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CONDUCTED BY

JUNO-ANN CLARKE (Ph.D.)

FOR

MEDICAL ASSISTANCE PROGRAMS, INC.

IN COOPERATION WITH

U.S.A.I.D. / AFGHANISTAN

AFGHANISTAN
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HERAT
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JALALABAD
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KABUL

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Nutritional Status in the Hazarajat

Conducted by: Juno-Ann K. Clarke (Ph.D.), Nutritionist

For: Medical Assistance Programs, Inc., Afghanistan Project

Supported by a grant from U.S.A.I.D/Afghanistan

Introduction

Afghanistan is a country completely surrounded by land, being bounded on the east by Iran, the west and south by West Pakistan and the north by the Soviet Union. Its area is estimated to be 270,000 square miles. Afghanistan has been called the "crossroads of the world" and due to its central location in the Asian continent it has been the object of many invasions which have left their influence on the population, culture and language.

The population of Afghanistan is estimated to be approximately 15 million, distributed in five primary ethnic groups: Pastuns, 60 per cent; Tadjiks, 30 per cent; Uzbecks, 5 per cent; Hazarah, 3 per cent; and Hindus and others, 2 per cent. More than two and a half million of the population are nomadic and move with their flocks in a cyclic fashion going north in the summer and south in the winter in search of good pasture for their sheep, goats and camels. Most of the remaining population is engaged in agriculture or non-nomadic herding which produce more than 65 per cent of the gross national product. The main exports are wool carpets and Karakul pelts (1).

The Hazarajat is in the central section of the country and consists of the high mountains and valleys of the Hindu Kush. In this area live most of the Hazarahs, a Mogul people believed descended from some of the warriors of Ghengis Khan. The growing season is very short and the winter very long due to the high elevation. Water is a limiting factor and irrigation is

accomplished when possible on the sloped mountain fields by a system of winding ditches or juies. Fuel for heat and cooking is scarce and brush, roots and dung cakes are most commonly used.

Food grown in this area consists mostly of grain and root vegetables. Occasionally legumes and pulses are available. Fresh fruits and vegetables are in short supply and dried fruits are often too expensive for common use. Sheep and goats are raised mainly for their wool and cattle are used for work in the fields.

Little information is available on vital statistics and the prevalence and incidence of diseases caused by unsatisfactory diets in Afghanistan. Data concerning the Hazarajat area has been particularly limited because of the difficulty of the geographic terrain and the isolation of the villages.

The current study was undertaken to elucidate some of the nutritional factors contributing to disease patterns in the Hazarajat and to determine the nutritional status of various segments of the local population.

Review of Literature

Afghanistan is basically an agriculturally oriented country. Sixty-nine per cent consists of barren mountains or desert land, 20 per cent is used as pasture, 3 per cent is forest, 5 per cent is presently under cultivation and another 3 per cent is thought to be potentially productive. Seventy-five per cent of the land presently under cultivation is located north of the Hindu-Kush Range in the valley of the Oxus River. The Hindu-Kush Mountains and the Hazarajat Plateau comprise one of the five agricultural regions of Afghanistan. Little of the agriculture is commercially done and subsistence farming by families is encountered almost everywhere. This farming is performed under very primitive conditions. Land is usually plowed by wooden plows drawn by oxen, the crops harvested by hand with a sickle, and the grain threshed by oxen teams dragging a wooden plank. Little or no fertilizer is used as most of the animal manure is saved to be burned as fuel.

Wheat is the staple food and is grown in rotation with barley under both dry farming and irrigation. Potatoes and other vegetables are grown only occasionally. A typical farmer works from 1 to 2 hectares. He lives in a nearby village and has to go to the field each day. He may have a few hens and a rooster which forage for themselves and are usually thin and scrawny. Egg production is low and they are generally sold rather than eaten. A fortunate farmer may have an ox to plow his fields and thresh his wheat or a donkey to carry his crops or goods to the bazaar. Most farmers have an average cash income of less than the equivalent of 80 U.S. dollars per year derived from the sale of wheat, alfalfa or handwoven cloth (1).

