm	11	11	--	699	3.8	67	56	0.15	0.18	8.5	7
Eggs, 5 gm	1	1	--	10	0.1	3	35	0.01	0.02	--	--
Berries, 50 gm	--	--	3	22	0.6	30	--	0.02	0.02	0.2	45
Bread,27 gm	2	--	13	20	0.3	6	--	0.01	0.01	0.2	--
Barley and peas, 6 gm	1	--	2	19	0.4	11	--	0.02	0.02	0.01	--
Sugar, 6 gm	--	--	6	--	--	--	--	--	--	--	--
Coffee, 65 gm	1	--	2	10	0.3	9	--	0.06	--	0.06	--
TOTAL	377	162	59	4,467	40.5	401	10,364	2.78	2.64	108.80	195
		3,359 Kcal									
Oxford		3,000 Kcal		1,000	10.0	750	833	1.20	1.80	12.0	30

Coffee is considered negligible in terms of nutrition; most food charts do not even list it. Given difficulties in comparison of the two diets, they both point out the adequacy of the diet in terms of Oxford or NRC standards and both reflect the high level of protein and fat as opposed to low carbohydrate levels.

2. Change and Contemporary Sources

In all but the most isolated areas, the diet has changed from the traditional diet to a diet resembling white man's diet. Traditional hunting patterns changed in that the amount of time spent hunting became less and a new hunting technology replaced the old, for the most part. Wage employment has made it possible for people to buy food and therefore less reliance on traditional foods is necessary.

Russian explorers in the 1700's and fur traders and missionaries in the 1800's were early stimuli for change. Gold prospectors around 1900 came in some areas and left considerable impact.

Guns first appeared at Barrow on the Plover about 1843 and by 1854, the Eskimos were well supplied (Murdoch 1892:93). Interior contact with the coast brought guns to the Nunamiut and the riverine people between 1850-75 (Gubser 1965:51; Foote 1964:17). Use of guns changed hunting patterns by increasing the efficiency in take of caribou, bear, seal, and walrus.

In 1892, reindeer (Rangifer tarandus) herding was introduced along the coast and on St. Lawrence Island under Sheldon Jackson, U.S. General Agent for Education in Alaska, and before that a Presbyterian missionary. By using Lapp herders to train Eskimos, it was hoped that Eskimos would learn to herd reindeer which would then provide a reliable subsistence

resource. Herding had increased from 16 animals in 1891, to 27,325 in 1910 (Jenness 1962:11). Reindeer herding was not accepted as a way of life because, according to Hughes (1960: 150), (1) the new subsistence complex was not accepted; (2) the change in ownership of the herd from the individual to corporate, with shareholding removed personal initiative, and (3) range deterioration depleted feeding grounds for the animals. Jenness (1962:36) said that other problems were the mixing of herds, interbreeding with caribou, and predation. Milan (1964:22) wrote that herding decreased when it was no longer an individual enterprise. According to VanStone (1958:30), the cultural pattern was not accepted because herding required a more sedentary way of life in order to attend to the reindeer. Considering everything, it becomes understandable why the project was not successful.

In 1893, commercial fishermen came to Alaska and those natives living along the Pacific and Bering Sea coasts found themselves in competition for fish resources. Interior areas were impacted from people who came to install the telegraph in 1912, by the Alaska Railroad construction around 1900 and by World War II, during which time, airstrips and roads were built.

Boats and outboard motors began to replace skin boats around 1940. A few umiats are still used with a motor for open sea mammal hunting. In the 1960s, sled dogs began to be replaced by snow machines. All of these new changes in technology are costly in terms of gasoline, ammunition, and parts. Snow machines are more efficient and less troublesome overall than maintaining a sled dog team, but they quickly wear out and need to be replaced frequently.

The more isolated villages are less impacted by white man's life style than are the larger communities. For example, from the Eskimo (Shields: 1917) at Wainwright:

> Smelting and sealing are good. Coal is good. Life is good here at Wainwright where we can get coal, wood, fish, seal, foxes, bears, caribou and lynx and where we can buy flour and many things from our own native store.

Rodahl (1963:127) writes of an old man and wife at Kotzebue who had returned from Fairbanks, "There we had to pay rent, electricty, food and telephone....Here all we need is coffee, sugar, milk and pancakes for breakfast; the rest is from the sea."

Flour, sugar, tea and rice became staple items early; but after the Second World War, coffee, baking powder, dried fruits, canned fruits and vegetables, pilot bread, crackers, peanut butter, jelly, evaporated milk, bacon, canned meat, and fish were prevalent, as well as soda pop and candy. Flour was indispensible for pancakes, bannock, doughnuts and biscuits. Seasonings and salt were added to the diet. In the 1900's, some gardens appeared. They were primarily tried along the Pacific area (Victoria 1974:29; Befu 1970:34;), interior regions and along rivers, such as at Shungnak (Shields 1917:No.7) and Kobuk (Giddings 1961:135). However, there were more northerly coastal areas that cultivated gardens, such as at Unalakleet (Heller and Scott 1956-62:137) and even as far north as Wainwright (Shields 1917:No. 10).

In order to be able to purchase new hunting equipment, modern appliances, and food and clothing, wage income became necessary. Wage employment generally took place in the summer months.

Many native people today rely on government monies in the form of Aid to Dependent Children, Old Age Assistance, Veteran's Disability

and Unemployment Insurance. A few belong to National Guard. Outward migration to larger cities for summer employment is becoming more prevalent all over and, of course, now pipeline activity has provided considerable income for some. Some villages along the Bering Sea began electrifying in the early 1900's (Shields 1917:No. 9). Today most villages do have generators and some have electric cooperatives.

Among Northwest Coastal Eskimo, whale, seal, walrus and caribou remain important resources; however, store foods are being utilized also.

Fish and caribou still are primary resources for people living along the rivers. Around 1900, and until 1920, caribou were scarce. In 1909, reindeer were introduced and herding was an activity until 1940 (Hall 1971:240). When the caribou returned in 1920, people again hunted caribou and, around 1960 moose (Alces alces)(Hall 1971:240) were present in the area as a subsistence source. During the time that the caribou were absent, fish was the staple food. Whaling ships at Point Barrow did much to deplete the food resources of the coastal and Nunamiut Eskimos in the 1890's. Whales, walrus, seal, and caribou were subjected to hunting pressure. And, too, fluctuations in caribou migrations made caribou an annually unreliable food source. Thus, interior Eskimos congregated along the northern coast exploiting available resources. Today, Anaktuvuk Pass, a place where people have returned, is the only Nunamiut village.

Walrus is still important at St. Lawrence Island. Reindeer herding was tried here also (Hughes 1960:144), but after 1940 herds began to decline (ibid:149). The lower Kuskokwim and lower Yukon riverine Eskimos have changed their diet considerably. Seal and walrus are still sought,

as well as small land animals, waterfowl and especially fish. A few wild plants and berries are still picked, but in decreasing amounts (Oswalt 1970:103).

The diet among Pacific Eskimo still utilizes many of the traditional foods only prepared in white man's ways. Fish, especially salmon, is most important, but seals, sea lions, and bear are also utilized (Befu 1970:34). Wildfowl, rabbit, and shellfish round out the diet. Some native plants are still utilized.

Salmon is still the basis of the diet for Tanaina (Townsend 1970:4). Other foods include moose, caribou, bear, fish, and shellfish. Sculpin is new to the area (Osgood 1966:192). Sea otters are rare and, since 1911, Fish and Game regulations have not allowed them to be hunted (ibid.:192).

Formerly, Ingalik would go upstream in the spring to fish and to go to goose camp (Pilcher Diaries, Box 1). During this time, they would also hunt caribou and bear in the mountains. In the fall, they returned downstream. They now move to fish camp in the spring, but do not go to the hills to hunt caribou because they are no longer there. Moose have replaced the caribou (Osgood 1966:192). Whitefish and salmon are taken in the summer, moose and waterfowl in the fall, and beaver and rabbits in the winter. Bear and muskrat are also taken (Easton 1950:4). Eeling was an important activity for the Ingalik right after the Yukon froze. Berries are still gathered, but Hosley (1961:100) mentions no other plants. Salmon is still the most important subsistence food resource among Koyukon, Lower Tanana and Ahtna. Salmon are taken on fishwheels, netted, and hooked. Ahtna and Lower Tanana no longer hunt caribou,

but hunt moose instead. Sheep are still sought by Ahtna but competition is keen from other hunters. Bear, porcupine, muskrat, ground squirrels, waterfowl, and beaver are still taken; as in other areas, the beaver season is limited. Varieties of fish make up the rest of the diet. The people say that moose is more difficult to get and salmon runs aren't as good anymore. Most of these problems are blamed on competition from white men, and, in the summer of 1975, fishing was poor due to too much rain. Wild rhubarb and berries are still collected.

The Chandalar Kutchin, the Upper Tanana and the Koyukon still hunt caribou moose, bear, beaver, muskrat, lynx, rabbit, porcupine, marmot, and squirrel. Muskox is no longer available to hunt as a food resource. The diet is supplemented with wildfowl, whitefish, salmon, plants, and berries. Caribou are no longer taken in quantity in the Upper Tanana area (Leechman 1954:5, Marshall 1933:47). In 1928, Endicott (1928:142) reported 1,000 in the area, so the disappearance has been recent. Mink and otter are no longer used for food along the Upper Koyukuk (Heller and Scott 1956-61:18) but are trapped for fur along with fox, lynx, and marten. In March and April, it is possible to take beaver, although from 1925-49, there was a closed season on beaver (Murray 1961:51). Plants and berries are gathered to some extent (Morehouse, field notes).

Trade among groups of natives is no longer extensive. Some furs are used for trade but money economy is more common. Airplanes and car travel, where there are roads, and snowmobiles and riverboats make villages and urban areas accessible quickly. Wage employment provides money for airfare and traveling is not uncommon. People think nothing of hopping on a plane to go somewhere for the weekend for fun, to visit

relatives or to buy alcohol. For example, traffic between Wainwright and Barrow is so heavy that one pilot remarked, "I feel like I'm running a damned taxi."

Some items in the diet that were formerly trade items are still used. Mineral salt and other seasonings are universally used and seal oil is less extensively used. The Kutchin and Koyukon Athapaskans no longer utilize seal oil to any extent. Most Eskimo people still consider it a necessity with fish and meat.

Alcohol has become a problem for most villages. The problems seem to be greater where alcohol is more easily acquired, but not always so. A few villages are dry and place fines on those bringing alcohol in, as well as for drunkenness; but some villages which do not have easy access to alcohol will bring it in by mail, or individuals will even charter planes to bring it in. Wage income is in many ways related to alcohol use and accessibility. Those who have the money and desire will get alcohol one way or another. Villages that decided to sell it retail did so in order to retain the profits within the village.

Coffee and tea are used by all and are considered staples. Use of Labrador tea is no longer extensive. Today, the diet among many young people is almost indistinguishable from the white urban diet. Older people still prefer native foods and subsistence hunting prevails (Hippler 1969:63), but change is taking place. Most villages have cooperative stores. Some people order food through mail. Prices are generally high. Typical prices for villages are listed in Appendix III. The following are some menus which represent current native diet in the villages.

Northwest Coastal Eskimo
(Morgan 1974:71)
Lunch -- rice, macaroni, reindeer
Dinner -- frozen fish, seal oil, doughnuts

(Van Stone 1962:74)
Breakfast -- pancakes or biscuits, coffee
Dinner -- boiled meat, biscuits, or doughnuts, tea, sugar, jam
Bedtime snack -- biscuits or bannock, coffee

(Spencer 1959:376)
Breakfast -- biscuits, cornflakes, canned milk, bread, coffee
Lunch -- frozen fish or meat, coffee, tea, also canned meat or fish
Dinner -- boiled meat

Interior Eskimos
(Gubser 1965:75)
Breakfast -- coffee, pancakes, butter, syrup
Dinner -- fried caribou, boiled rice

Riverine Eskimos
(Rodahl 1963:3)
Breakfast -- pancakes, syrup, porridge, milk, sugar, bread, peanut butter, coffee, tea

Bering Sea Eskimo
(Oswalt 1970:18)
Breakfast -- unleavened bread, margarine, coffee
Lunch -- dried salmon, seal oil, bread, margarine
Dinner -- fish soup, agutuk, duck soup, rice, greens, bannock, tea

Riverine Athapaskans
(Morgan 1974:103)
Dinner -- moose or beef, vegetables, mashed potatoes

(Morehouse Field Notes)
Breakfast -- pancakes, or eggs, bread, butter, jelly, coffee
Dinner -- fish or meat, vegetables, butter, bread, coffee

A generalized diet would consist of a breakfast of pancakes and syrup with coffee and milk and a dinner of fish or meat with seal oil, bread and butter with jelly, vegetables, and rice and would yield the nutrients listed in Table 3. Values are obtained from Appendix II and the Handbook of Food Values. An increased portion of meat and the

Table 3. Food Value of a Generalized Diet (Minimal)

Food Item	Protein gm	Fat gm	CHO gm	Phos. mg	Iron mg	Ca. mg	Vit. A I.U.	Thiamine mg	Riboflavin mg	Niacin mg	Vit. C mg
Butter, 2T.	--	24	--	--	--	--	7,500	--	--	--	--
Syrup, 2T.	--	--	30	--	1.6	1.8	--	--	--	--	--
Whitefish, 1/2 c.	70	3.2	--	257	0.2	65.0	540	.11	.13	--	--
Seal Oil, 1/2 c.	--	50.0	--	--	--	--	2,430	--	--	--	--
Bread, white 1 slice	2	1.0	10	--	1.0	34.0	--	.10	.08	1.0	--
Meat,moose 1/2 c.	25.1	2.5	--	218	5.7	12.0	650	.074	.027	5.0	--
Bisquits,2	4.0	6.0	30	--	1.2	38.0	--	.16	.14	1.2	--
Jelly, 1T.	--	--	13	--	0.3	4.0	--	--	.01	--	1.0
Pancakes, 2 plain	4.0	4.0	20	--	0.6	116.0	140	.08	.12	0.4	--
Canned milk, 1/2 c.	9.0	10.0	12	--	0.15	327.0	405	.08	.13	.25	1.5
Canned peas, 1/2 c.	4.5	0.5	15.0	--	2.1	25.0	560	.12	.06	1.1	11.0
Rice, 1/2 c.	2.0	--	25.0	--	0.9	10.0	--	.11	.01	1.0	--
TOTAL	86	100	155	475	12.8	674	12,225	.80	.99	9.95	13.5
		1864 Kcal									
NRC		2800 Kcal		.8g	10	.8g	5,000	1.4	1.7	10	60

addition of fruit would bring values in line with National Research Council (NRC) allowances. NRC allowances and some food composition charts are given in Appendices I and II. Diet composition and nutrient levels vary according to area. For example, a diet in the southwest has more fish than the interior diet and therefore is likely to be lower in iron. The NRC allowances provide a margin above physiological requirements which is subject to individual variation and body storage capacity. Recently, nutritionists are giving more concern to individual needs as opposed to generalized needs. This diet reflects a decrease in protein and increase in carbohydrate.

CULTURAL FACTORS AFFECTING DIET

A. Eating Patterns

1. Traditional Patterns

Traditional eating patterns were uniform for Eskimos but more diverse among Athapaskans. Because interpretation of what constitutes a meal varies with individual reporters, discrepancies occur in the literature in terms of the number of meals eaten and their frequency. The place where eating takes place is of relatively little importance to people interested in nutrition, but it has importance in terms of health and the well being of the people. Traditionally, Eskimos were seasonally mobile, with the coastal villages being relatively semi-permanent. In general, the winter houses were semisubterranean made of driftwood, stone, whalebone (in some places) and sod on the coast and of log and willow in the interior. In the spring, when the houses became damp and

uncomfortable, people would move into summer tents of willow poles and hides. Those interior Eskimos who were more mobile had temporary shelters that could be easily constructed on the trail.

In some places, meals were eaten in the qargi, the communal house where men worked and adolescent boys of the north slept. Murdoch (1892:64) says the northwest coastal Eskimos usually ate only one meal in the evening after the hunter returned. After the spring hunt, people ate steadily for two days. There was a tendency to eat frequently during the day (Spencer 1959:376). According to Spencer (ibid.), the Nunamiut ate a breakfast of meat and fat, and lunch was caribou meat. When traveling, the main meal occurred in the evening. Stefansson (1960:28, 2) says, however, that among the Nunamiut, meals consisted of raw fish in the morning and cooked meat in the evening.

The riverine Eskimo ate one meal a day in the evening (Stoney 1900:40; Giddings 1961:135). During the day, dried whitefish or dry meat was snacked upon. Hunters often went without breakfast. Zagoskin (Michael 1967) reports that Bering Sea Eskimos ate two meals a day. In the morning, dried fish or meat and frozen or cooked fish was eaten with water. In the evening after the sweatbath, some ice cream, pickled fish or fish eggs were eaten. According to Bethel students (Kaliikaq Yugnek 1974), the men did not eat breakfast until returning from hunting or trapping. Women were not supposed to eat during the time that men were hunting. After the men ate breakfast, they would take a steam bath. Later, lunch was served to them. Lantis (1960:47) states that at Nunivak, it was customary for children to eat whenever they wanted, but were scolded for wasting food. Old people at Nushagak would watch the young boys in the

qasgiq to see that they threw a piece of everything they ate into the fire in remembrance of the dead (Oswalt 1963:53).

Among the Pacific Eskimo, food was cooked in the houses which were occupied by several families (DeLaguna 1956:59). People would eat heartily when food was available (Gunther 1972:198).

Mothers nursed babies sometimes as long as 4-5 years, but usually until 2-3 years. This also served as an effective means of birth control. As far as we know, there were no other means of birth control. Premasticated meat was given to babies. Extended nursing periods and premastication of meat were true of all groups--Eskimos and Athapaskans.

Eskimos usually ate with their fingers. Pieces of meat were cut beforehand by the women and if the pieces were large, it was placed in the mouth and cut with a knife (Hughes 1960:86; Murdoch 1892:64; Giddings 1961:138). It was customary to be generous with food and guests were treated hospitably in the qasgiq. The amount eaten varied. Weyer (1969:56) says that they ate great quantities--4 to 8 pounds of meat per day when there was plentiful food. Nelson (1971:285) states that people were more cheerful in the summer when there was plenty of food because starvation in late winter was known.

Athapaskan house styles varied but were generally of wood and hide. All groups changed houses between summer and winter. All the Athapaskan families ate within their homes, except for the Ingalik where men ate in the qasgiq.

Usually people ate two meals per day, morning and evening, but eating took place whenever one was hungry (Parsons 1921:55; Sullivan

1942:74; Osgood 1936:35; McKennan 1965:30; McKennan 1959:45; Morehouse, field notes). The Tanaina (Osgood 1966:45) ate one meal per day. Old people ate a breakfast of boiled dry fish and water was drunk anytime. The men ate first; then women and children; dogs ate after everyone else. Chandalar Kutchin (McKennan 1965:30) and Ahtna (Morehouse, field notes) ate all together at one time. The Tanaina (Osgood 1966:45) fed guests first. For Athapaskans, like Eskimos, it was important to be generous with food; thus, food was shared with others.

2. Change and Contemporary Patterns

Settlement patterns changed. One of the primary reasons for settling into permanent villages was to educate children. Another factor which changed the settlement pattern was disease. Whole villages were wiped out and small villages consolidated. Stores and trade attracted people to large communities. Depleting resources and wage income, also, encouraged settlement. Houses have changed from subterranean winter houses and summer tents to all-year-round above ground frame houses or log houses. Those who still go to fish camps in the summer use canvas tents. The frame houses with several rooms were constructed to alleviate sanitation problems resulting from leaky, damp houses which were not meant for year-round use. By separating individuals and relieving overcrowding, it was hoped to improve conditions and retard the spread of tuberculosis (TB). The ultimate effect was that the houses were costly to heat and the modern plumbing froze. The social culture of the people was not adaptable to several rooms, resulting in walls being torn down or the closing down of extra rooms (Jenness 1962:55). Many villages still have sanitation problems

connected with water and sewage disposal (McPherson and McPherson 1976). Interior villages have fewer problems because wells and outdoor toilets can be maintained. Small northern coastal villages still utilize snow and ice for water and honey-buckets and barrels for sewage. The health problems resulting from bad water and sanitation are those dealing with intestinal parasites and infections.

Many villages today are electrified and people buy modern appliances. Sixty-five villages by 1971 were to have cooperative electricity (Cruikshank 1972:35ff). Electricity is necessary for operation of modern appliances that are purchased. Modern dishes and utensils are also used. It is, however, not uncommon to cut meat with an ulu or to use fingers for some foods (VanStone 1962:74; Oswalt 1970:20). Modern pots and pans took over quickly but plates, dishes, and silverware were later in acceptance.

Meal patterns have changed from one or two per day to three meals a day. Eating is still informal and people eat whenever and wherever food is available, especially during the summer and among children. Generosity is still valued by all; sharing of food is important. Among northern coastal Eskimo, Ahtna, Koyukon and Kutchin groups, people eat together and there is no preference about who eats first (Morehouse, field notes). Generally, nutritionists consider three meals a day important in order to insure proper nutrition; however, there is a great deal of variation between individuals. Native people who ate only one or two meals a day were well fed and certain adaptations were made to such a diet. Even though they are now eating three meals a day does not mean they are receiving proper nutrition.

Fewer babies are being nursed and for shorter periods of time. Nursed babies are fed on demand and may be nursed for two years (Milan 1964:57; VanStone 1962:78; Nowak 1975:33; Oswalt 1970;30). Fat on a stick, which was formerly used as a pacifier, is rarely used. The tendency is to wean to a bottle, which may also serve as a pacifier. Bottles may be filled with Kool Aid, juice, Tang or milk. Usually babies are fed evaporated milk with syrup or two tablespoons of sugar for six feedings throughout the day (Nowak 1975:32; Heller and Scott 1956-61:32). At Napaskiak, supplemental pieces of fish, fish liver, bread and agutuk are given (Oswalt 1970:29).

Children eat when hungry and are welcome at anyone's home (Milan 1964:57; Oswalt 1970:29). Children at Napaskiak (Oswalt 1970:33) get canned milk with tea and sugar, snacks of bread with margarine or bacon grease, and large amounts of candy and gum. At Point Hope (VanStone 1962:74) children do not drink coffee until 8 years old, and then it is diluted with canned milk.

The Bureau of Indian Affairs (BIA) sponsors hot meal programs in the schools. Schools also give vitamins and iron supplements to children, as well as to pregnant and lactating mothers. At Point Hope (ibid.) the Parent Teacher Association (PTA) mothers cook hot breakfasts consisting of hotcakes, bacon, eggs, cocoa, milk, juice, cereal, or sometimes vegetables. On Nunivak (Nowak 1975:32) a usual hot lunch is of reindeer meat plus cheese sandwiches. Other menus vary. Vitamins consist of ABCDE plus 30 mg/cc of fluoride and 25 mg/cc of ferrous sulfate. Pregnant and lactating mothers get 900 mg of iron and vitamins (ibid.). Mothers also give babies extra vitamins.

Baby feeding practices among Athapaskans are similar to Eskimos. The only milk that most children receive is through the schools. Vitamins are also distributed at schools. Children, as in the past, eat whenever they desire and whenever food is available.

B. Cooking Methods

1. Traditional Methods

The most common cooking method for northwest coastal Eskimo was boiling with hot stones in containers of wood or pottery (Murdoch 1892: 61; Spencer 1959:54). Since wood was a scarce resource, they heated rocks to conserve fuel. Meat was under-cooked, just brought to a boil. Although the term "Eskimo" means "raw meat eaters," and they became known for eating raw meat, nonetheless, meat was rarely eaten raw. Frozen meat or fish and muktuk was also used. Raw, frozen, and undercooked meat has an advantage in that there is good mineral and vitamin retention. This is not to say there was extreme nutrient loss with boiling because the cooking water was also consumed. Soup made of blood and sometimes with plant leaves added was common. Masu or potato and other roots were eaten raw or boiled. Greens were generally boiled or eaten fresh with seal oil. Berries were eaten fresh with oil or they were boiled or putrified. The riverine and Nunamiut Eskimos had more variety of cooking methods. This may be because there was more wood available. Besides stone boiling in wood and birch (Betula papyrifera) bark, they roasted with a flat stone or spitted ducks, fish, and meat on a stick inclined to the fire. Baking and roasting, generally, conserve nutrients while making food palatable. The other

cooking methods consisted of eggs baked in hot sand or willow bark tube on the Kobuk; bear boiled in a wooden trough with hot stones on the Selawik; and boiling in the hot springs in the Brooks Range. Bone grease was also rendered by inland Eskimos. Frying and "trying" fat by direct heat came later with the Europeans (Stefansson 1960:39).

The Bering Sea coastal and riverine Eskimos used the same cooking methods as the northern riverine; however, they did not use hot springs and they did roast meat. The St. Lawrence Island Eskimos fermented walrus and whale was fermented on Norton Sound. Caribou meat was cooked in the stomach. The use of internal organs as cooking containers was effective in that nutriture was retained and it contributed to efficient use of the animal.

The Pacific Eskimos' (Birket-Smith 1953:42) cooking methods consisted of boiling with hot stones in baskets, roasting on flat stones and spitting food by the fire. Mountain Goat was cooked in the animal's stomach. Meat was eaten frozen, but no blood soup was eaten. Fermented salmon with berries and seal oil was also used. Fern roots (Dryopterus dilatata) were baked in a pit oven made by lining a hole with rocks and skunk cabbage leaves (Lysichiton americanum), and then covering it with dirt and setting a fire over it.

Where wood was available, cooking methods were more diverse and approximated those of the Athapaskans; otherwise, stone boiling was the most common method of cooking.

In contrast to the Eskimos, many more ways of cooking were used by Athapaskans, who employed not only the animal's stomach for cooking but various other organs. Stone boiling in birch bark, wood, or pottery

was used by all groups. Blood soup, roasting meat, and fish on spits was also used by all.

The Pacific Tanaina (Osgood 1959:24) employed a special broiler stick consisting of small branching sticks on which herring and candlefish were skewered. Shellfish were roasted, boiled, and steamed. Ice cream [a dish which looks like ice cream but in which its primary ingredient is fat] was made of fish roe, oil, and berries. Roots were used raw or roasted. Porcupine was hung by a line over a fire and roasted or stuffed with fat and liver and then buried in a pit oven. Ground squirrel was stuffed with wild onions and broiled. Feet were stewed and intestines were stuffed with fat and meat and then boiled. Berries and seaweed were used with oil. Ice cream was made of boiled roots, berries, and bear grease.

The Ingalik (Osgood 1959:24; Osgood 1958:164) made ice cream of cottonwood (Populus balsamifera) seed pods, caribou lichen (Cetraria sp.), or berries plus fish eggs and salmon oil. Other greens were mixed with fish eggs or eaten fresh like salad. They also would put fish eggs in a casing which was skewered over the fire. Soup was made of blood, fish eggs, and meat or fish eggs and rotten blackfish. Fish, meat and fowl were broiled, boiled or roasted.

The Koyukon made ice cream of meat or fish, berries or fish eggs plus grease or seal fat. Fish, ducks, and meat were usually roasted. The head of game animals, especially bear, which was always eaten on the trail, was cooked in a gravel hole. Bear head could also be suspended from a pole with rawhide attached to the teeth and then roasted.

The Lower Tanana (Andrews 1975:68ff) mashed potatos and cooked them

in the juice of the meat. Ferns were braided and boiled or roasted. For Ahtna, (Morehouse, field notes) a pit oven was used for cooking meat by lining a hole with rocks, placing the meat inside, covering the meat with bark and dirt, and then building a fire over it. Meat and internal organs were placed into intestines to make sausages or weiners. A trail food that was used consisted of an intestine with viscera fat. This was rolled up and carried along. When at camp, the intestine was filled with water and roasted to make a soup. Stomachs were sliced and boiled. Stomachs could be filled with liver and stomach fat and then roasted on a stick. Blood soups were eaten, as were caribou stomach contents. Ice cream was made of salmon oil and berries. Stone baking by the fire was also done. Berries were eaten fresh or boiled. Mushrooms (Aurontium testaco, Boletus scabum, Lypercondum perlatum, Calvatia gigantia) were put into soup. Roots were boiled or fried, or they were eaten raw.

The Han (McKennan 1959:33) put salmon eggs in a King Salmon skin and to which was added water to make a paste. Wild onions and wild rhubarb were roasted or boiled. According to Schmitter (1910:9), boiling stones were hard to come by, so people carried them along with them when changing camps. Boiling stones were of quartzite (McKennan 1965:31).

The Chandalar Kutchin ice cream consisted of marrow, salmon eggs, berries, and oil. Marmot and moose were roasted in a pit oven. Ground squirrel fat, liver, and stomach were placed in the intestine to made a sausage (Morehouse, field notes). Stomachs of large game animals were sliced and boiled. Beaver was stuffed and roasted over the fire. Willow buds were used fresh, but berries were used fresh and boiled.

Soup was made of blood, caribou stomach contents or fish heads. Horns were roasted. Birds were roasted on a stone.

For the Upper Tanana, boiling consisted of putting hot stones in birch bark or hide or paunch. According to McKennan (1959:133), no pit oven was used. Ice cream was made of dry meat, marrow grease, or salmon added to blueberries and grease. Soup was made of meat and blood or rotten fish. Mushrooms were roasted. Caribou lichen was boiled and stomach contents were added to bear fat. Stones for boiling in this area came from the Wrangell Mountains (Abercrombie 1900:158; Morehouse, field notes).

2. Change and Contemporary Methods

For all groups, boiling continues to be the most common way of cooking; however, cooking is done on oil, propane, or wood stoves. Roasting is sometimes done. Blood soups are rarely made, but caribou, fowl, polar bear, walrus, seal, beluga, and small animals are boiled with rice and macaroni, seasoning, and sometimes greens (Nelson 1969:163, 180, 214; Rodahl 1963:69,105; VanStone 1962:34; Foote 1960:16; Spencer 1959:24, 373f). Tongue, heart, liver, brain, ribs, and eggs are also boiled. Heads and stomachs of walrus and seal may be boiled with brain and eyes (Rodahl 1963:69; Spencer 1959:373). Flippers and fish heads may be fermented. Seal meat is sometimes made into hamburger (Spencer 1959:373) and livers are fried. Frozen meat and fish are still dipped in seal oil; frozen meat and fish may be used for summer camps (Nelson 1969: 179; Rodahl 1963:69; Gubser 1965:74). Walrus, seal, and fish are sometimes dried and dipped in seal oil (Rodahl 1963:69; Oswalt 1973:158). Berries, dried fish, dried caribou and salmon roe are put into ice cream

(Rodahl 1963:169; Spencer 1959:374; VanStone 1960:20; Oswalt 1970:16). The back of seal and scraped intestines may be eaten raw, as well as walrus liver and heart (Rodahl 1963:68f). On Kodiak, sculpins, ducks, and other animals are usually boiled (Befu 1970:30). These methods are gradually being replaced by white man's cooking methods. Foote (1960:16) estimated that at Point Hope, 80 per cent of the fish was raw frozen and 20 per cent boiled. Caribou was 50 per cent raw frozen and 50 per cent boiled, stewed, or fried.

Among Athapaskans, cooking is now done with oil, propane, or wood stoves inside the house. Occasionally, food is cooked outdoors in the summer over a fire or on Coleman gas stoves. Putrified or fermented fish is sometimes made (Townsend 1974:25; Guedon 1971:56; Morehouse, field notes).

Moose is boiled, baked, or fried (Olson 1968:325; Nelson 1973:111; Morehouse, field notes). Muskrat and beaver is boiled or roasted outdoors (Nelson 1973:260). Bear is boiled or fried (Nelson 1973:127). Salting of fish and drying are post contact introductions (Loyens 1966: 129). Among Ahtna, berries are cooked in sugar or fried in grease (Guedon 1971:56; Morehouse, field notes). Roots are also fried.

Former cooking practices of both Eskimos and Athapaskans were notable in that a high retention of minerals and vitamins was possible. The use of raw and undercooked meat, plants, and berries was especially good for Vitamin C retention. The use of blood soups and practice of using cooking water were also efficient food preparations for retention of nutrients. Broiling and roasting have always been considered efficient for nutrient retention and the use of organs to cook meats was

not only a good method of retaining nutrients, but additional nutrition was obtained from the organ itself. A reliance on store foods and assimilation of white man's ways has led to a change in cooking practices. Blood soups and cooking waters are not used often and foods are cooked until well done; nutrient retention is not as great. Frying foods, while quick, is not necessarily the most healthy method of food preparation in that fat and oils add additional calories that may not be needed for nutrition. While roasting and broiling are still efficient means of cooking whether outside or on a stove, the use of stoves and fuel is costly and therefore more money income is necessary.

Traditionally, all parts were utilized that could be. As my Ahtna friend, Laura, said, "We used everything" (Morehouse, field notes). Wastage of animals in some areas now occurs because of loss when animals sink in the water when shot and also there is greater accessibility to animals leading to overkill and utilization of only certain parts. The parts of animals most retained for food use are those that were and are considered choice, and preferences and delicacies. These foods carry high psychological value. In many places people still prefer the traditional foods. Nelson (1969:155) says that at Barrow, Eskimos feel strongly enough about the traditional food that if they don't hunt themselves they will pay high sums of money for these foods. Certain foods as the loon and seagull will be eaten only by the old (ibid.:163). Muktuk or whale skin is still a favorite of most (Heller and Scott 1956-61; Spencer 1959:27). Of the walrus, the heart, liver, kidney, skin, foetus, tongue, mussels in the stomach, suet around the intestines of female walrus, and, especially, the flippers, are still desired (Nelson 1969:372;

Rodahl 1963:68; Befu 1971:34). Caribou tongue, heart, marrow, and kidney suet is preferred (Rodahl 1963:68, 105; Nelson 1969;180). Seal oil is universally desired, as well as the liver (Pingayak n.d.). Ice cream is a favorite among Eskimos and Athapaskans alike. Other traditional foods preferred among Athapaskans include moose nose, tongue, marrow, head, brisket, ribs, and a saclike digestive organ (Nelson 1973:111). Beaver tail is sometimes mentioned (ibid.:270), as well as caribou stomach contents and putrified fish (Morehouse, field notes).

Because starvation is no longer heard of, many of the animals that once were eaten during hunger periods are no longer eaten at all. Some of the smaller animals, such as lynx, mink, marmot, squirrel, and fox, are taken for fur and not for food. In this sense, not all available sources of food are utilized. Species used for food are more selective.

C. Preservation Methods

1. Traditional Methods

The most common way of preserving meat on the northern coast was by freezing and caching it in underground pits covered with stones. Food was also stored in the passageways of houses or on a platform outside (Stefansson 1960:37). Meat, walrus, flipper, seal, fish, and herring were putrified [putrifying food was also considered under cooking methods], and when stored properly with air and no sunlight makes a pickled dish which people like for a change of flavor in the diet. Blubber placed before direct heat was rendered in a cased seal poke, hair inside. This poke was filled with strips of blubber with some meat still left on, and then placed either on a platform or under stones. A

hairless skin placed above the seal skin raised the temperature in the summer to 80° or 90° F. Left all summer, the oil rendered itself.

The riverine and interior Eskimos dried meat, fish, and fish eggs. Fish were also frozen and putrified. Stoney (1900:38) describes one way of caching on the Ambler River. A cache was made under a fire hearth by digging a hole, lining it with spruce boughs, filling it with meat, and then covering it with spruce, dirt, and hot ashes. The melting snow from the hot ashes froze together with the ashes into a solid piece which protected the meat from predators.

The Bering Sea Coastal and Riverine Eskimo used freezing, drying, and oil rendering in pokes. Greens and berries were stored in pokes off of the ground. Fish and caribou were dried and salmon heads were putrified. Sorrel was fermented to make a relish. Pemmican, a European introduction, was made of marrow, seal or whale blubber, which was chewed to little bits. After mineral salt was introduced, people salted fish and ducks and stored them in barrels. Smoking also came later. On Norton Sound (Michael 1967:114), fish were split lengthwise and were left attached at the tail. The backbone and head were fed to dogs.

Meat and fish was dried (later, fish was brined and smoked) over alder (Alnus crispus, A. sinuata) or cottonwood for the Pacific Tanaina (Osgood 1966:42), cottonwood for Koyukon (Sullivan 1942:12,25,74), and alder by the Ahtna (Morehouse,field notes). Food was stored in wooden boxes by Tanaina. Birch bark was used for storage by other groups. The containers were either cached underground or on log platforms. A common method for fish was to dry them, remove the bones, and tie them into

bundles which could be stored anywhere and sometimes even used to sit on.

Salmon and whitefish could be preserved in two ways. (1) The old way was to split the fish from the back lengthwise to the tail and hold it open with skewers. This left the skin and some flesh on one side, while most of the flesh was attached to the opposite side. It was an efficient way of preserving most of the flesh. (2) The white man's way is to split the back to the tail and hang it over the rack with an equal portion of flesh on both sides. Seal oil or fish oil was preserved in boxes, birch bark baskets, or the stomachs, bladders, and intestines of animals. Clams were strung on lines and put into containers. Fish was fermented by all. Oil was rendered from salmon, whitefish, and lamprey. Bear grease and other grease from bones was also rendered. The usual way to render fish oil was to soak fish in water for awhile, then boil, skimming off the fat. Fish eggs and sometimes berries were dried, frozen, or preserved in oil. Blueberries were mashed and then stored. The stomachs, intestines, and heart of caribou and other big game animals were dried by Chandalar Kutchin (McKennan 1965:28). Indian potatos were simply buried in dirt. Pemmican was made of powdered meat or fish added to fat. Pemmican has not been reported by Koyukon or Lower Tanana. Mushrooms were dried by Ahtna on birch bark trays (Morehouse, field notes).

2. Change and Contemporary Methods

As previously mentioned, salting and smoking of fish was introduced by the Russians. Eskimos and Athapaskan current preservation methods are discussed together.

Freezers are becoming popular as villages electrify and money income increases. Ice cellars and log caches are still used. Fowl is either dried or frozen (Hughes 1960:118, Nowak 1975:25). Nelson (1969:162) says that fowl need not be cleaned if stored in the cellar. Fish is dried, frozen, or both (Rodahl 1963:68, Spencer 1959:36). Whale is dried or stored raw and the entrails chopped (Spencer 1959: 373). Caribou meat is frozen or dried (ibid.) as is reindeer meat Nowak 1975:25). On the Bering Sea, fish is smoked (VanStone 1960:20). Greens and berries are put up with oil or frozen in freezers (Nowak 1975:25).

Besides salting of fish, fish may be dried, smoked, or frozen. Moose and duck are frozen or dried (Morgan 1974:128; Geudon 1971:54; Morehouse field notes). Berries are preserved in jam or frozen (Morehouse, field notes). Potatos are stored in a cool place.

Traditional preservation methods of freezing, preservation in oil, pickling, and putrifying were extremely good methods of preserving nutrient content. Because Vitamin C is water soluble and loss is rapid, preserving plants and berries in oil allowed for maximum retention of this vitamin and other vitamins as well.

Drying and freezing, of course, used in the past as well as the present are efficient for preserving nutrients. Traditional methods of oil packing, pickling, and putrifying are not commonly used anymore. It should be pointed out that there were times when oil-rendering processes and putrification were not properly done leading to cases of food poisoning. This became more of a problem as precautions were relaxed and people became careless. Fish eggs stored now in plastic

bags has resulted in food poisoning. One of the problems with present freezing of food is, of course, the cost involved in the purchase of equipment, refrigerators, and freezers as well as the high cost of electricity.

D. Taboos

1. Traditional Taboos

The economic, social, and religious elements of man and his environment were all tied to the importance of food gathering. The relationships of food to religion is an important area that needs discussion. While some of the foods not eaten may have religious connotations, for the most part they were associated with general distaste of the animal source. This was true particularly for birds (Nelson 1969:166; Spencer 1959:272). Both Eskimos and Athapaskans had restrictions and requirements of food for particular times when the relationship to the animal spirits was critical. Respect for food, animals, and religion were tied together. These relationships were expressed in ceremonial life as well as in the taboos.

The festivities that took place in midwinter, January and February, were extremely important to the people in a number of ways. It was a time of celebration when work involved with storing of food for winter use was over. It was a time of relaxation; it was a time to thank the benevolent animals and appease their spirits in order to insure their return; it was a time to remember the dead and honor individuals; and it served as a time of transition between past hunting season and preparation for a new. There were also ceremonies that surrounded life cycle events, such as boy's first kills, girl's first berry picking, birth, marriage

and death. In all of these ceremonies, feasting was essential. Food eaten for these ceremonies consisted of what was available. Feasting lasted as long as the food held out. The most important ceremonies revolved around the most important food resources, i.e., whale in the north, seal along the Bering Sea, caribou on the interior, etc.

The overall effect of taboos on nutriture may not have been great except when food was scarce; however, psychologically taboo observance or breach were important to the overall well being of the people.

The taboos related to food fall into two areas--those that are negative or those animals one is not to touch, kill, or eat, and those that are positive, those things which must be done to placate the animals spirits for good luck and to bring them back again. The Eskimos and Athapaskans lived in a world of spirits--animal, plant, and natural phenomena as the wind and fire. People had to coax and appease these spirits in order to insure food supply. As with ceremonies, the more important taboos concerned the important resources for each area, i.e., whale and seal in the northern coastal area; caribou, moose, and bear for the interior Eskimos and Athapaskans; fish for the riverine. Shamans or medicine men had special control and power over the spirits. As such, they had special songs, amulets, and taboos. For all, taboo breach would result in bad luck in hunting, illness, death, and famine unless the shaman and medicine men used corrective measures. Their ritualistic restrictions and requirements emphasized respect of animals and soul associations. Animals were taken because of need, but the souls were not forgotten.

The hunter had special taboos. One shaman said, "Life's greatest

danger lies in the fact that man's food consists of souls" (Birket-Smith 1936:166). He exposes himself to danger everytime he kills. For example, northwest Eskimo hunters had special food restrictions while hunting certain animals such as the whale (Rainey 1947:245; Spencer 1959:338) and among Pacific Eskimos no food was eaten for five days after killing an enemy (Birket-Smith 1953:33). Taboos for men were varied in that eating of certain foods was restricted to not only after killing of animals (Osgood 1958:66), but there were food restictions for after birth of a baby (Osgood 1958:66; Parsons 1921:51; DeLaguna 1969-70:23; McKennan 1959:140, 1965:58) and for having been in contact with women while giving birth or while they had menstrual periods (Olson 1968:33; DeLaguna 1969-70:23).

Taboos surrounding women were many and most related to times when she was menstruating, pregnant, or giving birth. She was considered dangerous to animal spirits. Many groups had restrictions on women in regard to bears as not eating of the meat and/or being anywhere near bear (Spencer 1959:271; Giddings 1961:20; Hosley 1961:108; Henry 1973:3; Loyens 1966:44,91; McKennan 1959: 140, 168; Olson 1968:34). It appears that taboos concerning bear is an interior taboo including all the Athapaskan groups but also interior Eskimos. Among the Ahtna, the feeling about bear is one of respect (Morehouse, field notes). It may be that taboo of bear for women is related to respect and fear of bears and to the protection of women. It seems to me that this taboo was one that males were more interested in enforcing than the women.

At birth, mothers usually had food restrictions whether it was not

eating of food for several days as northwest riverine and Bering Sea Eskimos (Spencer 1959:232; Lantis 1945:193) or not eating certain foods as among interior and Bering Sea Eskimos (Gubser 1965:28, Oswalt 1970:29) and among Koyukon, Lower Tanana and Ahtna Athapaskans (Leechman 1954; Jette 1911:703; McKennan 1959:166; DeLaguna 1968-70:23).

For Athapaskan young men, restrictions were related to various animals or parts of animals that could not be eaten, particularly bear, caribou, fish, and loon (Osgood 1966:174; 1959:24; 1971:48; Loyens 1966:44; Michael 1967:245; McKennan 1965:52; Paul 1974:3). These taboos were primarily related to training to be a hunter. For example, among Upper Tanana the milk bag of caribou was not to be eaten as it would make one too heavy and then you could not run fast when hunting (Paul 1974:3).

During puberty, girls were secluded sometimes as much as 30 or 40 days and food was restricted among all Eskimos (Birket-Smith 1953:81; Spencer 1959; Gubser 1965:208; Stefansson 1913; Giddings 1961:20; Oswalt 1967:201; Lantis 1960:76, 1945:193). Restrictions usually involved eating of no fresh meat. Eskimo puberty seclusion rites were less stringent than Athapaskan. Sometimes Athapaskan women were secluded a year, as for Koyukon (Loyens 1966:66), Lower Tanana (Olson 1968), and Ingalik (Osgood 1958:37). Usually food restrictions consisted of no fresh meat of particular animals. These seclusion restrictions were reported for Tanaina (Osgood 1966:162), Upper Tanana (Anderson 1956:16; McKennan 1959:140), Koyukon (Loyens 1966:67), and Ahtna (DeLaguna 1969-70:19). Restrictions also applied for later menstrual periods.

Food connected with death consisted primarily of restrictions for mourners and grave offerings in the form of food. This was true for

all Eskimo groups (Michael 1967:109; Gubser 1965:214; Giddings 1961:20; Stoney 1900:68; Lantis 1947:13, 1945:193) and Athapaskans (Osgood 1958:148; Michael 1967:248; Loyens 1966:95; Jette 1911:716; Clark 1970:82; Leechman 1954:28, Osgood 1936:150; Schmitter 1910:13; Olson 1968:101; McKennan 1959:168; Anderson 1956:16; Guedon 1971:306).

2. Change and Contemporary Taboos

Religious customs and taboos have almost completely changed since Christianity was accepted. How each religion handled the Eskimo traditions and introduced its own was different. The introduction of a taboo to refrain from Sunday hunting did change patterns of food gathering and for some it was a problem. Some old customs have been retained even though they are disassociated with supernatural beliefs. They tend to involve respect for animals. Some things are done because they have always been done even though reasons are unknown or have changed. For instance, the wife of a man who has killed a seal gives the seal a drink, "This has to do with the thirst of seal after life in salt water" (Pingayak n.d.); and heads are cut off and skulls are returned to the sea (Morgan 1974:90), "We always do it that way" or because "It gives the crabs a share" (Milan 1964:68). Among Athapaskans, people still give something back to mice and muskrats when their catches are taken (Guedon 1971:48; Morehouse, field notes). The bear taboo for women is still practiced among the Ingalik (Hosley 1961:108) and Koyukon (Clark 1970:84). Ahtna still will not eat flying squirrel, little birds, and bird eggs (Morehouse, field notes). Certain rituals surrounding caribou, moose, wolf, raven (Cerus corax), camp robber (Perisoreus canadensis) are carried out among the Ingalik (Hosley 1961:109). Wolverines and wolves are not eaten. Special

ceremonies still surround bear, wolf, and wolverine among Koyukon (Clark 1970:84).

Aside from the Bering Sea coastal and riverine Eskimos, few pregnancy and birth taboos remain. Lantis (1959:31) reports that at Nunivak, some taboos are done to be safe. In most areas, puberty rituals have disappeared, but in Napaskiak in the late 1950's (Oswalt 1970:45) girls were still secluded with taboos for 40 days.

Among Ingalik Athapaskans, girls in puberty and lactating mothers still maintain old taboos (Hosley 1961:108). They can eat no fresh meat, fish, or berries and must use special dishes. Girls are secluded and their food is prepared by their mothers. This seclusion was in existence in 1960, but whether it is now in existence has not been determined. Seclusion existed for Han in the 1960's (Osgood 1971:154) and for Ahtna in the 1950's (Morehouse, field notes). McKennan (1965:58) says few were secluded when he was there in 1933. The persistence of taboos among the Ingalik reflects a phenomena similar to the southwest Eskimo.

In the literature, there is no evidence that pregnancy and birth taboos still exist for Athapaskans other than the bear taboo.

CHAPTER 3. HEALTH

1. Traditional Status

Early explorers attested to the fact that given, existing living conditions in the Arctic, the natives were in good health. Some commented on their cleanliness as being less than European standards, while others found them clean, well fed, healthy, and hospitable (Murdoch 1892:61, Edmonds 1966:29). Weyer (1969:329) summarized the Eskimos as relatively free of disease. Adult death was a result of an accidents, famines, or old age.

Teeth were considered in excellent condition with no gingivitis or caries, an observation which is supported by skeletal remains (Hrdlicka 1944:31; Rodahl 1963:23). Teeth showed wear in front due to their use for softening of hide and sinew.

The statement that Alaska natives were in good health does not mean that they were disease free before contact. Health problems other than famine and accidents did occur. The environment required strenuous labor and strained the physical body taking its toll in the form of shortened life span. Female infanticide and the abandonment of ill and aged was another way of coping with scarce food and the necessity of mobility.

Simple aches and pains and common health problems were administered to with selections from native plants and animal pharmacopoeia. The use of plants has already been documented; many of these were medicines.

Medicines that were used reflected the availability of resources for the area. For example, natives living along the northern coast had fewer plant species to choose from so many of their medicines were

taken from animals, such as oil and blubber. Bering Sea Eskimo also utilized animal parts but included many plants (Lantis 1959:5ff; Lantis 1945:202). Riverine Eskimo and Athapaskan groups chose their pharmacopoeia from a variety of plants but among some groups, such as the Koyukon and Kutchin, few have been documented. For the Ahtna, I was told that there were many remedies and cures which involved the use of two or three different plants (Morehouse, field notes). This leads one to believe that the lack of information is due to lack of field data. However, it could also be explained by differences in vegetation since there appear to be chemical differences in the same plant species between areas and/or differences in available leisure time during which experimentation could take place.

Although it has been stated by some, such as Allen (1900:129), that the medicine men were in control of the medicines, this was not the case. In all areas in Alaska, knowledge of most medicines was available to anyone. Shamans and medicine men had control over certain ailments which usually dealt with internal disorders such as lungs, internal bleeding, heart, fractures, etc. The ordinary practitioner dealt with wounds, some broken bones, colds, stomach disorders, eyes, rashes, etc.

Certain diseases, some of them dietary, and other health problems probably existed in traditional times.

(a) Scurvy. Evidence that scurvy did occasionally occur has been reported, although it was not prevalent. Abercrombie (1900:38) had problems among his own party on the Copper River as did other exploratory parties, but no mention is made of the natives having scurvy. Tikhmenev (1974:121), Cook (Gunther 1972:195), Weyer (1969:329), and Edmonds (1966:29)

report incidence of scurvy among Alaskan Eskimos.

(b) Rickets. Evidence of rickets is missing, but there probably were occasional problems due to lack of sunlight in winter and poor food resources in the spring which would deplete bone calcium deposits. Part of the problem lies in the lack of skeletal evidence due to crematory practices of Athapaskans and the Eskimos placing of bodies on open tundra where bones were available to predators.

(c) Beriberi. LaPerouse and Portlock (Aronson 1947:3) discussed a disease that appears to be beriberi in Lituya Bay in 1786; otherwise there is no evidence that it existed. Beriberi is a thiamine deficiency disease.

(d) Upper respiratory diseases, eye problems, skin and stomach ailments were problems before contact among all Alaskan native groups (Edmonds 1966:29; Michael 1967:110; Tikhmenov 1974:121; Schmitter 1910:5; Allen 1900:45; Hrdlicka 1944:16; Sniffen and Carrington 1914:5; Reinhard 1974:5; Petroff 1900).

(e) Epilepsy and insanity, as well as mental retardation were known, but some of these people were assigned a special place in the culture, becoming shamans.

(f) Arthritis, humpback, and ill-shaped bodies have been noted by Edmonds (1966:29).

(g) Food poisoning from meat, shellfish, and polar bear liver probably happened occasionally, given the fact that it happens sporadically now (Baker 1962:177; McKechnie 1972:70).

(h) As a simple ecosystem such as in the Arctic does allow a few species of helminths and intestinal protozoa to exist, these organisms

undoubtedly would have created intestinal problems at times (Dunn 1973:228).

(i) Middle ear infection or otitis media has often been discussed in terms of a contact phenomena, but it may have been a precontact ailment. Facial paralysis has been interpreted from representations in native masks (Wagoner and Chun 1974:123). While most paralysis is caused by temporal bone lesion, surgical trauma or palsy, 8 per cent can be contributed to otitis media and another 8 per cent to other causes including TB. Given the high incidence in Alaska natives today (Maynard 1969:93; Brody, Overfield, McAlister 1965:29; Reed, Struve, and Maynard 1967:165), it is highly likely that otitis media occurred long before statistics were kept.

While it is realistic to consider what probably was in fact inevitable, it is more appropriate to discuss what happened after white men came. Conspicuously absent was severe dietary disease. Those diseases listed in the present health status and what are otherwise considered dietary diseases such as scurvy, rickets, pellegra, beriberi, anemia, and thyroid problems were not present to any extent.

2. Change and Contemporary Status

Early explorations--Russia 1741, Spain 1775, England 1776, French 1786--did much to disrupt Alaskan Eskimo and Indian populations by enslavement and disease. Among generally healthy natives, the introduction of new disease organisms for which there were no resistance took a devastating toll of lives. One old wise man on Kodiak connected with Glottof in 1753 said, "Who knows what sickness they [the Russians] may bring us" (Aronson 1947). Unfortunately, his foresight was borne out.

Destruction of villages and creation of orphans affected the family structure. Jenness notes (1962:31) that in 1916 decimation of villages by disease created orphanages along the Kuskokwim. Later, severe cases were sent to Seattle or other cities separating people by even greater distances. The spread of diseases in epidemic proportion also changed the demography of the population. Many villages disappeared.

Today, the populations are no longer dispersed over the vast territory, but clustered in village areas. As people gave up former mobility and settled into permanent communities the housing and clothing also changed. Resource depletion, increase in influx population, and lack of alternative native subsistence sources disrupt the ecological balance so much that people transmit disease faster (Reinhard 1974:1). When new factors are introduced into a population and change the balance, profound disruption occurs where not only disease and ill health prevail, but new diseases arise (Smillie and Kilbourne 1969:68; Newman 1962:32; Dunn 1973:228).

The etiology of disease among people is involved with beliefs about health and ill health. There are three elements to primitive medicine: (1) magical, (2) social, and (3) psychological and psychopathological (Achernecht 1971:7).

The Athapaskans in Alaska believed sickness could be caused by some object intruded into the body of the patient (Lantis 1954:11). Usually a medicine man was responsible and therefore he could also remove the evil spirit. That they were willing to accept medical care and antibiotics readily can be contributed to positive and immediate results of the new medicine and also to their receptiveness and flexi-

bility to new ideas. The Eskimos, too, attributed illness to shamans who then had the power to remove the illness. Possibly because of fear of shaman powers, the Eskimo quite readily was able to substitute Christian ideas and modern medicine and prayers for power songs and shaman power (ibid.). Integrations of old and new occurred among the Eskimos, but the Athapaskans almost totally replaced old ideas with new.

Modern medicines and physicians have replaced shamans and medicine men and, for the most part, the traditional cures.

Seal oil as a chest rub for cough and urine to stop bleeding, as well as the use of both for emetics [?], are used by some Eskimos (Chance 1966:62; Milan 1964:64). Cuts are still treated with blubber and snow-blindness and back pains with bloodletting. Herbs and burned flour are sometimes used for diarrhea (Chance 1966:62; VanStone 1962:33). In the Bering Sea area, holy water and steambaths are still used for remedies (VanStone 1960:25; Oswalt 1970:95). Other remedies in the southwest are lichen for weak condition, willow bark as a poultice, cottongrass for general health, and camomile (Matricaria matricoroides) for colds (Oswalt 1970:95). Lantis (1959:15ff) lists salmonberries, mossberries (Oxycoccus microcarpus), cranberries, tea, and marsh marigold as medicines still used.

References for current use of traditional medicines among the Athapaskans do not exist. Among the Ahtna, Labrador tea for stomach ache, birch bark for poultice, spruce gum for sores are occasionally used (Morehouse, field notes). Spruce gum for sores may be used by Chandalar Kutchin and Koyukon (Morehouse, field notes).

Diseases in Alaska which appear to be related to change in diet

and environment and to poor nutrition include tuberculosis, upper respiratory, and neoplastic diseases, anemia, diabetes mellitus, obesity, tooth caries, cardiovascular problems, osteoporosis, alcoholism, and intestinal infections. For any diseases in Alaska, medical records and statistics have only been kept during the last twenty years. Statistics before that time are ambiguous and whether these problems were present earlier is hard to say. Other problems with these statistics are due to unreported cases and a tendency to lump Eskimo and Indian together under the census category of Indian.

a) Tuberculosis

"Epidemiological and experimental studies indicate the important role that adequate nutrition plays in establishing and maintaining body resistence to the development of TB" (Parran et al. 1954:VI 43). In this sense, food is medicine and the relation of nutrition to infectious diseases is important.

In 1955, Alaska led the U.S. in active TB rates and, while death rates were decreasing the incidence of TB was increasing due to better reporting and detection. The TB death rate has dropped from 650/100,000 in 1950 to 26/100,000 in 1960 for Alaska natives (Kaplan, Fraser and Comstock 1972:924). This decrease was due primarily to efforts by the U.S. Public Health Service and the Alaska Department of Health and Research by the Arctic Health Research Center. Early detection, BCG vaccine, separation of tubercular patients into private sanitariums, and the cooperation of the natives were factors responsible for checking the disease. Later, isoniazid prophylaxis lowered its incidence; however, TB still remains a problem. In 1970, there were no deaths from TB and

the incidence had decreased from the higher prevalence 1,854/100,000 in 1952 to 436/100,000 in 1960 and a decreased incidence of 141/100,000 in 1970 (ibid.).

Although TB appears under control [Recent information indicates a rise again of TB in some rural areas (Personal communication, Alaska Health and Social Services)], the after-effects of those seriously afflicted present other problems. Chief among these is corneal scars or phylctenular keratoconjunctivitis (PKC). Early thoughts about PKC was that it was partially cultural in origin (Fritz 1947). "The practice among these people of transporting the children on their backs inside the parka where the children's faces come in contact with fur" was thought causative. In 1947, of 400 TB patients in the state, 127 Eskimos and Indians were affected by PKC (Fritz 1947).

In 1958, a survey of 5,480 Eskimos and Indians revealed that 41 per cent of all age groups show scars of the cornea (Colyar n.d.:81) and in 1958, 40 of 175 children and 25 adults at Ft. Yukon had this problem (Alaska Health 1955:15). Visual acuity of children with scars is inferior to that of children without scars. The early treatment of TB prevents scarring. Other factors believed responsible for eye problems were nutritional deficiencies, poor sanitation and actinic rays. It has since been concluded that TB is primarily responsible (Fritz and Thygesen 1951:24).

The epidemiology of the Arctic has interested many scientists in recent years (Dunn 1973:321; Reinhard 1974:25; Birdsell 1973:229; Newman 1962:23). Genetic resistence to disease is difficult to detect. It

is easier to relate the expression of various diseases to environment rather than genetics; e.g., TB has been related to poverty, crowding, sanitation, etc. But, according to Smillie and Kilbourne (1969:64), one indication of a genetic relationship to TB is the existence of TB in identical twins in different environments. This has been shown to be the case not only for TB but also for polio (ibid.). It seems probable then that Alaskan Eskimos and Indians not only had no resistance to some diseases but might also have been susceptible because of genetic differences.

b) Upper Respiratory Diseases

In 1954, TB was the leading cause of death among the Alaska Natives (Parran et al. 1954:III, Fig. 4), but accidents and upper respiratory problems were reported to be second and third, respectively. With a decrease in TB, accidents and upper respiratory ailments are now listed as the leading cause of death among Alaska Natives. In 1956, 90 per cent of 150 children on the Kuskokwim were afflicted by eye, ear, nose, and throat disease (EENT) (Alaska Health 1955:8). In 1968, 15 per cent of the natives hospitalized in the state were hospitalized for respiratory disease. Seventy-five per cent of the infant deaths were caused by respiratory disease. Most of the infant deaths occurred before the age of one year (Fleshman 1968:40). Of these ailments, otitis media, or middle ear infection, ranks first. Ten to fifteen per cent of native children in Alaska had otitis media in 1968. Wallace (1973:452) stated that if a child has otitis media before one year of age, chances of repeated attacks increase. If hearing loss occurs, surgery and other medical treatment are necessary in order for the child

to develop proper speech and language (ibid.). Two thousand tympanatomes were done in Alaska in the years 1969 to 1972. Kemberling (1973:1067) says complications from these surgeries have been nearly eliminated. In 1965, 22,614 cases were reported, and in 1969, there were 39,351 cases (ibid.).

Whether otitis media was present before contact is speculative, but if facial paralysis is evidence, the possibility exists. Alaskan Eskimo-Indian children are more susceptible to otitis media than Caucasians (Maynard 1969:95; Brody n.d.:1; Reed, Struve, and Maynard 1967:1162; Brody, Overfield, and McAlister 1965:33). However, American Indians, in general, have this problem (Mortimer 1973:1065). Respiratory infections are the predisposing causes of otitis media, but diet has also been implicated. Low infant hemoglobin levels are related to iron deficiency anemia, and anemia is related to infections. Low hemoglobins are found in bottle-fed babies without adequate iron supplementation, but not in breast-fed children (Maynard and Hammes 1970:621; Howes 1975:6). Eskimo babies fed with bottles in the first month of life showed that low hemoglobin levels are five times as high as in breast-fed babies. Middle ear pathology is ten times as high in these bottle-fed babies (Schaefer 1971:488). Whether this is due to increased dietary iron in breast milk as compared to bottle milk or due to protective factors of breast milk and the provocative factors of cow's milk and/or sanitation problems is not clear. It may be contributed to all factors or factors not mentioned.

Early treatments for otitis media consisted of removal of the tonsils, the adenoidal tissue and, in some cases, mastoidectomy (Colyar n.d.:85;

Parran et al. 1954:VI 78). Maynard's study (1969:96) points out that the critical age is in the first year, during which time these operations are not practical. Rather, early antibiotic prophylaxis might be appropriate (ibid.). The treatment not only needs to be early but with the right antibiotic (Alaska Dept. HEW 1962:79). Laboratory analysis in rural areas has not been possible, so ampicillin has generally been recommended (Maynard 1969:97). Repeated infection of otitis media resulting in hearing losses of 26db or greater (Kaplan et al. 1973:585) has been found in Alaskan children. The loss was reported as high as 30db in Canadian children (Ling and Baxter 1974:38). Otitis media seems to be more frequent in rural areas than in urban areas (Johonnatt 1973: 418), which would implicate poor housing and sanitation conditions as a relevant factor. Another study (Weymuller 1974: 867) indicates that Eskimos seem to have a wider eustachian tube oriface and it is possible that the angle at which the tube leaves the nasopharnyx is different than in white men. Pathogens then might penetrate to the middle ear more easily. There is apparently a relation between infected adenoid tissue and otitis media. As more studies take place in this area, more will be known whether its occurrence is related to diet, housing conditions or physiology or perhaps all. The loss of hearing becomes in children put them at a disadvantage in terms of education. Children with hearing loss were reported to have a a definite loss of verbal ability and were retarded in math, reading, and language (Kaplan et al. 1973:583).

c) Neoplastic Diseases

In general, factors relating to cancer are not all as definitely

correlated as are smoking and lung cancer, but cancer is generally considered a disease associated with advanced technological societies. Some possible relations exist between nutrition and various cancers (e.g., liver cirrhosis, choline deficiency and liver neoplasms; iron deficiency and upper alimentary tract cancers; poor nutrition, drinking, smoking, and esophageal cancers; smoked meat, smoked fish, and stomach cancers), but these associations warrant further study (Wohl and Goodhart 1964:1068f). The prevalence of various cancers among Eskimos and Indians has not been fully studied.

d) Anemia

Among Alaskan natives, low hemoglobin levels in blood began to show up relatively early. In 1954, Scott, Wright, and Hanan (1955:141) found men to be moderate in hemoglobin levels, but 158 Eskimo women were found to have levels of 10 mg/100 ml. Of these women, 6 per cent of the hemoglobin levels were below 8 mg/100 ml. In the women below 10 mg, anemia was microcytic and hypochromic. The low hemoglobin levels were apparently nutritional; some anemias were improved by iron therapy. Children on hot-lunch programs at schools and National Guardsmen on a military diet did not have anemia (ibid.:146). Because variations between men and women and individuals occurred and there was a lack of consistency, it was believed iron deficiency and some other factor were responsible for the anemia. In 1961, Scott (1961:3) suggested the other factor to be low caloric intake in these people. This problem is more acute in winter when fresh foods are restricted and more prevalent in areas that rely on fish, such as in western Alaska (ibid.). Cereal products contribute most of the iron from store food (Scott and Heller 1964:282). The impor-

tance of iron levels in blood and infection has been discussed in terms of otitis media; it also relates to other infections.

e) Diabetes Mellitus

Diabetes is a hereditary or developmental disorder which is characterized by a raised glucose concentration in the blood due to deficiency or diminished effectiveness of insulin. Diabetes affects metabolism of protein and fat also.

The traditional diet which was high in protein and low in carbohydrate produced no evidence of ketosis and diabetes was not present. Normally in a high carbohydrate diet, the citric acid cycle operates at a high level incorporating ketone bodies which are oxidized and utilized as metabolic fuel. When the carbohydrate level is low, ketone bodies are not incorporated and normally ketosis develops. An adaptation occurred among Alaskan natives that prevented this from happening (Draper 1977b:312).

In 1962, only one case of diabetes in Alaskan Eskimos was reported (Mouratoff, Carroll, and Scott 1967:962). The rarity of the disease has been associated with a high tolerance to a glucose load and a high degree of physical activity. A change in diet incorporating more carbohydrates will increase the sugar in the body. In 1973, Mouratoff and Scott (1973:1346) conducted a similar study and found 6 per cent more people were overweight and 4.5 per cent more were intolerant of glucose than in 1962. A change in weight and decreased physical activity [less hunting and more labor-saving devices] is suggested by these authors as a cause for the increase of diabetes. There are three times as many cases of diabetes in Arctic Canadian Eskimos as ten years ago (Schaefer

1971:13). One might logically predict an increase in diabetes in the future (Mauratoff and Scott 1973:1346; Schaefer, Crockford, and Romanowski 1972:738; Schaefer 1971:13; Fairbanks Daily News-Miner Dec. 10, 1973).

f) Obesity

Diabetes in overweight people is only one of a series of problems and while obesity is not common among natives as yet, the increase in carbohydrates in the diet and the decrease in physical activity will increase the number of people who will have overweight problems. Associated with the increase in diabetes and obesity are increased gall bladder problems; this is now being seen among Canadian Eskimos (Schaefer 1971:15). Still, one other problem associated with high carbohydrate levels, and which afflicts the teenagers, is acne vulgaris. Researchers and the young people, themselves, attribute this as due to consuming "pop, chocolate, and candies" (ibid.). Draper (Unpublished manuscript) notes an increase in incidence of obesity, particularly in females and more so in southern than northern Eskimos.

g) Tooth Caries

Next to TB, no health area has received greater attention than the dental problems among Alaskan natives. Aside from wear on the front teeth, Eskimos were noted for their healthy teeth. When their teeth began to be carious is difficult to determine exactly, but Hrdlicka (1944:311) notes in 1926-31 that the teeth were good in the Kuskokwim area, but on St. Lawrence Island, the teeth of the children were not as good as their parents (ibid.:94). It must have started to become a problem at that time due not so much to diet change as to general poor health.

In the Kuskokwim area in 1939, children with no cavities were given candy and in six weeks, three-fourths of them developed cavities (Waugh and Waugh 1940:489). While this is questionable in terms of ethics, the study does point out what can happen in a short time with the introduction of refined carbohydrates. At that time, most natives were beginning to experience widespread caries (Totter and Shuker 1948:4); this was attributed to the diet change during the Second World War.

Recent decayed, missing, and filled (DMF) rates from 1957-72 for ages six to seventeen are listed in Table 4 (Wallace 1973:453). Two studies by Bang and Kristofferson (1972:444) conducted at Anaktuvuk Pass were done in 1955-57 and again in 1965. The studies indicate that 50 per cent of the children for the earlier period were carie-free but all had decayed teeth in 1965. In people over thirty, none had cavities for the early study, and all of them had cavities in 1965. This relationship had been directly correlated to dietary changes and is true for Canadian Eskimos as well (Mayhall 1970:118).

Table 4. Decayed, Missing, and Filled (DMF) Teeth Rates.

Year	Decayed	Missing	Filled	Total DMF
1957	2.49	0.40	1.11	4.00
1969	2.42	0.32	3.13	5.88
1972	2.43	0.32	3.19	5.92

In 1939, Waugh and Waugh (1940:483) showed that for Eskimos of

Western Alaska, 85 per cent of the mouths that were free of caries contained no lactobacilli. This was confirmed by a later study (Rosebury and Waugh 1939), which showed that natural sugars from Eskimo foods do not initiate or cause increase in oral lactobacilli or in cavities, but Eskimos consuming refined sugars showed an increase in oral lactobacilli increasing dental cavities (ibid.). This has been shown for the Aleut as well (Moorhees 1957:137). A more recent study at Kotzebue (Wood 1971:353) indicated that decay and premature loss of teeth, which results from a changed diet which incorporates starches and sugars, has also caused the incidence of malocclusion to rise dramatically. Crowding, cross-bite, and edge-to-edge bite creates a problem not only in eating but also cosmetically, which some of the young people feel self-conscious about. As yet, there is no indication that the jaw relationships are affected (ibid.). Dental caries are generally associated with microorganisms which cause decay, the amount of saliva in the mouth [more = better], genetic traits, and the amount of carbohydrate, particularly mono and disaccharides (Wohl and Goodhart 1963:663). That natives experienced the problem of tooth decay goes without saying. The Fairbanks Daily News-Miner articles in October 1974 relate:

1) At Anaktuvuk Pass, "People here are having toothaches for some reason. We need a dentist right away and it is so high to go to Fairbanks just to see dentist its about $87.50 one way to Fairbanks, so thats $174.00 round trip. We don't have that kind of money" (Fairbanks Daily News-Miner 15 October 1974).

2) At Rampart, "Betty Ann Taylor who works in the store is in Fairbanks getting some dental work done. It is almost an even bet

here that she dodges the dentist altogether" (Fairbanks Daily News-Miner 12 October 1974).

One additional area that deserves more study is the relation of the increase in the DMF rates to otitis media (Brody n.d.:2). At Hooper Bay, the rate increase of DMF correlates with a rate increase in ear pathology. Whether these correlations are directly or indirectly related through health and poor nutrition is not determined. The problem of caries is, of course, compounded not only by bad food choice but also by lack of oral hygiene due to inadequate education, lack of fluoridated water, lack of dental care, and lack of funds for air travel. An increase of dental service in the last few years in terms of visiting dentists and hygienists has taken place, but only 54 per cent of the population under twenty years of age is receiving dental service (Wallace 1973:453).

h) Cardiovascular Problems

In 1950, heart diseases in Alaska ranked seventh as cause of death (82.7/100,000) for natives in Alaska, but by 1960, heart disease ranked third (80.4/100,000) among natives (Robinhold and Rice 1970:83). Overall, the crude rates have been lower than the rest of the U.S., but heart disease is considered a technological disease and one can expect it to increase as acculturation of natives increases.

Atherosclerosis is increasing nationwide. Atherosclerosis is characterized by accumulation of fatty materials in the arteries, which may be a result of dietary fat composition (Mayer and McGowdy 1973:38). Heredity, body build, obesity, blood cholesterol, high blood pressure, sedentary living, diabetes, and cigarette smoking are risk factors associated with this disease (ibid.).

Hypertension is high blood pressure characterized by thickening of arterioles. It is correlated with overweight and high salt intake. High intakes of salt from infancy may be important in aggravating hypertension. Aboriginal Eskimos and Indians had low intakes of salt, principally derived from sea water, and thus had lower hypertension levels (ibid.). Draper (1977b:315) reports an increase of hypercholesteremia and blood pressure levels among people in the southerly villages of Kasigluk and Nunapitchuk. The northern villages of Wainwright and Point Hope were still below the national average.

At this time heart disease is still not a noticeable problem; rates are low compared to the rest of the United States (Maynard, Hammes, and Kester 1967:717). The disease prevalence in the southwestern and northern areas was lower than in the southeastern and southcentral areas of Alaska (ibid.). Aleut, Indian, and Eskimo rank in that order for deaths between 40-65 years old but Indians, Eskimo, and Aleut ranked in order for 65 years and over. They reported that attempts to correlate environmental and genetic factors were not possible at that time. Males over 65 had higher rates than females. In 1976-77, the Alaska Native rate of death from heart disease and hypertension was 11 per cent higher than the non-native rate (Statewide Health Coordinating Council 1980:4-55).

Atherosclerosis specifically is associated with a soft, morphous lipid accumulation in the arteries. It consists of plaque build-up in blood vessels which restricts blood flow and causes formation of thrombi and hemorrhaging. The exact mechanism of lipid deposits in vessel walls is unknown. A recent theory called monoclonal theory suggests there are genetic factors and mutagenic factors responsible;

thus, atherosclerotic plaque may be a form of neoplasm (Benditt 1977:74ff).

Hyperlipidemia is a high concentration of lipids in the serum. This, then, is the importance of testing for lipids and cholesterol levels in the blood for predetermining factors of atherosclerosis. High carbohydrate diets result in hyperlipidemia of tryglyceride and cholesterol type. There are two substances which control the circulating blood cholesterol level, dietary cholesterol being one. Cholesterol is readily synthesized in the body from the two-carbon molecule acetate. All substances which yield acetate [amino acids and carbohydrates] are precursors of cholesterol. Almost all foods can be the source of acetate; hence, cholesterol. Most tissues may synthesize it. The biological function is as a precursor of hormones, the end products of which are bile acids and are important as emulsifiers of fats and thus promote intestinal lipid absorption. Certain foods--eggs, shellfish, sweet-breads--are rich in cholesterol. Dietary intake of these foods will tend to raise cholesterol blood levels.

The other factor which raises blood cholesterol levels is dietary fats, specifically saturated fats [butter, margarine, chocolate and fats of animal origin]. Unsaturated fats tend to make serum cholesterol go down [most vegetable oils, except olive oil]. Marine animals such as sea mammals and fish are low in saturated FA [18-20 per cent] and high in unsaturated FA [70-80 per cent] (Wohl and Goodhart 1964:928). Also, caribou meat is higher in polyunsaturated fatty acids than beef (Draper 1972-6:311). Thus, while natives were consuming high proportions of dietary cholesterol, they also were consuming low proportions of saturated FA. A diet change to commercial saturated fats would tend

to raise FA in the blood.

As previously mentioned, Corcoran and Rabinowitch (1937:388) found cholesterol levels in Eskimos to be low. This was confirmed by Wilbur and Levin (1950:424), Sinclair, Brown, and Crank (1949:), Rodahl (1954b: 193), and Pett and Lupin (1958:488). Scott et al. (1958) found normal ranges [ave. 214 mg/100 ml] but with geographic variation--the levels of northern Eskimo were higher than the southern Eskimo. Ho et al. (1972:738) found averages of 420 mg to 1,650 mg per day at Point Hope, where people were still living primarily on subsistence. Obviously, extreme seasonal variation and individual variation occurred. Also, data are open to research error--either in sampling or analysis. Earlier studies are statistically less reliable than more recent studies. A diet which derived 50 per cent of its calories from fat, 30-35 per cent from protein, and 15-20 per cent from carbohydrate gave averages of 221 mg/100 ml, indicating values similar to Scott (1958). Robinhold and Rice (1970:85) found cholesterol levels within normal range at Wainwright. The Feldman et al. study (1972) found triglyceride levels lower than the rest of the U.S., but high free FA levels indicating that phospholipids may play a major role in body enzyme production. Prebeta proteins were lower than the U.S. averages, but alpha and beta lipoproteins were the same. The study indicates there was an adaptation to a diet of hypocholesterol, alternating with hypercholesterol, and an adaptation for increased intestinal absorption which kept the total serum levels normal and reduced the incidence of atherosclerosis. How long this will persist as an adaptation is not known. Baker (1969: 615) expresses concern over infant cholesterol levels with the intro-

duction of cow's milk. Levels of 150-160 mg/100 ml are higher than children's levels of 125 mg/100 ml in Sweden and 136 mg/100 ml in Columbus, Ohio [base for comparison]. Triglyceride levels were also higher (Ibid.:616). Concern for present levels of adults is not urgent if the diet is based primarily upon subsistence. Concern is expressed for children on bottle formula and those whose diet has changed drastically.

i) Osteoporosis

While presently this is not a great problem, an increased incidence of osteoporosis is due not only to longer life, but also to diet changes and specifically the change in calcium-phosphorus levels and balance. This problem area needs to be watched. A recent study (Mazess 1970:116) indicate aging bone loss occurs in Alaskan and Canadian Eskimos. Beyond 40 years of age, the rate of loss of bone mineral is estimated at 10 per cent per decade in males and 15 per cent in females. This is to be correspondingly compared to U.S. whites at 5 per cent and 10 per cent per decade. The cause is believed to be related to a diet high in protein and phosphorus and low in calcium.

j) Alcoholism

The major importance of alcoholism to nutrition is considered the effect of overall lowered nutrition and the development of liver cirrhosis. Because it detracts from the family food budget, it is a concern to nutritionists as it affects the level of nutrition among low income families. Also, as alcoholism among natives increases, a tendency to obesity and lethargy increases.

In the current American environment, the prevalence of malnutrition

among chronic alcoholics is less than 20 per cent, with frank deficiency disease less than 3 per cent (Olson 1975:1042). Chronic alcoholics tend to eat poorly while drinking but may eat adequately during periods of sobriety. This intermittent fasting-eating is apparently enough to prevent malnutrition. Nutritional deficiencies to which alcoholics are prone include protein, water-soluble vitamins, particularly B-complex, and the minerals magnesium, potassium and zinc.

Concern is expressed for Native Alaskans who do not have sufficient money available to purchase both nutritional food and alcohol. The pattern of "binge" drinking when economic resources are available and alcohol is readily accessible, as during pipeline construction, has created problems in some rural villages. But excessive drinking is not necessarily limited by those conditions. The increase of alcohol and drug abuse is reflected in a study by Krauss (1977) and represented in Table 5. Recently, attention has been placed on the problem of alcohol consumption of pregnant women and the deleterious affects on the newborn baby. Teenage drinking and teenage pregnancies are both on an increase. The combination of drinking and teenage pregnancies among Alaskan women could be a serious problem.

k) Intestinal Infections

Two common classes of intestinal infection occur in Alaska: (1) food poisoning and (2) parasites, which have probably been prevalent for some time.

Food Poisoning

Stefansson in 1929 (Doleman 1960:230) noticed many families died from bad whale meat, probably as a result of botulism occurring in infected

Table 5. Alcohol and Drug Abuse Among Alaskan Natives. First visits and incidence rates for ambulatory patient care given in Indian Health Service facilities for diagnosis relating to alcohol and drug abuse. Fiscal year 1971-1977. (Krauss 1977).

Fiscal Year	First Visits	% of Total Visits	Incidence Rate/100,000
1971	2,012	1.8	3,972
1972	2,401	2.0	4,670
1973	3,592	2.5	6,885
1974	3,501	2.9	6,594
1975	4,129	2.9	7,659
1976	3,712	2.5	6,783
1977	4,208	2.6	7,577

wounds when days-old whales were consumed after being washed ashore. It is reasonable to assume that from time to time occasional food poisoning occurred due to preservation methods, the eating of undercooked meat, and the fact that polar bear, fox, beluga, walrus, and bearded seal may carry trichina. Among Eskimos, this relationship was known for polar bear; they would not eat it raw.

(1) Poisoning from spores of Clostridium botulinum or botulism has taken place among Eskimos and Indians. Of particular importance is the method whereby salmon eggs are preserved (ibid.). Outbreaks have been shown to occur in beluga flippers and in whale fluke which was poorly fermented and then undercooked. The spores of botulinum apparently germinate along coastal ocean floors in the Arctic, which are then acquired through sea mammals.

In 1972, there was a Clostridium botulinum Type E outbreak at Kotzebue, Point Hope, and Elephant Point (Miller, Clark, and Klingle (1972). Colyar (n.d.:92) lists thirteen outbreaks of botulism in 25 years involving 44 persons and 23 deaths in the last 15 years. These are known cases, but there are probably cases which go unreported or undetected. The recent practice of storing fish eggs in plastic bags providing ideal conditions for spore production could lead to higher incidence of food poisoning.

(2) Paralytic Shellfish Poisoning is a problem associated with the red tide. Poisoning is due to minute dinoflagellates which are then ingested by shellfish which stores the toxin. The natives claim they were able to detect a time when not to eat them. Nonetheless, from time to time there has been poisoning.

(3) In 1969, Salmonella enteritis at Nelson Island resulted from uncooked muktuk from tail flippers of dead whales. There were no deaths but 105 were afflicted (Bender et al. 1972).

Intestinal Parasites

While some species of intestinal parasites existed, the degree to which they affected overall health and the various populations in Alaska was insignificant.

The fundamental problem associated for nutrition with parasites is in terms of sanitation and disease resistence. The solution to these problems are related to water and waste disposal problems, as well as improved housing and infant feeding practices. "Every community is different and solutions need to be adjusted to individual problems. It is possible to work out systems for every problem"

(Day 1951:922). It would appear that the technology to solve these problems exists. The problems then lie in the felt need of the people to solve these problems and adequate funding.

CHAPTER 4. DISCUSSION AND IMPLICATIONS

1. Traditional Diet Analysis

Nutrition usually plays a part in disease. In Alaska, resource depletion due to overkill with technological changes, whalers, traders, and other outside hunters and change of life style has placed a nutritional stress on natives. Inadequate food intake increases the possibility of infection. Additionally, as already mentioned, diseases and starvation went together in Alaska because natives were unable to hunt when ill.

Eating is not just a matter of consuming food in order to nurture the physical body, but rather it reflects a complex interrelationship between the economic pursuit in relation to the social and religious aspects of the cultures. Great variance in the way in which the goals were accomplished occurred, not only between groups of related people such as the Athapaskans, but within the groups as well. Most of these variations were in different ways related to the ecology and resource exploitations and were necessary in order to survive. That they were successful, barring exceptions, is a tribute to the ingenuity and flexibility of the people. It has been pointed out that the balance beween human society and nature was achieved by taking only what was necessary, by taking a range of what was available, and by complete utilization of what was taken from the ecosystem.

Utilization of plants and animals provided sufficient calories, although diet very much depended upon the availability, ease of collection, and custom. The main sources of calories were protein and fat. The proportion of calories derived from protein and fat has been a matter of

controversy. The early observers noted fat in the diet as contributing the major proportion. Much of this was assumed because of observation methods. Differences between findings are probably due to regional differences between the north and south and/or between Eskimos and Athapaskans which depict differences in diet between marine mammal diet and high fish-plant diet (Heller-Scott 1956-60). Other factors accounting for differences in study results are reflective of change in diet since the earlier studies and differences in diet due to seasonality (Feldman, Ho, Lewis, Mikkelson, and Taylor 1972). Additionally, experimental methods and techniques have been improved (ibid.).

While the diet was higher proportionately in fat than the European diet (Rodahl 1954; Heinbecker 1932:282), it has been shown that the fat intake was moderate and that energy derived from protein was exceptionally high (Krogh and Krogh 1913). The total caloric levels varied, but 280 grams from protein, 135 from fat, and 54 from carbohydrate [mostly from meat glycogen] gives a total of 2,640 calories. This figure seems somewhat low given higher figures which were calculated later; but, depending upon the quantity that is eaten, the caloric level would vary. In addition, the relative proportion of fat intake would have varied seasonally. Generally, during the summer but varying with area, more fresh meat and fish and plants were available to provide more protein and carbohydrate; while in the winter, calories would have been coming from oil, meat and plants preserved in oil, and fish dipped into oil, as well as from fresh food sources. The amount of calories required for energy needs are slightly higher in winter because of cold temperatures and because the burden of heavy clothing restricts movement and more energy is needed by

hunters and people moving about (Rodahl 1954:285).

There is a difference between white and Eskimo-Athapaskan in terms of Basal Metabolic Rate (BMR). Eskimos have shown a high BMR, which is adaptive for extremely cold temperatures (Mitchell and Edmond 1951:6, Law 1957:9; Milan and Rodahl 1961:155). The mechanism creating the high BMR is due to ability to metabolize a high fat-protein diet without evidence of ketosis, an increased nitrogen excretion in the urine (Evonuk et al. 1962:179; Milan and Evonuk 1967:567; Drury, Vaughan, and Hannon 1959:97, Heinbecker 1932:282; Corcoran and Rabinowitch 1937:348; Sinclair, Brown, and Crank 1949:255).

The high fat-protein diet has an additional advantage in that fat has a satiety value which is important in cold climates (Mitchell and Edmond 1951:40). It also spares thiamine (Evonuk et al. 1962:179; Scott and Griffith 1957:421) by allowing somewhat lower levels of thiamine intake to exist without detrimental metabolic problems and poor growth. Mitchell and Edmond (1951:40) suggest that a higher fat diet also improves the metabolism of carbohydrate and vitamin C, in addition to thiamine. Also, the increased specific dynamic action of high protein may be helpful for cold tolerance (ibid.).

A diet high in fat and cholesterol intake, but low in blood cholesterol, has been reported by Corcoran and Rabinowitch (1937:348). Some researchers (Rodahl 1954:71; Pett and Lupine 1958:488; Sinclair et al. 1949:255; Wilbur and Levine 1950:422) found blood cholesterol levels to be the same as white people. According to Rodahl (1954:31), blood pressure levels were lower for Eskimos with no evidence of cardiovascular disease. However, Scott, Hoskins, Griffith and Whaley (1958) found

evidence of high blood pressure. The Feldman group reported insignificant serum cholesterol differences in relation to Caucasian people, but Eskimos had a greater capacity to absorb cholesterol. They also found low triglyceride levels [a high level associated with high carbohydrate diet]. Free fatty acid (FFA) levels were higher than those for the U.S. white average, but not high in ketone bodies, indicating FFA plays a major part in energy production, as does the presence of sufficient carboyhydrate. The greater capacity to intestinally absorb cholesterol is a long-term adaptation to higher fat diet and essential for survival (ibid.:741). Apparently atherosclerosis is evident in post mortum patients but not severe enough to be seen clinically. This may be explained by alternate periods of hyper-hypocholestermia, whereby high levels during times of plentiful food supply is complemented by periods of no intake and a gradual removal of cholesterol from the body at that time, preventing serious build-up in the vascular walls. Thus, while atherosclerotic symptoms exists, they are not severe enough to be noticeable and manifest themselves the same as in the rest of the U.S., which is typified by a consistent hypercholesterol diet leading to heart problems. A National Heart Institute Study confirms the reversibility of serum cholesterol by diet restriction (Gilmore 1973:184).

Another point about high cholesterol levels is that a diet of fish and marine animals consists primarily of unsaturated fats, as opposed to saturated animal fat. Saturated fats raise the serum cholesterol levels while unsaturated fats lower levels (Gilmore 1973:184; Albanese 1972:3).

Depending upon the ratio of carbohydrate to fat and to protein in the diet, other dietary adaptations that occur over time are reflected in

respective enzyme levels (as:amylase for carbohydrate, lipase for fat, trypsin for protein) in tissues and intestine. According to Fabry (1969: 11ff), an increase in one energy source over another leads to a preferential use of that source for energy. A reduction of an energy source leads to change of those enzymes and those pathways associated with the metabolism in the system. A diet high in fat would result in increased metabolization of fat, increased oxidation of fatty acids, increased formation of ketone bodies in the liver [usually], preferential use of fat reserves for energy and reduced lipogensis from acetate and glucose in the liver and adipose tissues, due to shortage of carbohydrate activity of the pentose cycle. A diet high in protein would increase enzymes associated with catabolism of protein and amino acids for sources of energy and increased enzymes for noncarbohydrate sources. An immediate increase of protein results in liver glucose-6-phosphotase increase in the beginning which later levels off. An increased formation of urea also occurs. These changes would have occurred for Alaskan Eskimos and Athapaskans with a concomittent loss of enzymes associated with low carbohydrate intake.

Some of the most obvious genetic adaptations occur in enzymes. The most prominent enzyme studied has been lactase for milk lactose (Albanese 1972:3; Launiala 1972:5). The low activity level of this enzyme has been viewed by health researchers as a prevalent problem with African and American Negroes, Asian populations, and Arctic populations. Intolerance of lactose is especially true of people with a nondairying history. This suggests that tolerance is a result of milk present in the diet for centuries. A mixing of gene pools in-

Table 6. The History of Dairying and Prevalence of LM in Different Cultures. (Sahi 1972:13).

	Years	Percent
Egypt*	5,000-7,000	80-90
Western Europe	4,000-5,000	
England		6-32
Switzerland		6-17
Denmark		2-6
Finland	3,000	15-17
North and South America	300	50-70
China and Thailand	100	90
Lapps	200	?

*No explanation is provided for figures in Egypt.

dicates a decrease in intolerance suggesting a hereditary dominant factor. Everyone at birth has a tolerance, but it diminishes after weaning. Indians and Eskimos in Alaska have been estimated as 80 per cent for Lactose Malabsorption (LM). It manifests itself by the inability to digest large quantities of milk without severe diarrhea. Most adults as well as children are able to tolerate at least one cup of milk at a time. By ingesting several cups at various intervals during the day, it is possible to achieve the recommended amount in the diet. It is more difficult for pregnant and lactating women to acquire the desired amount without difficulty (Draper 1977b:313). The problem can be handled through use of processed milk products as cheese, yogurt, and lactose-free milk. Sahi (1972:14) gives history of dairying in relationship to LM prevalence

in Table 6.

Sucrase, the sugar-splitting enzyme, has also been identified as low in Eskimos (Draper and Bell 1972:15; Draper, Bell, and Beggen 1973: 1190). The symptoms are similar to those of lactase deficiency. Cake, ice cream, and carbonated beverages create the same problems as milk for LM. "It is possible that sucrase deficiency is confined to the Arctic region where sucrose has been virtually absent from the diet for many centuries" (Draper 1977b:313). Sucrase deficiency is present from birth. It is more difficult to regulate than lactase deficiency as it imposes more restrictions on food.

Undoubtedly, there are other enzymatic adaptations to diet which have not been identified as yet. The possibility that other enzymes may have a low frequency among Eskimos and Indians remains for further study. Among humans, there are marked individual variations in the metabolism of drugs that are handled primarily by microsomal enzymes. "Genetic factors may play an important role in the metabolism of drugs" (Kappas and Alvares 1975:22-23). One such study that deserves attention is for liver alcohol dehydrogenase. "The duration of hepatotoxic and central nervous effects of alcohol clearly depends on the rate of its metabolic breakdown" (Wartburg 1971:63). The biochemical breakdown of alcohol involves several relationships (Wartburg 1971:63; Kalant 1973:3f; Lieber 1973:73; Tremaliers and Griffaton 1973:125). Food is normally broken down in three phases:

I. Digestion and absorption of the gastrointestinal tract;

II. Metabolic change of the substrate;

III. Channeling (oxidation of acetic acid in cytric

acid cycle.)

Alcohol skips Phase I and so the intermediary metabolism of carbon dioxide and water plus excess of hydrogen become important. Ninety per cent is oxidized in Phase II and III. Addicting effects are possibl, related to metabolic digestion. Enzymes which catabolize ethanol are alcohol and aldehyde dehydrogenases, and for methanol, catalase and aldehyde oxidase. Biochemical individuality of enzymes could be responsible for addiction. Liver alcohol dehydrogenase is the role-limiting step of alcohol removal. Variation occurs in the ratio of oxidation capacity for ethanol to become converted to aldehyde. According to Wartburg (1971:89), the genetic model, which is complicated, is under study but clearly individuals vary in tolerance. Repeated and prolonged intake leads to adaptive increased tolerance, probably increased at the receptor sites. An increase in oxidation is related to corresponding enzyme activities and the ability to utilize alternative oxidizing pathways.

Stefansson (1960) and Scott (1956) have commented on lack of green and fruits in the diet, but it has been shown that people gathered what was available with as much time and energy as could be sacrificed. Plants as sourdock, willow, mousenuts, and berries such as lingenberries and cloudberries were gathered by most people. All of these have substantial amounts of vitamins and minerals which, when preserved in oil and eaten fresh, would have contributed to keeping the levels of vitamins C, B, A, and the minerals calcium and phophorus within range of National Research Council (NRC) requirements as they are today (Heller and Scott 1956-61). Thus, the low incidence of scurvy, beriberi, rickets, and

osteoporosis becomes understandable. Seaweed and sea mammals contain enough iodine, so that thyroid problems were absent. Trade by the interior people with the coastal people for products containing iodine would have assured an adequate supply for them. Iron was available in rich quantities in dried meat, sea mammal flesh, bone marrow, blood soups, liver, and some fish, as sculpin and needlefish, waterfowl, and small amounts in plants and berries. Enough iron was consumed to prevent anemia.

The complete utilization of all edible parts of animals to include organ meats and caribou stomach contents insured that dietary sources of vitamins A,B, and C, and the minerals calcium, phosphorous, and iron were adequate (Rodahl 1954:46). Other sources of calcium and phosphorous came from using the entire fish, especially blackfish, smelt and whitefish which were put in soups. Mashing of caribou bones for bone meal was also a source of calcium (Keats tape). The edible clay could also have provided minerals; however, it also would have interfered with iron absorption. Some livers such as bear and fox were not eaten because of taboos. It has been shown that they have toxic levels of vitamin A (Rodahl 1949:72) due to the concentration through trophic levels, i.e., herring to seal to polar bear, etc. The older animals are more toxic than the younger. Vitamin D, acquired mainly from the sun and commonly held to be a problem in northern climates, was not a problem in Alaska where ling cod or loche livers, used by all, is high in vitamin D, i.e., cod liver oil. Additional sources came from some other animal livers. The combinations of adequate vitamin D and calcium-phosphorus levels was enough to prevent rickets and osteomalacia.

Absence of tooth caries and other dental problems can be contributed to adequate intakes of calcium-phosphorus, protein, vitamin C, and other nutrients. Especially important was the low carbohydrate intake. The primary sources of carbohydrate were meat glycogen, roots, greens, and berries.

Without a doubt, the cooking methods as boiling soup, stew, partial cooking of meat, use of raw flipper, fish, pit oven baking, and roasting allowed for the rention of high amounts of nutrients. The preservation methods of drying, putrifying, quick freezing, and oil packing all were effective in conserving ultimate food value. Some of the fat soluble vitamins would have been lost in oil pack and some of the water soluble vitamins would have been lost in freezing, but overall preservation methods were effective.

Nutritionists have promoted the three-meal-per-day pattern of eating for the last 200 years, but this is designed for regulated work/play schedule of an industrialized society encompassing a wide range of variation. Three meal preparations of hunter-gatherers not only would have been time consuming, but inconvenient. A usual pattern of one regular meal plus maybe an additional meal during the day was adequate and promoted efficiency.

It has been shown that decreased time between meals is beneficial to increase caloric intake (Fabry 1969:130). Food was available anytime and frequent snacking occurred. The men ate as they butchered, the women nibbled as they prepared food, children ate whenever they felt like it. Fair amounts of fat in the diet were important for satiety value (Mitchell and Edmond 1951:40). Psychologically and physiologically, fat was

important to the people. Besides its satient value, fat is important for metabolism of fat soluble vitamins and synthesis of vitamins necessary for enzymatic reactions.

Periodic starvation versus times of plenty led to periods of feasting for days when available, since they knew that at other times food would be scarce. Culturally, this grew to be a pattern which is still prevalent, although starvation is no longer present.

Children were indulged. Babies were nursed 2 to 3 years on demand, sometimes longer. Their diet was supplemented with additional soup or premasticated meat or fish liver. A pacifier of a piece of fat on a stick not only served as a teether and pacifer, but had the additional advantage of being nutritional in that it added fat to the infant's diet.

The values of Labrador tea, tobaccos, and certain delicacies and preferences can best be measured in terms of satisfaction and comfort. Their contribution to mental health was important; the nutritional advantage was probably not great. This is true for medicines as well; although, if taken in quantity, the berries and plants added nutrients which were especially high in vitamins. Many of Alaska's plants have not been chemically analyzed for their nutritive value, so it is difficult to state what advantage some of them would have been in the diet. Replacement of traditional stimulants with tobacco and alcohol certainly has not been advantageous to nutrition and health.

Other cultural adjustments, particularly in terms of food taboos, undoubtedly must have placed a strain on the nutriture of women during puberty, pregnancy, parturition, lactation, and other menstrual periods. By limiting fresh and cooked meat and fish, a valuable source of protein

and iron was cut off when most needed. Taboos and cultural practices can best be viewed as meaningful to the adaptations necessary to the ecology of a particular area.

Taboos and restraints on young boys were a matter of training for strength and endurance and, except for fasting periods, probably did not tax the nutrition to any extent. Although great diversity of food resources existed between the various ecological areas, various cultural adjustments allowed for optimal energy utilization. Nutritionally the people were homogenous in that the diet was adequate in nutrients. In areas where food supply was predictable and constant and life more settled, as in the Bering Sea and Pacific, ceremonial life reached heights. It is, however, an area where a great many taboos and restrictions existed, so overall perhaps there was no advantage nutritionally, except during starvation periods.

2. Change and Contemporary Diet Analysis

When the Alaskan Dietary Survey was done in 1956-61, extreme variation of nutrients among the various groups was encountered. This was explained by the fact that subsistence diet, which is subject to seasonal and regional variation, was still the norm in most areas and commercially purchased foods were just beginning to make an incursion into the diet. The sampled villages were primarily western and northern Eskimo villages but also the Athapaskan villages of Allakaket and Huslia. The villages that were sampled did not, at the time, substantially rely on money income. Overall, the diets were not deficient among Eskimo and Indians, except for pregnant and lactating mothers; and, in this study, the one Athapaskan village

dispensing vitamins and minerals was not deficient in that area. Vitamin distribution, school hot lunches, and Head Start were not well established throughout rural Alaska at that time, but have been since, probably as a result of this particular study. Some villages such as Barrow began distribution in 1949 of vitamins including ADC, thiamine, and riboflavin, along with bone meal (Alaska Health 1948:7).

a) Protein

In 1954, Rodahl (1954) found protein to be the primary source of calories at Anaktuvuk Pass and Gambell. The higher protein diet, consisting of 50 per cent of the calories, contributes to a higher BMR. Higher BMR's were found at Anaktuvuk Pass than at Gambell. A dietary survey in 1956 at Anaktuvuk Pass (Foote Archives) revealed protein foods in the diet to be high with carbohydrate and fat about equal in proportion as sources of calories. (Cholesterol levels were average.) The high amount of caribou in the diet has always accounted for a high protein diet here. This was also true for Shungnak, a riverine Eskimo village (Heller and Scott 1956-61:280). The northern coastal Eskimos also have high protein intake where the primary source is sea mammal meat (ibid.:37f). The southwest Eskimo rely primarily on fish for protein. A 1972 study (Draper 1977b:314) of calorie sources among Wainwright and Point Hope Eskimos reveals an increasing reliance on calories from carbohydrate and fat and less from protein. Where native foods were used, a higher percentage of calories were from protein foods. Some diet protein comes from bread, milk, and cereal products, but, except for children with additional school milk, this source of protein is insignificant and varies individually (ibid.).

The importance of complete versus incomplete protein must also be considered. Meat, fish and milk make the essential amino acids available for body protein synthesis, while cereal and bread protein lacks an amino acid which requires a complimentary food to fulfill the completeness of the protein in order to provide all the essential amino acids. For example, macaroni and cheese, or cereal and milk in combination provide complete protein. These logical combinations are common in white man's diet, but whether they occurred in these villages was not determined.

The Interdepartmental Committee on Nutrition for National Defense (ICNND) Report (1959:91ff) notes the adequacy of protein in the diet, but the proportion of protein was decreasing and great individual variance appeared, not only among adults, but among children as well. Concern was expressed about borderline cases of insufficient protein and other nutrients among children. As long as the child was on breast or bottle, the intake was adequate; but shortened nursing and bottle feeding times, without adequate supplementation for children between one and school age, has been a concern. Additionally, infants receiving bottles are more subject to illness than those on the breast (Maynard and Hammes 1970:619). Breast feeding provides higher levels of iron and increased resistance (Jelliffe 1974:557). Heller's (1963:10) analysis of infant feeding points to a decrease in breast feeding and the disappearance of supplementing with premasticated meat, fat pacifiers, and blood soup; there was an increase in bottle feeding with questionable levels of calories, iron, thiamine, and ascorbic acid. On the other hand, Baker (1969:619ff) found among

nine infants who were not breast fed, normal levels of serum protein lipids, indicating adequate nutrition. Children were receiving, in addition to evaporated milk, cereal, meat, and animal oils. Four of these children were receiving iron supplements (ibid.). This would indicate the importance of adequate supplementation in the diet for infants on bottle and iron supplements for preschool children as well (Sauberlich et al. 1972:437).

b) Carbohydrate

Scott and Heller estimated that 2 to 11 per cent of the aboriginal diet was carbohydrate in nature, the chief sources coming from meat glycogen, especially liver and organ meats, plants, and berries. The carbohydrate requirements were derived from biosynthesis of glycogenic amino acids (Heller and Scott 1956-61:44f; Draper 1977b:311). In the survey, approximately one-third of the calories come from bread, cereals, sugar, soda pop, candy, syrups, etc. The Athapaskan diet, which utilized more imported foods, had a higher range of carbohydrate, as opposed to the Alaskan Bering Sea Eskimo villages. The ICNND report (1959:88) gives an average of 167.6 grams of carbohydrate, 136 grams of protein, and 72.9 grams of fat, for a total of 1,855 calories. This represents over one-third of the calories coming from carbohydrate. Serum protein levels are adequate due chiefly to protein derived from subsistence foods (Sauberlich et al. 1972:438). Carbohydrate foods have made inroads into protein consumption in the last couple of decades (Draper 1977b:314). A recent dietary study in southwest Alaska indicates a shift in diet to 50% carbohydrate, 35% fat and 17% protein (Knapp and Panuk 1979:6).

c) Fats

Fats in Heller and Scott's survey (1956-61) provided slightly over one-third of the total calories and this was also reported for the ICNND report. More than one-half of the fats came from imported sources, such as butter, margarine, hydrogenated fat, and beef tallow. Local fats came from meat and fish. Rendering of seal oil and other fat in sea mammals is less now than formerly; most of the fat is under the skin so that if the fat is not rendered, the diet fat would have to come from other sources. Seal oil is a preferred condiment for Eskimos, and some Athapaskans prefer bear grease, but overall little fat is utilized from local foods. The making of ice cream by all natives does provide a source for using local fats, but even here ice cream is sometimes made of commercial fats. The change from using local fats as opposed to store fats which are saturated is of importance in terms of heart disease, an area already discussed.

d) Total Calories

There were times in the past when Eskimos and Athapaskans were confronted with too few calories and starvation. There were times when little protein was available to meet amino acid requirements for glucose synthesis. The capacity of the liver to convert amino acids to glucose is limited. It is speculated but unknown that Eskimos perhaps had an unusual adaptation in that they could rely on ketone bodies as a source of metabolic fuel (Draper 1977b:312).

Meat in the north and fish in the south has provided the greater source of calories in the past but store bought foods are increasingly providing more of the total calories. Imported foods provided more of the calories than local foods in all villages in the Heller and

Scott survey (1956-61:36). Imported food calories were highest in Athapaskan villages. Children relied more heavily on imported food, principally because of school lunches. An average daily intake of 2,000 calories per day (123) for children, 2,600 for an adult male, and 2,100 calories for an adult female indicates levels below NRC of 2,800 and 2,150 for men and women respectively. In general, 75 per cent of the diets are low in calories. Low levels were confirmed for the ICNND (1959:91) study as well. Arriving at acceptable levels of calories for an individual is difficult because individuals vary. Body size and composition, age, sex, heredity, physical activity, special conditions such as pregnancy and lactation are all important considerations. With a decrease in physical activity, one would hope for a decrease in calories to offset tendencies toward diabetes and obesity, so low levels are not of concern to nutritionists. They are concerned however about the source of calories.

d) Fat Soluble Vitamins

Vitamin A

Vitamin A sources have not been a problem as long as blubber, oil, livers, wild greens, salmon, and other fish were used and provided substantial quantities of Vitamin A. These sources continue to be utilized, as well as imported fruits, vegetables, dairy products, and vitamin supplements. In Heller and Scott's survey (1956-61:57), approximately three-fourths of the Vitamin A were from local foods. Indians relied more heavily on imported foods. In 1948, Totter and Shukers (1948) found low levels of Vitamin A and incidences of eye problems, but Heller and Scott found considerable variation between

villages. The southwest area had amounts below NRC recommendations but Shishmaref was above. These differences were accounted for by less use of seal oil and greens at Napaskiak, while people of Shishmaref made efforts to store these foods for winter. There is also a tendency for season variability. These findings were confirmed by ICNND (1959:96). Low serum levels were not found by Draper and Bell (1972: 14). Sauberlich et al. (1972:437), while not testing for serum Vitamin A, presumed levels to be adequate for school children who receive 4,000 U.S.P. units per day.

Vitamin D

Absences of rickets and osteomalacia would indicate adequate levels of Vitamin D despite lack of sunlight, the chief source of Vitamin D. Generally, the food sources which provide Vitamin A also provide Vitamin D. Fish livers, especially cod, is a rich source of Vitamin D. Provided that Vitamin A and calcium-phosphorus levels are normal, Vitamin D deficiencies are unlikely to occur. For this reason, dietary studies are less likely to include serum levels of Vitamin D in their priorities. In the U.S. as a whole, people obtain adequate Vitamin D through fortified milk. Children acquire adequate amounts in school milk in Alaska but adults who do not consume milk for various reasons--expense, no taste for it, digestive problems--need to watch food sources to insure that adequate intakes are present.

Vitamin E

Vitamin E plays a role in enzyme production and acts as an antioxidant. In animals it has been shown to play a role in reproduction. It is chiefly found in whole grain cereal products.

The aboriginal diet contained adequate amounts in the animal tissue and oils in the form of alpha tocopherol, the most active form (Draper and Bell 1972:15; Draper 1976:310). Human milk is also high in alpha tocopherol. While normally one does not worry about the adequacy of this vitamin in the diet, an area that might be monitored would be among babies fed with bottles with no supplementation.

Vitamin K

Vitamin K is important as the blood coagulant and is never really considered a problem as adequate intakes can be derived from a wide variety of foods.

f) Water Soluble Vitamins

Vitamin C

Because of the apparent lack of fresh fruits and vegetables in the aboriginal diet, Vitamin C was sometimes discussed, but the lack of scurvy indicated sufficient intake, probably due to the use of blood soups, organ meats, fresh and rare meat, and adequate preservation and cooking methods. The Eskimo practice of eating meat raw, frozen or partially cooked prevented loss of Vitamin C (Draper 1977b:310). In 1948 (Totter and Shukers 1948:5), 3 to 10 per cent had gum problems and Vitamin C levels were one-fifth below normal levels. Heller and Scott (1956-61:67ff) found 75 to 94 per cent of all adults were well below NRC recommendations. What was available came from areas where fresh berries and greens were utilized, such as Noatak, Shishmaref, and Hooper Bay. Children's intake was sufficient because of school vitamins, and at Allakaket, vitamins were given at home. The ICNND report (1959;92) also gave low values but minimal levels were

maintained. The amount of Vitamin C, while below level, apparently is adequate enough to prevent scurvy and gum diseases.

Thiamine

Totter and Shukers (1948:4) found no evidence of beriberi in 1948. In Heller and Scott's survey (1956:61), one-third of the children's diets were low and three-fourths of the lactating women were low for thiamine. One-third came from local food, meat and fish for Eskimo and a lesser amount for Indians. Multiple vitamin supplements improved levels in the Eskimo diet where they were available. Intakes were better when seasonal meat and fish were fresh. The village of Noatak had low levels; this may be partially due to heavy use of herring which contains thiaminase, an enzyme which destroys thiamine.

The ICNND Report (1959:97) also reported low levels; however, Sauberlich et al. (1972:438) report adequate levels. Because thiamine functions in carbohydrate metabolism as a part of two coenzymes important for the decarboxylation of alpha-keto acid, dietary requirements in the past probably was lower due to lower carbohydrate intake. High fat diets have a sparing effect on thiamine. Decreased use of liver and kidney meat could bring a change in intake levels and as carbohydrate foods are used, care will have to be taken that thiamine levels remain adequate. Egg yolk, pork, and whole grain cereals, especially germ provide good sources of thiamine. These foods need to be encouraged in food selection.

Niacin

Meat and bread products provide an adequate source for niacin and levels never appear to have been below the accepted range, according to

Heller and Scott (1956-61). Vitamin supplements kept children's levels adequate. This vitamin is of little concern among native diets at this time.

Riboflavin

Riboflavin is found in a variety of foods; milk is the primary source. It has never been found to be low, so it is of little concern.

Others

Pantothenic acid, biotin, folic acid, B_{12}, and B_6 requirements are very low and are widespread enough in foods that adequate intake is not a problem. It should be noted that pyrodoxine or Vitamin B_6 is given to counteract effects of isoniazid (INH) which is given for TB control (Brown 1972). The sensitivity to INH of individuals varies considerably and people have been known to become ill and die from an overdose. It apparently can also create mental problems (Brown 1972; Scott and Wright 1967:35; Hanson et al.1967:1048; Sauberlich et al.1972: 441).

g) Minerals

Iron

Iron levels were not traditionally a problem because of sea mammal meat, blood soups, liver, waterfowl, and egg use. Some species of fish such as needlefish and blackfish are high in iron and plants contain some iron. Blood soup and plants are now used less extensively. Areas that relied heavily on fish tend to have lower iron consumption than other areas. In 1948, iron levels among northwest coastal Eskimo were found to be low (Totter and Shukers 1948:4) and in 1954 Scott (1961:1,

Scott, Wright, and Hanan 1955:146) found iron levels low in the southwest. This was also born out by the dietary survey (Heller and Scott 1956-61: 100). It was particularly low for infants on bottle without adequate supplementation of foods. The rest of the population, however, fell within normal range (Heller and Scott 1956-61:50). It was highest at Shishmaref and coastal towns and lowest at Napaskiak. These results are confirmed by the ICNND report (1959:97). In 1964 (Scott and Heller 1964:282), levels were found to be low but could be improved by dietary supplements. Sauberlich's (1972) study at Wainwright showed low levels of vitamins, but Head Start was about to begin iron supplements. Iron supplements will have to be recommended for all children and pregnant and lactating women until food patterns change such that adequate amounts are derived from meat, eggs, cereals, etc.

Calcium

Considered by some to have been low in the aboriginal diet, calcium has recently come under more discussion with the appearance of low calcium levels and osteoporosis, or loss of bone calcium and protein in old people (Mazess 1970:115). The traditional use of blood soup, raw meat, fish, whole fish, putrified fish, caribou stomach contents, willow and other greens provided adequate amounts of calcium. One plant, sourdock, does contain oxylate like spinach, chard, beet greens and rhubarb, which would have tied up calcium and made it unusable in the calcium oxylate form. This plant, however, is not as high as some of the others in calcium and this is only a problem if calcium is inadequate anyway. That calcium acts in balance with phosphorus, of which native sea mammal meats are high, might indicate that an upset of the

balance could be responsible for osteoporosis. Calcium, magnesium, sulphur and phosphorus react in balance together for effective absorption. Too much or too little of one decreases the absorption and tissue utilization. Prior to recent studies, Totter and Shukers (1948:5) found calcium levels low. Especially low were levels in older people and in areas where utilization of whole fish was important, as in the southwest (Scott 1956:1; Heller 1964:427). Local foods provided less calcium than imported foods but milk was an important source for children. The ICNND report (1959:97) found levels adequate. It would appear that calcium levels are still reasonable but, without daily milk consumption, other sources will have to be utilized to keep these levels adequate. Phophorus, magnesium, and other trace minerals need not be discussed. They are abundant in food, especially in native meats.

Iodine/Fluorine

Endemic goiter is usually considered a problem in residents of continental land mass interiors because iodine sources naturally found in marine animals and seaweed are scarce or non-existent in these areas. In Alaska, people on the coast using seaweed, kelp, shellfish, sea mammal, and fish were provided adequate iodine. People traded from interior to the coast and were able to acquire foods which contained adequate amounts of iodine. Rodahl in 1959 (1963:122) noted some evidence of goiter so it needs to be monitored and people need to be encouraged to use iodized salt.

Nutritionally, fluorine is not a problem in terms of adequate levels, as it is found abundantly in soil, water, plants, and animals. However, the increased need for dental care makes the presence of fluorine

important. Fluorine tablets and fluoridation of teeth is recommended as well as fluoridation of water in villages that have a municipal source.

Aside from the genetic adaptations listed, there are also morphological adaptations that Eskimos and Indians have. They are shorter and more muscular than the white population of Alaska. However, with the change in diet, growth patterns are changing. Heller and Scott's survey (1959-61) did not find significant difference in growth, but when Schaefer (1970) studied Canadian Eskimos, he found significant difference in phenotypic weights and heights which he related to a decrease in protein and an increase in carbohydrate. (Carbohydrate is related to an excessive production of growth hormone.) Schaefer's findings have been confirmed by Jamison and Zegura (1970:128) for Eskimos at Wainwright. Schaefer (1971:11) thinks that the increase of refined sugar has created a problem for Eskimos in that they have a difficult time keeping their blood sugar levels stable and thus strain the endocrine metabolic stabilizing systems which overstimulate the insulin producing systems and growth hormones. The problem is that they lack cushioning devices for the metabolic consequences of this strain. Additionally, they are arriving at puberty at an earlier age which could potentially be harmful in terms of early pregnancy (ibid.). Without practice of birth control and an increase in pregnancy rate, the problem is compounded. Other morphological adaptations that were adapted to cold and diet will gradually change with race admixture and as cultural and economic changes occur. Problems centered on these adaptations can be adjusted for by cultural adaptations. However, genetically and physiologically, the length of time that may be necessary to adapt to the

changes that took place in the diet is not possible to determine; but if the lactose tolerance calculations are accurate, these kinds of adaptations take thousands of years.

CHAPTER 5. SUMMARY AND RECOMMENDATIONS

Mitchell and Edmond (1951:1) have said, "Men to a certain extent select their foods and acquire food habits best adapted to aid them in combating climatic stress." In the Arctic, where agriculture is not feasible, there was little choice in food resources; people utilized what was available. Fabry (1969:119) summarily states, "Adaptation to long-term changes of external environment involves a series of partive mutually close linked adaptive processes, which finally lead to the formation of a new equilibrium between the organism and the environment." Alaska natives are a case in point. Through time, Alaska natives not only adjusted morphologically and physiologically, but culturally, as well, to their environment. Knowledge of animal behavior and skills necessary to hunt then were acquired, as well as food selection, preparation and preservation. Deeply imbedded in the economic pursuit, a social and religious system developed. An effect on one system has an effect on another.

Their diet, which was high in protein and fat and low in carbohydrate, was adequate. After contact with white culture became direct and constant, the diet and culture of the natives began to change. The natives of Alaska were able to buy store foods, but those most readily purchased such as carbohydrate type foods, have not been beneficial to their health. Diseases such as atherosclerosis, diabetes mellitus, tooth caries, hypertension, anemia, etc. are diet related. Incumbent with the diet change and impact of new diseases is the fact that biological adaptations have not had time to take place. Cultural adaptations

are in transition. The foods that one chooses to eat are defined by culture. They involve symbolism (Richie 1967:30; Fathauer 1960:335). Food preferences tend to have sentimental associations and those food customs which one grows up with are retained. A change in food preference takes time. That some Eskimos and Indians still prefer traditional foods while the others prefer store foods is characteristic of cultures in transition. What is difficult for some natives to understand is all the ill health that has accompanied a change in diet. Some older people properly place the blame on the foods that are eaten. However, most old people think of the old days as hard. An "easier way to do things" becomes receptive, especially since game and fish are being depleted and money income becomes possible. To go back to a diet based entirely upon subsistence foods is impossible for most natives and impractical for others. The young adults feel torn between the old and the new.

In my opinion, the major problem that now faces Alaskan natives is how to keep the best of both worlds and avoid frustration leading to chaos between the two worlds. Adjustment for these people is not an easy task when they have been forced to assimilate into our society quickly without the benefits of a good education, training, and the experience necessary to operate in an alien culture.

Old people as a whole, because of old age assistance, are now almost financially independent; however, they still prefer traditional foods, but they find them more difficult to obtain due to changing social patterns and depletion of subsistence sources. The young still respect the old and the old ways, for the most part, but they feel less like following the old ways and sharing resources. If the subsistence way of

life is inadequate, the old have a difficult time living entirely from their pensions when fuel prices, electricity, and store food prices keep increasing. Thus, while they are more independent now than in the old days, their budgets are limited and living within them is becoming increasingly difficult.

The young adults prefer more and more to work for wages and purchase food, clothing, equipment, appliances, etc. They are less hindered by a limited budget than are the older people, but at the same time they have the problem of being torn between cultures. They have difficulty competing for better jobs because of lack of education and skills, but they are also less well trained to hunt and fish. Because of these conditions, they are often frustrated and feel inadequate. Some totally immerse themselves in one culture or the other, trying to ignore the existence of the other culture; while others end up with one foot in each culture, a situation which may lead to frustration, the use of alcohol, drugs, and suicide. There is a need for better education and training programs geared to help meet the problems of people living in both cultures. Mental health programs also have to be aimed at meeting the needs of these individuals.

Children will receive adequate nutrition as long as Head Start and the schools provide a hot breakfast or lunch and vitamins are dispensed. More information needs to be presented to growing children and to mothers concerning nutrition and food choice. The use of candy and chewing gum needs to be discouraged. Instead I suggest that snacks consist of more nutritious foods as cheese, nuts, fruits, vegetables, etc. The importance of adequate nutrition for children cannot be overemphasized. As an

example, when Barrow first began a nutrition program in 1945, results were dramatic (Alaska Health 1945). Children gained weight; there was improved school attendance with better performance at school and fewer health problems. There is some evidence that mal- and under-nutrition has an effect on intellectual growth. An increase in the nutritional level benefits the child psychologically. Malnutrition early in life lowers scores in psychological tests (Latham 1974:541) which later may be reversed by nutrition. Poor nutrition during puberty delays puberty and results in the onset of puberty at a low body weight. A girl who becomes pregnant during puberty then is under a heavy nutritional burden to provide adequate nutrition for herself and her child.

Recently, many villages have improved health care for pregnant mothers. Adequate vitamins, iron, and calcium should be given to all pregnant and lactating mothers to insure against inadequate nutriture of the mother and child. Mothers need information on the benefits of breast feeding versus bottle feeding. If bottles are given, the proper methods of hygiene need to be given and the use of bottles as pacifying devices to be discouraged.

Adequate nutrition requires a knowledge of food selection. Alaskan Eskimos and Athapaskans in general need instruction about nutrition and choice of foods. Clinics, organizations, and health personnel not only need appropriate materials, but need to make special efforts to educate native populations. Preventive medicine is vital.

The U.S. Nutrition Policies of the 1970's (Mayer and McGowdy 1973: 158) recommends that a family of four spend $1,570 a year on food. [This figure does not take into consideration inflation, the high cost

of living and the extent of subsistence dependence in Alaska]. Anything less results in adjustments to the diet which are:

1) Eliminating fresh milk, fresh fruit and spoilables, such as eggs and frozen foods.
2) Increase in mush and gravy use.
3) Eating two meals or making one a water base as coffee, cola, etc.
4) Tendency to spend more on food when money is available, and on a diet which is monotonous.

The U.S. Census of 1970 revealed that 38.3 per cent of native Alaskan families were below poverty levels while only 4.3 per cent of non-natives were in this category. With an increased cost of living in Alaska, the problem is compounded. The food stamp program needs to be boosted for natives and U.S. Department of Agriculture surplus commodity foods need to be made available to village stores.

Improved sources of income need to be sought to bring people above poverty. Land claim money and pipeline jobs are only a temporary solution. Wherever possible, people should be encouraged to at least partially live on subsistence. In relation to this point, Yupiktak Bista (1974:18) recommends: (1) allow absences from work for subsistence activity; (2) sharing of jobs; (3) prevent economic development which adversely affects subsistence, and (4) promote self sufficiency. A balance is needed between the resources available and the population.

Community water and sewage systems need to be engineered to fit the community. Proper sanitation is essential for health. Other community projects could include gardens and greenhouses where feasible, community

owned "cats" for road maintenance and garbage disposal, and community owned freezer storage.

Federal, state, regional, and community efforts need to be coordinated to provided adequate health and dental care, as well as a greater dissemination of information in terms of preventive medicine. The Food Intake Survey for Alaska by the U.S.D.A. of 1978 should provide some information in terms of native nutrition in Alaska. The problem in Alaska has been summarized by Latham (1973:71):

> Malnutrition is linked to overall socio, economic, and physical environment, which is characterized by poverty, inadequate housing, overcrowding, poor sanitation, and social instability. Isolation leads to difficulties in purchasing food, increased costs of food, and other necessities, and to exploitation by traders who have a monopoly on retail business. Harsh climate and arid land with permafrost and inadequate soil makes agriculture difficult. The government has the obligation to educate, plan preventive medical programs, and provide medical care to its people.

I hope that the material and data drawn together in this thesis will be of use to the health personnel and nutritionists as they work with natives helping them to solve their problems and I especially hope it will be useful to the natives as they try to solve their own problems. Of particular importance is education in terms of food selection. The Native diet needs to change back to utilization of higher quality foods with more emphasis on protein and less on carbohydrate. This is necessary to achieve reduced infant mortality, production of better growth and development in children, and improved vitality and health in adults. Alaska Natives should at least be able to maintain a level of health which is comparable to white Americans.

APPENDIX I

FOOD AND NUTRITION BOARD, NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL
RECOMMENDED DAILY DIETARY ALLOWANCES; REVISED 1973

Designed for the maintenance of good nutrition of practically all

	(Years) From up to	Weight (kg)	Weight (lbs)	Height (cm)	Height (in)	Energy (kcal)[2]	Protein (g)	Fat-Soluable Vitamins: Vitamin A Activity (RE)[3]	Vitamin A Activity (IU)	Vitamin D (IU)	Vitamin E Activity[5] (IU)
Infants	0.0-0.5	6	14	60	24	kg x 117	kg x 2.2	420[4]	1,400	400	4
	0.5-1.0	9	20	71	28	kg x 108	kg x 2.0	400	2,000	400	5
Children	1-3	13	28	86	34	1300	23	400	2,000	400	7
	4-6	20	44	110	44	1800	30	500	2,500	400	9
	7-10	30	66	135	54	2400	36	700	3,300	400	10
Males	11-14	44	97	158	63	2800	44	1,000	5,000	400	12
	15-18	61	134	172	69	3000	54	1,000	5,000	400	15
	19-22	67	147	172	69	3000	54	1,000	5,000	400	15
	23-50	70	154	172	69	2700	56	1,000	5,000		15
	51+	70	154	172	69	2400	56	1,000	5,000		15
Females	11-14	44	97	155	62	2400	44	800	4,000	400	10
	15-18	54	119	162	65	2100	48	800	4,000	400	11
	19-22	58	128	162	65	2100	46	800	4,000	400	12
	23-50	58	128	162	65	2000	46	800	4,000		12
	51+	58	128	162	65	1800	46	800	4,000		12
Pregnant						+300	+30	1,000	5,000	400	15
Lactating						+500	+20	1,200	6,000	400	15

[1] The allowances are intended to provide for individual variations among most normal persons as they live in the United States under usual environmental stresses. Diets should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined. See text for more-detailed discussion of allowances and of nutrients not tabulated.

[2] Kilojoules (KJ) = 4.2 x kcal.

[3] Retinol equivalents.

[4] Assumed to be all as retinol in milk during the first six months of life. All subsequent intakes are assumed to be one-half as retinol and one-half as B-carotene when calculated from international units. As retinol equivalents, three-fourths are as retinol and one-fourth as B-carotene.

healthy people in the U.S.A.

	Water-Soluable Vitamins							Minerals					
Ascorbic Acid (mg)	Folacin[6] (mg)	Niacin[7] (mg)	Riboflavin (mg)	B_6 (mg)	Thiamin (mg)	Vitamin B_6 (mg)	Vitamin B_{12} (ug)	Calcium (mg)	Phosphorus (mg)	Iodine (ug)	Iron (ug)	Magnesium (mg)	Zinc (mg)
35	50	5	0.4		0.3	0.3	0.3	360	240	35	10	60	3
35	50	8	0.6		0.5	0.4	0.3	540	400	45	15	70	5
40	100	9	0.8		0.7	0.6	1.0	800	800	60	15	150	10
40	200	12	1.1		0.9	0.9	1.5	800	800	80	10	200	10
40	300	16	1.2		1.2	1.2	2.0	800	800	110	10	250	10
45	400	18	1.5		1.4	1.6	3.0	1200	1200	130	18	350	15
45	400	20	1.8		1.5	1.8	3.0	1200	1200	150	18	400	15
45	400	20	1.8		1.5	2.0	3.0	800	800	140	10	350	15
45	400	18	1.6		1.4	2.0	3.0	800	800	130	10	350	15
45	400	16	1.5		1.2	2.0	3.0	800	800	110	10	350	15
45	400	16	1.3		1.2	1.6	3.0	1200	1200	115	18	300	15
45	400	14	1.4		1.1	2.0	3.0	1200	1200	115	18	300	15
45	400	14	1.4		1.1	2.0	3.0	800	800	100	18	300	15
45	400	13	1.2		1.0	2.0	3.0	800	800	100	18	300	15
45	400	12	1.1		1.0	2.0	3.0	800	800	80	10	300	15
60	800	+2	+0.3		+0.3	2.5	4.0	1200	1200	125	18+[8]	450	20
60	600	+4	+0.5		+0.3	2.5	4.0	1200	1200	150	18	450	25

[5] Total vitamin E activity, estimated to be 80 percent as $_a$-tocopherol and 20 percent other tocopherols. See text for variation in allowances.

[6] The folacin allowances refer to dietary sources as determined by Lcatobacillus casei assay. Pure forms of folacin may be effective in doses less than one-fourth of the RDA.

[7] Although allowances are expressed as niacin, it is recognized that on the average 1 mg of niacin is derived from each 60 mg. of dietary tryptophan.

[8] This increased requirement cannot be met by ordinary diets; therefore, the use of supplementasl iron is recommended.

CHEMICAL

Food Items, Origin and Date Collected
Mammals, Fresh Meat
Polar Bear, Pt. Hope, March 1958
Caribou, Noatak
Caribou, Pt. Hope, March 1958
Caribou, Shishmaref, March 1958
Moose, Noatak, March 1958
Muskrat, Kasigluk, 1959
Beaver, Allakaket, March 1958
Seal, Pt. Hope, March 1958
Seal, Shishmaref, March 1958
Walrus, St. Lawrence, March 1958
Walrus, Shishmaref, April 1958
Oogruk, Shishmaref, April 1958
Whale, Pt. Hope, July 1958
Muktuk, Hide, Pt. Hope, July 1958
Meats, Dried
Seal, Newtok Camp, 1958
Walrus, Savoonga, 1958
Muskrat, Kasigluk, 1958
Oogruk, Shishmaref, 1957
Walrus Liver, St. Lawrence, May 1958

APPENDIX II

COMPOSITION OF ALASKAN FOODS, 1958

Nutrients/100 gm of food

Moisture gm	Ash gm	Protein gm	Fat gm	Carbohydrate gm	Calcium mg	Vitamin A I.U.	Thiamin mcg	Riboflav mcg	Vitamin C mg
70.3	1.1	25.6	3.1	0.0	17	1400	23	573	2
70.6	1.1	26.7	1.2	0.4	28	trace	167	509	2
68.7	1.1	28.9	1.1	0.0	15	trace	113	670	3
70.8	1.5	26.6	1.2	0.0	10	trace	186	772	4
72.4	1.0	25.5	1.1	0.0	16	1000	21	265	4
73.4	1.1	22.4	1.3	0.0	25	2820	90	372	5
46.2	0.6	14.3	39.0	0.0	-	-	61	310	2
64.7	1.1	32.4	1.8	0.0	12	-	120	337	3
68.5	1.2	29.6	0.4	0.3	33	-	-	380	6
59.5	1.3	26.5	11.6	0.0	15	-	281	372	4
76.5	0.7	15.4	5.2	0.0	-	-	-	-	2
69.6	1.2	26.7	5.2	0.0	10	1400	135	273	25
75.0	0.9	23.6	0.7	0.0	17	-	85	80	8
68.1	0.2	12.3	1.2	18.2	13	-	501	-	2
41.2	2.6	46.0	6.6	0.0	19	360	174	353	7
33.6	2.7	54.4	4.9	4.2	23	1732	84	282	5
33.3	2.1	28.4	36.2	0.0	130	4170	41	535	6
19.0	3.3	75.0	2.8	0.0	21	2160	84	390	3
73.4	1.2	17.6	3.2	4.6	23	17800	151	912	19

Food Items, Origin and Date Collected	Moisture	Ash
	gm	gm
Fats and Oils		
White Fish Oil, St. Lawrence, 1958	0.0	0.0
Seal Oil, Nunivak, 1957	0.0	0.0
Seal Oil, Akiak	0.0	0.0
Seal Oil (Old), Nunivak, 1957	0.0	0.0
Seal Oil (New), St. Lawrence, 1958	0.0	0.0
Seal Blubber, Shishmaref, 1958	1.0	0.0
Walrus Oil (Old), St. Lawrence, 1957	0.2	0.0
Walrus Oil (New), St. Lawrence, 1958	0.0	0.0
Oogruk Oil (Old), Shishmaref, 1957	0.5	0.0
Muktuk Blubber, Point Hope, 1958	9.5	0.9
Seal Blubber, Point Hope	1.0	0.0
Oogruk Oil (Old), St. Lawrence	0.5	0.0
Fish Flesh, Dried		
Smoked Salmon	11.1	3.5
King Salmon, Kasigluk	14.1	3.3
Dog Salmon, Shishmaref, 1958	26.2	3.7
Pike, Kasigluk, June 1958	22.6	3.9
White Fish, Kasigluk, 1958	18.0	5.7
Fish Eggs, Fresh		
White Fish	83.8	0.6
King Salmon, Akiak, 1957	46.0	1.9
Herring, Nelson Island	73.7	1.3
Lush Fish, Shishmaref, June 1958	74.3	1.8
Smelt	61.6	1.5

Protein	Fat	Carbohydrate	Calcium	Vitamin A	Thiamin	Riboflavin	Vitamin C
gm	gm	gm	mg	I.U.	mcg	mcg	mg
0.0	100.0	0.0	14	0	0	26	1
0.0	100.0	0.0	-	3990	0	-	0
0.0	100.0	0.0	18	4080	20	62	1
0.0	100.0	0.0	14	2787	0	73	1
0.0	100.0	0.0	trace	2407	0	117	0
0.7	98.3	0.0	11	2360	0	24	1
0.0	99.8	0.0	11	3266	0	64	1
0.0	100.0	0.0	15	2520	26	trace	0
0.0	99.5	0.0	trace	642	0	45	0
2.8	85.2	1.7	15	278	243	-	-
0.0	99.0	0.0	-	-	501	59	7
0.0	99.5	0.0		2510	0	-	1
46.4	36.6	2.4	18	-	28	204	3
51.0	24.9	6.7	19	219	99	224	5
55.7	1.2	-	58	143	360	60	5
68.7	2.8	2.0	32	-	51	98	4
69.0	3.2	0.9	960	-	51	112	15
8.0	5.0	2.4	54	-	137	673	13
30.4	15.0	6.7	30	185	231	700	2
23.6	0.2	1.2	46	-	10	298	7
18.2	4.5	1.2	11	-	108	547	8
21.4	5.6	9.9	32	-	-	-	-

Food Items, Origin and Date Collected	Moisture	Ash
	gm	gm
Fish Eggs, Dried		
Herring, Nelson Island	20.4	2.7
Fish Liver, Fresh		
White Fish, Noatak	78.8	0.7
Rainbow Trout	-	-
Fresh Fish, Shishmaref, March 1958	60.2	1.0
Lush Fish, Akiak	45.9	0.5
King Salmon, Bethel, June 1958	69.8	1.3
King Salmon, Testes, Bethel, 1958	80.0	2.2
Birds		
Ptarmigan, Lower Kuskokwim	71.2	1.7
Murre	58.9	1.2
Eider Duck, St. Lawrence, July 1958	68.3	1.1
White-Breasted Auklet	65.1	0.7
Crested Auklet	68.0	1.5
Least Auklet	64.4	1.6
Sea Pigeon	79.8	0.8
Cormorant, Legs, St. Lawrence	71.1	1.3
Cormorant, Breast, St. Lawrence, July 1958	73.4	1.3
White Breasted Puffin	67.0	1.4
Goose, Newktok Camp	71.5	2.0
Goose Liver	-	-
Devil Fish, Newktok Camp, 1958	80.8	1.5

Protein	Fat	Carbohydrate	Calcium	Vitamin A	Thiamin	Riboflavin	Vitamin C
gm	gm	gm	mg	I.U.	mcg	mcg	mg
64.4	4.0	8.5	25	-	0	208	8
11.0	4.4	5.1	55	8300	14	952	8
-	-	-	9	1720	289	882	15
8.3	24.7	5.8	40	-	186	402	7
5.6	42.0	6.0	-	3940	-	-	4
16.6	8.0	4.3	28	3140	97	703	13
16.3	1.5	0.0	13	-	194	201	31
25.7	1.4	0.0	351	trace	71	229	7
5.3	2.5	32.2	17	-	122	588	7
12.3	1.1	17.2	17	-	801	676	12
29.7	2.2	2.7	25	-	482	660	6
25.5	5.0	0.0	23	-	179	1117	9
28.8	3.4	1.8	15	-	532	738	11
16.6	2.2	0.7	34	-	562	892	19
23.8	1.9	1.9	18	-	219	252	15
21.2	1.9	2.2	21	-	33	689	5
26.7	2.5	2.4	17	-	315	358	15
24.0	0.6	0.0	18	-	89	545	5
-	-	-	16	-	-	-	-
11.7	5.3	0.7	329	-	46	95	3

Food Items, Origin and Date Collected	Moisture	Ash
	gm	gm
Fish Flesh, Fresh		
White Fish, Noatak	70.9	2.0
Blackfish (Whole), Kasigluk, April 1958	79.4	1.7
Stickleback (Whole), Hooper Bay	71.9	4.5
Rainbow Trout, Noatak, March 1958	72.9	1.2
Lush Fish, Shishmaref, March 1958	74.2	1.0
Lush Fish, Akiak, April 1958	78.7	1.1
Tomcod, Turamak, June 1958	78.1	1.6
Tomcod, Point Hope	71.7	4.3
Pike, Head End, Kasigluk	80.1	1.1
Pike, Middle Cut, Kasigluk	77.7	2.4
Pike, Tail Cut, Kasigluk	80.1	1.7
Smelts (Whole)	79.8	2.3
King Salmon, Head End, Bethel, June 1958	69.5	2.5
King Salmon, Middle, Bethel, June 1958	70.5	1.8
King Salmon, Tail End, Bethel, June 1958	66.1	0.9
Grayling, Noatak	70.2	4.8
Plants		
Marine Algae (Seaweeds)		
Alaria, St. Lawrence, 1958	73.9	5.4
Laminaria, St. Lawrence, 1958	84.2	3.2
Agarium, St. Lawrence, 1958	70.9	5.8

Protein gm	Fat gm	Carbohydrate gm	Calcium mg	Vitamin A I.U.	Thiamin mcg	Riboflavin mcg	Vitamin C mg
25.8	1.3	0.0	356	106	135	222	6
16.9	0.7	1.4	880	83	0	214	6
20.7	2.2	0.7	901	476	44	1431	6
24.4	1.5	0.0	54	trace	74	185	5
24.2	0.7	0.0	81	101	167	380	5
19.7	0.5	0.0	20	trace	74	74	3
19.6	0.3	0.0	250	-	55	139	2
20.2	3.8	0.0	494	120	269	625	5
18.4	0.4	0.0	80	-	75	51	2
18.7	0.2	1.1	62	900	36	83	6
17.5	0.7	0.0	28	-	42	49	4
15.3	2.4	0.2	476	-	41	812	1
4.6	7.1	-	20	-	156	50	8
21.4	3.3	0.0	22	-	105	108	4
5.5	8.4	9.1	14	-	219	46	5
23.4	1.6	0.0	532	81	-	-	4
1.6	0.4	18.6	303	-	74	102	69
0.5	0.2	11.9	138	-	42	99	50
3.9	0.2	19.3	720	-	29	87	33

Food Items, Origin and Date Collected	Moisture	Ash	Protein	Fat	Carbohydrate	Calcium	Vitamin A	Thiamin	Riboflavin	Vitamin C
	gm	gm	gm	gm	gm	mg	I.U.	mcg	mcg	mg
Flowering Plants										
Greene, St. Lawrence, 1958	80.5	1.2	4.3	0.8	13.2	205	-	49	258	377
Willow Leaves, St. Lawrence, 1958	66.5	0.7	3.7	1.2	28.0	129	-	88	186	298
Sedum, St. Lawrence, 1958	85.6	0.6	2.1	1.1	10.6	262	-	81	214	76
Sourdock, St. Lawrence, 1958	86.2	0.7	3.7	0.3	10.2	19	-	157	186	215
Salmonberries, Shishmaref, 1958	83.5	0.4	1.6	0.4	14.1	13	302	30	70	115

(Note: Before considering the chemical composition of fish, it should be realized that there is a considerable variation in such composition, so that analyses made on only a few samples cannot be considered representative, and, in fact, in many cases variation is so great that average composition is of only theorectical interest, since actually individual fish will vary so widely from such average values.

Doubtless the component of fish varying to the greatest degree is the oil (or fat) content. In addition to season of the year, other factors which may cause variation of oil content of fish include the nature of the food of the fish, locality where fish are caught, and the size and age. The water content of many species varies inversely with the fat or oil content. Fish also vary in composition at different sections of the same fish; fat content, for instance, is lower near the tail than the head.

Excerpt from: The Chemistry and Technology of Food and Food Products, edited by Morris B. Jacobs, Interscience Publishers, Inc., New York, Volume II, Chapter 22, pp. 933-974, 1951)

APPENDIX III

Alaska Unit Prices Summer 1975 (Dec. 1975 Ak. Mag, Fbks., July 1975 Pipeline Impact, Field Notes)*

	Seward	Kodiak	Kenai	Valdez	Anch.	Palmer	Fbks.	Bethel	Nome	Barrow	Wainwright	Ft. Yukon	Tanana	Tok	Delta	Mentasta
flour (all purpose)	.25	.30	.28	.28	.24	.26	.28	.40	.35	.40	.49	.42	.50	.30	.36	.29
rice (oz)	.07	.03	.07	.04	.06	.06	.05	.08	.08	--	--	.05	.07	.09	.07	.07
bread (w)	1.00	.81	1.00	1.09	.76	.85	.88	1.23	1.33	--	--	1.20	--	1.29	1.09	1.06
pilot bread	--	--	--	--	--	--	--	--	--	1.00	--	1.20	1.07	1.00	--	.91
pancake mix (oz)	--	--	--	--	--	--	--	--	--	.07	--	.03	.05	.03	.05	.03
macaroni (oz)	--	--	--	--	--	--	--	--	--	.06	--	.06	.03	.04	.03	.07
saltines, #	--	--	--	--	--	--	.80	--	--	--	--	.82	.65	.84	.89	.84
rolled oats (oz)	--	--	--	--	--	--	--	--	--	.80	.80	.80	.59	.48	.64	.48
Bisquick #	--	--	--	--	--	--	--	--	--	--	--	--	.80	.64	1.28	.80
syrup oz	--	--	--	--	--	--	--	--	--	.11	.13	.10	.11	.09	.08	.08
sugar #	.50	.63	.46	.49	.35	.39	.39	.66	.67	.69	--	.72	.75	.52	.44	.45
coffee #	1.17	1.15	1.56	1.37	1.41	1.46	1.54	1.70	1.53	1.95	2.04	2.19	--	1.98	1.69	1.90
tea #	--	--	--	--	--	--	--	--	--	--	--	--	--	1.59	1.65	1.51
dry milk (oz)	.09	.07	.09	.09	.07	.08	.07	.16	.10	.10	--	.10	.08	.10	.09	.10
c. fruit (oz)	.02	.02	.03	.02	.02	.02	.02	.04	.03	.06	--	.04	.07	.04	.03	.03
juice, oz	.04	.04	.04	.04	.03	.04	.04	.05	.05	.03	.03	.03	.03	.03	.03	.07
soup, 1-can	.29	.29	.27	.31	.23	.36	.27	.38	.33	.45	.43	.49	.43	.45	.33	.44
tomato 10 1/2 oz																
spam 12 oz	--	--	--	--	--	--	--	--	--	1.43	1.57	1.49	1.41	1.89	1.15	1.20
tuna 6 1/2 oz	.78	1.19	.73	.75	.57	.73	.68	.89	.79	.78	--	.84	1.09	.89	.72	.77
p. butter oz	--	--	--	--	--	--	.06	--	--	.13	--	.08	.09	.10	.09	.08
jelly, oz.	--	--	--	--	--	--	--	--	--	.16	--	.07	--	.06	.08	.07
tang, oz	--	--	--	--	--	--	--	--	--	.10	--	.09	.08	.12	.10	--
baby food 4 1/2 oz	.22	.19	.22	.25	.20	.29	.21	.26	.29	.33	--	.29	.20	.29	.25	--
milk evap 13 oz	.39	.37	.39	.47	.36	.37	.37	.39	.48	--	--	.55	--	--	.44	.44
TV Dinner	--	--	--	--	--	--	--	--	--	--	--	1.49	--	1.19	1.15	--
pizza (lg)	--	--	--	--	--	--	--	--	--	--	--	1.63	1.52	1.69	1.49	--
hamb #	1.29	1.09	1.01	1.09	.98	.98	1.13	2.02	1.54	--	--	1.70	--	1.69	1.40	1.49
weiners #	1.31	1.42	1.51	1.75	1.26	1.52	1.02	1.89	1.87	--	--	1.45	--	1.69	1.45	1.53
chicken #	.97	.99	.96	.95	1.03	1.09	.99	1.20	1.35	--	--	2.14	2.40	1.29	.99	1.28
milk (w) qt.	.77	.03	.78	.82	.66	.68	.77	1.31	1.42	--	--	1.39	--	.95	.82	--
apple (each)	.20	.20	.21	.23	.21	.20	.23	.23	.31	--	--	.29	.30	.16	.18	.25
orange (each)	.13	.14	.13	.12	.13	.09	.14	.21	.31	--	--	.29	.39	.16	.19	.25
onion #	.38	.36	.41	.45	.39	.24	.47	.47	.57	--	--	--	--	.49	.45	.35
potatoe #	.21	.21	.25	.25	.22	.11	.27	.47	.39	--	--	--	--	.25	.40	.26
butter #	1.32	1.35	1.19	1.39	1.05	1.18	.81	1.84	1.79	--	--	--	--	.98	1.35	1.46
margarine #	1.02	.82	.77	.69	1.19	.71	1.25	1.03	--	--	--	--	--	.89	.75	.96
eggs, doz.	.89	.99	.84	1.09	.77	1.24	.86	1.38	1.39	1.53	--	--	--	1.09	.99	1.25
shortening, oz.	.07	.06	.06	.05	.05	.05	.06	.07	.08	--	--	--	--	--	--	.06
soda pop, 12 oz	.29	.35	.28	.32	.25	.27	.30	.40	.40	--	--	.44	.45	.31	.26	.35
cigarettes, pkg.	--	--	--	--	--	--	--	--	--	--	--	.47	.51	.48	.42	.50
bar soap	--	--	--	--	--	--	.45	--	--	--	--	--	--	.29	.69	.29
toilet paper, roll	--	--	--	--	--	--	.33	--	--	--	--	--	--	--	.38	.30

LITERATURE CITED

Ackernecht, Edwin H.
1971 Medicine and Ethnology. Editors, H. H. Walsey and H. N. Kaelbing. John Hopkins Press, Baltimore, Md.

Abercrombie, W.R.
1900 Report of a supplementary expedition into Copper River Valley, Alaska, 1884. Compilation of narratives of explorations in Alaska. U.S. Government Printing Office, Washington, D.C.

Albanese, Joseph D.
1972 Newer methods of nutritional biochemistry. New York and London: Academic Press.

Allen, H. T.
1900 Report of an expedition to the Copper, Tanana, and Koyukuk rivers in the Territory of Alaska in the year 1885. A compilation of explorations in Alaska. U.S. Government Printing Office, Washington, D.C.

Alaska Health
1945 Volume I, II, III.

1948 Volume VI(2)

1955 Volume XII.

Alaska, State of, Department of Health and Welfare, Public Health Service The McGrath project. Report of a demonstration study on the prevention of upper respiratory disease.

Anderson, Laura David
1956 According to Mama. St. Matthews Episcopal Guild, Fairbanks, Alaska. (As told to Audrey Loftus).

Andrews, Elizabeth
1975 Salcha: An Athapaskan band of the Tanana River and its culture. M.A. Thesis, University of Alaska, May, 1975.

Aronson, Joseph D.
1947 The history of disease among the natives of Alaska. Alaska's Health V(3).

Bang, G., and T. Kristofferson
1972 Dental Caries and diet in an Alaskan Eskimo population. Scandinavian Journal of Dental Research 80:44.

Baker, Alfred
1962 Paralytic shellfish poisoning in southeast Alaska. Proceedings, 13th Annual Alaska Science Conference, p. 177.

Baker, George L.
1969 Nutritional survey of northern Eskimo infants and children. American Journal of Clinical Nutrition 22:612-16.

Befu, Harunu
1970 An ethnographic sketch of old Harbor, Kodiak: An Eskimo village. Arctic Anthropology VI(2):29.

Bender, T. R., T. S. Jones, W. E. Dewitt, G. J. Kaplan, A. R. Saslow, S. E. Neviun, P. S. Clark and E. J. Gangarosa
1972 Some hazards of Eskimo foods. American Journal of Epidemiology 96:153-160.

Benditt, Earl P.
1977 The origin of atherosclerosis. Scientic American 236(2):74-85.

Birdsell, Joseph B.
1973 Some predictions for the Pleistocene based on equilibrium systems among recent hunter-gatherers. In Man the Hunter, pages 221-240, edited by R. B. Lee and I. Devore. Chicago: Aldine Publishing Company.

Birket-Smith, Kaj
1936 The Eskimo. London: Methuen and Company.

1953 The Chugach Eskimo. Nationalmussets Skrifter. Ethnografisk Raekke 6, Copenhagen.

Bourke, John G.
1892 The medicine men of Apache. Ninth Annual Report of the Bureau of Ethnography. U.S. Government Printing Office, Washington, D.C.

Brody, Jacob
n.d. Notes on the epidemiology of draining ears and hearing loss in Alaska with comments on future studies and control measures. U.S. Public Health Service, Anchorage.

Brown, C.
1972 Acute isoniazid poisoning. American Review of Respiratory Diseases 105:206-16

Chance, Norman
1966 The Eskimo of North Alaska. New York and Chicago: Holt, Rinehart, and Winston.

Clark, Annette M.
1970 Koyukon Athabascan ceremonialism. The Western Canadian Journal of Anthropology 11(1).

Colyar, A. B.
n.d. Some problems of disease prevention and control in sub-arctic and arctic areas. Public Health Paper No. 18. Medicine and public health in the arctic and antarctic, WHO: 81-96.

Corcoran, A.C., and T. M. Rabinowitch
1937 A study of blood lipids and blood protein in Canadian Arctic Eskimos. Biochemistry Journal 31:343-48.

Cruikshank, Julie
1972 Culture response to Alaska village electric cooperatives in Alaskan native villages. Arctic Anthropology IX(1): 35-42.

Day, E. K.
1951 Sewage and waste disposal problems. Public Health Reports 66(29):922.

DeLaguna, Frederica
1956 Chugach prehistory, archaeology of Prince William Sound, Alaska. Seattle: University of Washington Press.

1969-70 The Ahtna of the Copper River, Alaska: The world of men and animals. Folk 11-12:17-26. Kobenhaven.

Doleman, C. E.
1960 Type E botulism: A hazard of the North Arctic. Arctic 13:230-56.

Draper, H. H.
1977a Diatary habits and nutritional status. Paper submitted for Western Hemisphere Nutrition Congress V.

1977b The aboriginal Eskimo diet in modern perspective. American Anthropology 39(2): 307-316.

Draper, H. H., and R. R. Bell
1972 The changing of Eskimo diet. Illinois Research 14(4): 14-15.

Draper, H. H., R. R. Bell and J. G. Beggen
1973 Sucrose, lactose, and glucose tolerance in North Alaskan Eskimos. American Journal of Clinical Nutrition 26:1185-90.

Drury, H. G., D. A. Vaughan and J. P. Hannon
1959 Some metabolic effects of high fat, high protein diet

during semi-starvation under winter field conditions. Journal of Nutrition 67:85-97.

Dunn, Frederick L.
1973 Epidemiological factors: Health and disease in hunter-gatherers. In Man the Hunter, edited by R. B. Lee and I. Devore. Chicago: Aldine Publishing Company.

Easton, Penelope S.
1950 Food resources of Alaska. Alaska Department of Health, Anchorage.

Edmonds, H. N. W.
1966 The Eskimo of St. Michael and vicinity. Edited by Dorothy Jean Ray. Anthropological Papers, University of Alaska 13(2).

Endicott, W.
1928 The famous potlatch of Healy Lake. Advances in Alaska and along the trail. Frederick Stokes Co., N.Y.

Evonuk, Eugene, George Klaine, Lucille Vaughn and David Vaughn
1962 The effect of high fat diet on thiamine excretion and plasma cholesterol. Proceedings, 13th Annual Alaska Science Conference.

Fabry, Pavel
1969 Feeding patterns and nutrition adaptations. London: Buttleworths and Prague: Academia.

Fairbanks Daily News-Miner
1973 "Easy" Eskimo life called unhealthy. December 10, 1973

1974 Recent native study discusses some health, life-style problems. January 17, 1974.

Fathauer, C. H.
1960 Food habits: An anthropological view. Journal of American Dietetric Association 37:335.

Feldman, S.A., K. J. Ho, L.A. Lewis, B. Mikkelsen and C.B. Taylor
1972 Lipid and cholesterol metabolism in Alaska Arctic Eskimos. Archives of Pathology 94:42-58.

Fleshman, J. K.
1968 Health of Alaska native children. Alaska Medicine 10(1)39-42.

Foote, Donald
1960 The Eskimo hunter at Point Hope, Alaska. September 1959 - May 1960. Part II, May to September 1960. U.S. Atomic Energy Commission, U.S. Government Printing Office, Wash.

1964 American whalemen in northwest Arctic Alaska. Arctic Anthropology 2(12):17-20.

Archives Collection, Box 3. University of Alaska Library, Fairbanks.

Ford, James
1959 Eskimo prehistory in the vicinity of Point Barrow, Alaska. Anthropological Papers, American Museum of Natural History 47(1).

Fritz, Milo H.
1947 Corneal opacities among Alaskan natives. Alaska Health V(12).

Fritz, Milo H., and Phillips Thygeson
1951 Phlyctenular keratoconjunctivitis among Alaska Indians and Eskimos. Public Health Reports 66(29):24-29.

Giddings, J. L.
1961 Kobuk River people. Studies of Northern People, University of Alaska, College.

Gilmore, C.P.
1973 The real villain in heart disease. New York Times Magazine, March 25, 1973.

Gubser, N.
1965 The Nunamiut Eskimo: Hunters of caribou. New Haven and London: Yale University Press.

Guedon, Marie-Francoise
1971 People of Tetlin, Why are you singing? A study of the social life of the Upper Tanana Indiana. Ph.D Dissertation, Byrn Mawr College. Ann Arbor, Michigan: University Microfilms.

Gunther, Erna
1972 Indian life on the northwest coast of North America. Chicago: University of Chicago Press.

Hall, Edwin S.
1971 The "Iron Dog" in northern Alaska. Anthropologia 13 (1-2):237-54.

Hanson, Mary L., G. W. Comstock and C. E. Haley
1967 Community isoniazid prophylaxis program in an under developed area of Alaska. Public Health Report 82(12):1045-1056.

Heinbecker, Peter
1932 Ketosis during fasting in Alaska. Department of Surgery

and Biological Chemistry, Washington West School of Medicine, P. 279ff.

Heller, Christine, and Edwin Scott
1956-61 The Alaska dietary survey, 1956-61. Public Health Service Publication No. 999-AH-2. Environmental Health Series, Arctic Health, U.S. Department of Health, Education, and Welfare.

Heller, Christine
1964 The diet of some Alaskan Eskimos and Indians. Journal of the American Dietetic Association 45(5):425-428.

1963 Infant dietary practices among Alaskan Eskimos and Indians. U.S. Public Health Service, Dept. of Health, Education and Welfare, Anchorage.

Hippler, Arthur
1969 Barrow, Kotzebue: An exploratory comparison of acculturation and education in two large northwest Alaskan villages. University of Minnesota, Minneapolis.

Henry, David C.
1973 Dinaak'a. Summer Institute of Linguistics, Inc., Fairbanks.

Ho, Kang-Jey, Belma Mikkelson, Lena A. Lewis, Sheldon A. Feldman and C. Bruce Taylor
1972 Alaskan Arctic Eskimo: responses to a customary high fat diet. The American Journal of Clinical Nutrition 25: 737-745.

Hosley, Edward H.
1961 The McGrath Ingalik. Anthropological Papers of the University of Alaska 9(2):93-113.

Howes, Helen Claire
1975 Hearing problems in the Eskimo. North Nord XXII:6.

Hrdlicka, Ales
1944 Alaska diary of 1925-1931. Washington: Smithsonian Institute. Lancaster, Pa.: Jacque Cattell Press.

Hughes, Charles C.
1960 An Eskimo village in the modern world. Ithaca: Cornell University Press.

Jamison, Paul, and Stephen L. Zegura
1970 An anthropomorphic study of the Eskimos of Wainwright, Alaska, Arctic Anthropology VII(1):125-43.

Jelliffe, Derrick B., and E. F. Patrice Jelliffe
1974 Human milk nutrition and the world resource crisis. Science 188(4188):557-69.

Jenness, Diamond
1957 Dawn in the Arctic. Minneapolis, Minnesota: Jones Press.

1962 Eskimo administration: I. Alaska. Arctic Institute of North America, Technical Paper No. 10.

Jette, Jules C.J.
1911 On the superstitions of the Ten'a Indians. Anthropos. International Review of Ethnology and Linguistics. St. Gabriel.

Johannott, S. C.
1973 Differences in chronic otitis media between rural and urban Eskimo children. A comparative study. Clinical Pediatrics 12:415-19.

Kalant, H.
1973 Biological models of alcohol tolerance and physical dependence. Advances in experimental medicine and biology. Edited by Milton Gross. New York: Plenum Press.

Kaliikaq Yugnek
1974 Early Days in Bethel, Bethel Regional High School, Bethel, Alaska.

Kaplan, G. J., F. K. Fleshman, T.T. Bender, Carol Baum and P. S. Clark
1973 Long term effects of otitis media. A ten year cohort study of Alaskan Eskimo children. Pediatrics 52:577-85.

Kaplan, G. J., Robert Fraser and George W. Comstock
1972 Tuberculosis in Alaska, 1970. American Review of Respiratory Disease 105:920-26.

Kappas, Attallah, and Alrito P. Alvares
1975 How the liver metabolizes foreign substances. Scientific American 232(6):22-30.

Keats, Della
n.d. Tape recording of Marquerite Stetson, University of Alaska Extension Service, Fairbanks.

Kemberling, Sidney R.
1973 The Indian Health Service: Commentary on a commentary. Pediatrics 51(6):1066-67

Knapp, Barbara, and Peter Panuk
1979 Southwest Alaska Eskimo Dietary Survey of 1978. Yukon Kuskokwim Health Corporation Publication, 1979.

Krauss, Robert
1977 Patterns of Mental Illness, alcohol abuse and drug abuse among Alaskan natives. Alaska federation of natives.

Krogh, August, and Marie Krogh
1913 A study of diet and metabolism of Eskimos undertaken in 1908 on an expedition to Greenland. Meddelson om Groenland 51.

Lantis, Margaret
1945 The social structure of the Nunivak Eskimo. Transactions of the American Philosophical Society 35:156-323.

1947 Alaska Eskimo ceremonialism. Ethnographic Society Monograph. New York: J. J. Augustin Publishing Company.

1954 Acculturation and health. Revised for Alaska Health: A survey report, Graduate School of Public Health Paper 11, University of Pittsburgh.

1959 Folk medicine and hygiene. Anthropological Papers of the University of Alaska 8(1):1-76.

1960 Eskimo childhood and interpersonal relationships. Seattle: University of Washington Press.

Latham, Michael
1974 Nutrition and infection in national development. Science 188(4188):561-565.

1974 Nutrition in intellectual growth. Physiological Review 54:541.

1973 Indians, Eskimos, and other groups for whom the government has special responsibility. In U.S. Nutrition Policy of the 70's. Edited by John Mayer. San Francisco: W. H. Freeman and Company.

Launiala, Kari
1972 Current problems of lactose malabsorption. Arctic Medical Research Report. Helsinki.

Laughlin, William S.
1968 Hunting: An integrating biobehavior system and its evolutionary importance. In Man the hunter, edited by

R. B. Lee and I. Devore. Chicago: Aldine Publishing Company.

Law, Phillip G.
1957 Nutrition in the Antarctic. Royal Australian College of Physicians. 9th Annie B. Fanning Lecture of Nutrition.

Lee, R. B.
1968 What hunters do for a living, or how to make out on scarce resources. In Man the hunter, edited by R. B. Lee and I. Devore. Chicago: Aldine Publishing Company.

Leechman, Douglas
1954 The Vanta Kutchin. Bulletin No. 130, Anthropological Series No. 33, Natural Museum of Canada.

Lieber, Charles
1973 Possible role of microsomal change induced by ethanol. Advances in Experimental Medicine and Biology 35:73.

Ling, D., A. Katsarkas, and J.D. Baxter
1974 Ear disease and hearing loss among Eskimo elementary school children. Canadian Journal of Public Health 65:37-84.

Loyens, Wm.
1966 The changing culture of the Nulato, Koyukon Indians. Ann Arbor: University Microfilms.

Marshall, Robert
1933 Arctic village. United States of America, Quinn and Boden Co. Inc.

Mauratoff, George J., Nicholas Carrol and E.M. Scott
1967 Diabetes mellitus in Eskimos. Journal of American Medical Association 199:961-64. Reprint.

Mauratoff, George J., and E.M. Scott
1973 Diabetes mellitus in Eskimos after a decade. Journal of American Medical Association 226:1345-1346.

Mayall, John
1970 The effect of culture change upon Eskimo dentition. Arctic Anthropology XII(1):117-121.

Mayer, John, and M. McGowdy
1973 U.S. Nutritional policies of the 70's. Edited by John Mayer. San Francisco: W.H. Freeman and Company.

Maynard, James, and Laurel Hammes
1970 A study of growth, morbidity, and mortality among Eskimo infants of western Alaska. Bulletin of WHO 42:613-622.

Maynard, James E., Laurel M. Hammes and Francis E. Kester
1967 Mortality due to heart disease among Alaskan natives 1955-65. Public Health Report 82(8):714-720.

Maynard, James E.
1969 Otitis media in Alaskan Eskimo children. An epidemiology review with observations on control. Alaska Medicine 11 (3):93-98.

Mazess, Richard
1970 Bone mineral content in Wainwright Eskimos: Preliminary report. Arctic Anthropology VII(1):114-116.

McKechnie, Robert E.
1972 Strong medicine: History of healing on northwest coast. Victoria, B.C.: Morris Publishing Company.

McKennan, Robert A.
1959 The Upper Tanana Indians. Yale University Publication No. 55.

1965 The Chandalar Kutchin. Arctic Institute of North America, Technical Paper No. 17.

McPherson, Roger, and Karen McPherson
1976 Candy and kuak: Nutrition and health in Barrow. Unpublished manuscript of KUAC radio script.

Michael, Henry
1967 Lt. Zagoskin's travels in Russian America. 1842-1844. Arctic Institute of North America, University of Toronto Press.

Milan, Frederick A.
1964 The acculturation of the contemporary Eskimo at Wainwright, Alaska. Anthropological Papers of the University of Alaska 11(2):1-85.

Milan, F., and Eugene Evonuk
1967 Oxygen consumption and body temperatures of Eskimos during sleep. Journal of Applied Physiology 22(3):565-67.

Milan, Frederick A., and Kaare Rodahl
1961 Caloric requirements of man in the Antarctic. Journal of Nutrition 75:152-56.

Milan, Leda Chase
1974 Ethnohistory of disease and medical care among the Aleut. Anthropological Papers of the University of Alaska 16(2): 15-40.

Miller, G., P.S. Clark and G.H. Klingle
1972 Possible origin of Clostridium Botulism contamination of Eskimo food in northwestern Alaksa. Applied Microbiology 23:417-418.

Mitchell, H.H., and Marjorie Edmond
1951 Nutrition and climatic stress. Springfield, Illinois: Charles C. Thomas.

Morgan, Lael
1974 And the land provides. Garden City, New York: Anchor Press/Doubleday.

Mortimer, Edward A.
1973 Indian health: An unmet problem. Pediatrics 51(6): 1065-66.

Moorhees, C.F.A.
1957 The Aleut dentition. Cambridge, Massachusetts: Harvard University Press.

Murdoch, John
1892 Ethnographic results of Pt. Barrow expedition. 9th Annual Report of the Bureau of Ethnography. Government Printing Office, Washington, D.C.

Murie, Margaret
1977 Island between. University of Alaska Press, Fairbanks.

Murray, Alexander
1910 Journal du Yukon 1847-48. Publication of Canadian Archives No. 4, Ottawa.

Murray, David
1961 Some factors affecting the prediction and harvest of beaver in the Upper Tanana River, Alaska. M.A. Thesis, University of Alaska.

Nelson, Edward Wm.
1971 The Eskimo about Bering Strait. Printed from the Bureau of American Ethnology, Washington, 1900. New York: Johnson Printing Company.

Nelson, Richard K.
1969 Hunters of the northern ice. Chicago. University of Chicago Press.

1973 Hunters of the northern forest. Chicago. University of Chicago Press.

Newman, M.T.
1962 Ecology and nutrition stress in man. American Anthropolo-

gist 64:22-34.

Nickerson, N.H., N.H. Rowe and E.A. Richter
1973 Native plants in the diets of north Alaska Eskimos. In Man and his Foods, edited by C.D. Smith. University of Alabama Press.

Nowak, Michael
1975 Subsistence trends in a modern Arctic Eskimo commuintiy. Arctic 28(1):21-34.

Olson, Wallace, and Peter Schlederman
1969 Archaeological survey of C.O.D. Lake Area, Minto Flats. Anthropological Papers of the University of Alaska 14(2): 67-77.

Olson, Wallace M.
1968 Minto, Alaska: Cultural and historical influence in group identity. M.S. Thesis, University of Alaska, College.

Olson, Robert E.
1975 Nutrition and Alcoholism. In Modern Nutrition in Health and Disease, editors Robert Goodhart and Maurice E. Shils. Lea and Febiger, Philadelphia, Pa.:1037-1050.

Osgood, Cornelius
1936 Contributions to the ethnography of the Kutchin. Yale University Publications in Anthropology, No. 14, New Haven, Conn.

1936 Distribution of North Athapaskan Indians. Yale University Publications in Anthropology, No. 7. New Haven, Conn.

1958 Ingalik social culture. Yale University Publications in Anthropology, No. 53, New Haven, Conn.

1959 Ingalik mental culture. Yale University Publications in Anthropology, No. 56, New Haven, Conn.

1966 Ethnography of the Tanaina. Yale University Press, No. 16, New Haven, Conn.

1970 Ingalik material culture. Yale University Publications in Anthropology, No. 22, New Haven, Conn.

1971 The Han Indians. Yale University Publications in Anthropology, No. 14, New Haven, Conn.

Oswalt, Wendell
1960 Eskimos and Indians of Western Alaska 1861-1868. Extracts from the diary of Father Illarian. Anthropological Papers of the University of Alaska 8(2):101-118.

1963 Mission of change in Alaska. The Huntington Library. San Marino, California.

1967 Alaskan Eskimos. Scranton, Pa: Chandler Publishing Co.

1970 Napaskiak, an Alaskan Eskimo community. University of Oregon Press.

1973 The Kuskowagmiut: This land was theirs. New York: John Wiley and Sons.

Parran, T.A, J.A. Ciocco, W.J. Crabtree, L.R. McGibony, S.M. Wishnik and M.Q. Elder
1954 Alaska's health: A survey report to U.S. Department of Interior by Alaska Health Survey Team, University of Pittsburgh, Pa.

Parsons, Elsie Clews
1921 A narrative of the Ten'a of Anvik, Alaska. Anthropos 16-17:51.

Paul, David
1974 According to papa. Fairbanks: St. Matthews Episcopal Church.

Petroff, I.
1900 Narratives of explorations in Alaska. Report No. 1023. U.S. Senate, 56th Congress, 1st Session, U.S. Government Printing Office, Washington.

Pett, L.B., and J.P. Lupine
1958 Cholesterol levels of Canadian Eskimo. Federal Proceedings Paper 1913, 17:488.

Pilcher, George
1899 Diaries of George Pilcher,Box 1, University of Alaska Archives.

Pingayak, John F.
n.d. Seal hunting in Chevak. Student Orientation Service, University of Alaska, College.

Rainey, Froelich
1947 The whale hunters of Tigara. Anthropological Papers of the American Museum of Natural History 41(2):235-283.

Reed, Dwayne, Susan Struve and James Maynard
1967 Otitis media and hearing deficiency among Eskimo children:

A cohort study. Journal of Public Health 57(9):1657-62.

Reinhard, Karl R.
1974 The relation of climate to the epidemiology of infectious disease among Arctic populations. Alaska Medicine 16(2): 25-30.

1974 Biometric disruptions and the health of Arctic people-- an adventure in retrospective pathecology. 102nd Annual Meeting of the American Public Health Association, October 20-24.

Ritchie, Jean. A. S.
1967 Learning better nutrition. FAO, Rome.

Rodahl, Kaare
1949 The toxic effect of polar bear liver. Skrifter, No. 92. Oslo.

1954a Preliminary survey of dietary intake in blood levels of cholesterol and the occurrerce of cardiovascular disease in Eskimo. Norsk Polar Institute, Skr. 102:31.

1954b Eskimo metabolism. Skrifter, No. 99. Arctic Aeromedical Laboratory of Alaska. Ladd Air Force Base, Alaska.

1954 Diet and cardiovascular disease of Eskimo, 1950-52. Manuscript, Arctic Health Research Center, 10pp.

1963 The last of the few. New York: Harper and Row.

Robinhold, D., and D. Rice
1970 Cardiovascular health of Wainwright, Alaska. Arctic Anthropology VII(1):83-84.

Rosebury, T., and L.M. Waugh
1939 A study of dental caries among Eskimo of the Kuskokwim area in Alaska: 1. Clinical and bacterial findings. American Journal of Diseases of Children 57:871.

Sahi, T.
1972 Genetic aspects of lactose malabsorption. Current problems of lactose malabsorption. Arctic Medical Research Report. Helsinki.

Sauberlich, H.E., W. Goad, Y.F. Herman, F. Milan and P. Jamison
1972 Biochemical assessment of the nutrition status of the Eskimo of Wainwright, Alaska. American Journal of Clinical Nutrition 25:437-445.

Schaefer, O.
1970 Pre- and post-natal growth acceleration and increased sugar consumption in Canadian Eskimos. Canadian Medical

Association Journal 103:1059-1068.

1971 Otitis media and bottle feeding. Canadian Journal of Public Health 62:478-89.

1971 When the Eskimo comes to twon. Nutrition Today 6:8-16.

Schaefer, O., P.M. Crackford and B. Romanowski
1972 Normalization effect of preceding protein meals on diabetic oral glucose tolerance in Eskimos. Canadian Medical Association Journal 107:733.

Schields, W.C., editor
1917 The Eskimo I(1) (7) (10) (11).

1918 The Eskimo II(8)(10).

Schmitter, Ferdinand
1910 Upper Yukon native customs and folklore. Smithsonian Miscellaneous Collections 56(4). Washington, D.C.

Scott, E.M.
1956 Nutrition of Alaskan Eskimos. Nutrition Review 14(1).

1961 Diet of Eskimos and its relation to anemia. Presented to the 10th Pacific Science Congress. Honolulu, August 21-September 6.

Scott, E.M., and Isabelle V. Griffith
1957 A comparative study of thiamine-sparing agents in the rat. Journal of Nutrition 61(3):421-436.

Scott, E.M., Dale D. Hoskins, Isabelle V. Griffith and Robert D. Whaley
1958 Serum cholesterol leveels and blood pressure of Alaskan Eskimo men. The Lancet: 667-68.

Scott, E.M., Rita C. Wright and Barbara T. Hanan
1955 Anemia in Alaskan Eskimos. Journal of Nutrition 55(1): 137-49.

Scott, E.M., and Rita C. Wright
1967 Flourometric determination of isonicotinic acid hydrazide in serum. Journal of Laboratory and Chemical Nutrition 15:282-86.

Scott, E.M., and C.A. Heller
1964 Iron deficiency in Alaskan Eskimos. American Journal of Clinical Nutrition 15:282-86.

Sinclair, H.M.
1949 The diet of Canadian Indians and Eskimos. Nutrition Society Symposium Proceedings 12:69-82.

Sinclair, R.G., G.M. Brown and L.B. Crank
1949 Serum lipids of Eskimos, effect of high fat diet and fasting. Federation Proceedings 8:255.

Smillie, Wilson, and Edwin D. Kilbourne
1969 Human ecology and public health. McMillan Company, New York.

Sniffen, Matthew, and Thomas Sprees Carrington
1914 The Indians of the Yukon and Tanana Valleys, Alaska. Indian Rights Association, Philadelphia, Pa.

Spencer, Robert F.
1959 The North Alaskan Eskimo: A study of ecology and society. Bureau of American Ethnology. Bulletin No. 171, Washington.

Statewide Health Coordinating Council
1980 State health plan for Alaska. Approved state health plan. Janauary 1980. Juneau, Alaska.

Stefansson, Vilhjalmur
1913 My life with the Eskimo. The McMillan Company, New York.

1960 Food and food habits in Alaska and northern Canada. Human nutrition, historic and scientific monograph III. Institute of Social and Historical Medicine. Iago. Loldston, editor.

Stoney, George M.
1900 Naval explorations in Alaska. U.S. Naval Institute. Annapolis, Md.

Sullivan, Robert
1942 The Ten'a food quest. Ph.D. Dissertation, Catholic University of America, Anthropology Series No. 11.

Tikhmenev, Petr Aleksandrovich
1974 Historical survey of the formation of the Russian-American Company and its activities to the present day, 1861-1863. Trans. by Richard A. Pierce. St. Petersburgh, U.S.S.R. Prepared by the Alaska Division of State Libraries, Juneau.

Totter, J.R., and C.F. Shukers
1948 Nutrition survey of Eskimos. Alaska Health 6(10):4.

Townsend, Joan B.
1970 Tanaina ethnohistory: An example of a method for the study of culture change. In Ethnohistory of southwest Alaska, and the southern Yukon, edited by Margaret Lantis.

Lexington, University of Kentucky Press.

1974 Journals of the 19th century Russian priests to the Tanaina: Cook Inlet area. Arctic Anthropology XI(1): 1-40.

Tremaliers, Larry R., and G. Griffaton
1973 The metabolic basis of ethanol toxicity. Advances in experimental medicine and biology 35:125.

U. S. Department of Agriculture
1975 Nutritive value of foods. Agriculture Handbook No. 456.

U. S. Interdepartmental Committee on Nutrition for National Defense,Alaska
1959 An appraisal of the health and nutritional status of the Eskimo. National Institute of Health, Bethesda, Md.

VanStone, James W.
1958 The Eskimo community and the outside world. Anthropological Papers of the University of Alaska 7(1):27-39.

1959 An early account of Russian discoveries in the north Pacific. Anthropological Papers of the University of Alaska 7(2):91-116.

1960 Three Eskimo communities. Anthropological Papers of the University of Alaska 9(1):17-60.

1961 Pt. Hope, an Eskimo community in northwest Alaska. Alaska Air Command, Arctic Aeoromedical Laboratory.

1962 Pt. Hope, and Eskimo village in transition. Seattle: University of Washington Press.

Victoria, Sister
1974 The Russian Experience. In Orthodox Alaska. Vol 5(3): 16-32.

Wagoner, Richard S. Van and Tong H. Chun
1974 Facial paralysis carved in Alaskan native masks. Alaska Medicine 16(6):123-25.

Wallace, Helen M.
1973 The health of the American Indian child. American Journal of Diseases of children 125:449-454.

Wartburg, J.P. Van
1971 The metabolism of alcohol in normal and alcoholics: Enzymes. The Biology of Alcoholism I. Biochemistry. New York: Plenum Press.

Waugh, Donald B., and L.M. Waugh
1940 Effects of natural and refined sugars on oral lactobacilli and caries among primitive Eskimos. American Journal of Diseases of Children 59:483-89.

Weyer, Edward Moffat
1969 The Eskimos: Their envrironment and folkways. Anchor Books.

Weymuller, E.A.
1974 Nasopharynogascopic observations in the Alaska natives. The Laryngascope:864-868.

Wilbur, Charles G., and Victor E. Levine
1950 Fat metabolism in Alaska Eskimo. Experimental Medicine and Surgery 8:422-25.

Wohl, Michael, and Robert S. Goodhart
1964 Modern nutrition in health and disease. Philadelphia: Lea and Febiger.

Wood, Barry
1971 Malocclusion in the modern Alaskan Eskimo. American Journal of Orthodontics 60:344-54.

Young, Steven B., and Edwin S. Hall
1969 Contributions to the Ethnobotony of the St. Lawrence Island Eskimo. Anthropological Papers of the University of Alaska 14:40-50.

Yupiktak Bista, Harold Napoleon, Director
1974 A report on subsistence and the conservation of the Yupik life style.