Barley flour is used as a "stretcher" with wheat. More than 30 varieties of wheat and 10 varieties of barley are grown throughout the country, often

planted together in the same field. Estimates of the production of cereals is given in Table 1 (2).

Livestock raising constitutes an important part of the national economy. Animals raised are mainly sheep (Karakul and "fat-tailed" varieties), goats, cattle, donkeys, camels and horses. Estimates of the livestock population are given in Table 2 (3).

Native sheep play an important role in nutrition, as the fat of their tails is considered a delicacy and often used in place of butter. Forty per cent of the sheep and goat herds spend the summer grazing on the Hazarajat Plateau. Wool from the sheep is used by women in the Hazarajat to produce handwoven cloth called "barack" and floor coverings called "gilim." (These rugs are very different from the Persian carpets produced in the northern areas for export.) All Afghan cattle are of the Bos indicus type with or without hump and are chiefly used for work in the fields. Their milk is collected and their meat is eaten when they are too old to work (1). Attempts have been made to introduce Brown Swiss bulls into some areas to improve milk production. Additional animal proteins come from eggs and poultry. The Lal-O-Sarjangal area is particularly known for egg production. The laying capacity of the hens is usually low due to their poor diets.

The population of the Hazarajat is rural and villages are small. Homes are built of an adobe type mud and usually consist of two rooms with small openings to allow the smoke of the fire to escape. The house is surrounded by a mud wall which encloses a courtyard. Animals are kept within this enclosure at night. Storage bins made of baskets covered with mud are placed on the roof of the house to hold grain. Food is scarce, but fuel is even more scarce. The most commonly used fuel is cattle dung mixed with straw, alfalfa

Table 1. Estimated Production of Principal Crops, 1953 through 1957.[a] Afghanistan. (thousands of metric tons)

Crop	1953	1954	1955	1956	1967
Wheat	2,281	2,090	2,018	2,100	2,100
Rice	316	279	284	250	274
Maize (corn)	602	618	570	730	654
Barley	n.a.	278	283	280	n.a.
Sugar, refined	3.4	4.9	5.4	6.1	n.a.
Cotton, ginned	14	13	20	20	20
Fruits	n.a.	n.a.	n.a.	n.a.	682

N.A. Data are not available.

[a] Fiscal years, March 21 through March 20.

Source: U.S. Dept. of Commerce, World Trade Information Service, Part I #58-7. Basic Data on the Economy of Afghanistan, 1958.

Table 2. Estimated Livestock Resources in Afghanistan, 1957.

Karakul sheep.	5 million
Native fat tailed sheep.	9 "
Goats.	6 "
Cattle	2.5 "
Donkeys.	800,000
Horses	500,000
Camels	300,000
Mules.	200,000
Yaks	2,000

Source: Lateef, N. A.: Characteristics and Problems of Agriculture in Afghanistan. Background Country Studies #5, Food and Agriculture Organization 4/2575/57.

roots and other brush. Cakes of dung and brush are stacked either on the roof of the house or near the entrance for use as fuel.

The diet of the people consists mainly of a flat bread called nan which is supplemented with fruit, rice and meat when these are available. Dogh (buttermilk) is an important item in the diet of the Hazarahs and supplies much of their protein and calcium. Mushung and bacquli are two legumes which occasionally are ground and incorporated into the wheat flour when bread is made. These improve the protein content and quality of the bread. Corn is infrequently consumed and then usually only in Bamian province. Mast (yogurt), chaka (cottage cheese) and qurout (a dried goat cheese) are also consumed when available and provide good sources of protein. Onions are the principal vegetable and potatoes are sporadically available. Tea, sugar and salt are purchased in the bazaar. Sugar consumption is quite high and often half of the tea glass is filled with sugar prior to pouring in the tea. Meat is most commonly mutton or goat. Clover may be consumed in the field as part of the noon meal with a piece of bread.

Meals are usually cooked only once a day to conserve fuel. Most cooking is done over a fire made between several cooking stones and rice pilaw or wheat porridge (halwa) is cooked in a metal pot. Nan or bread is baked in an oven which is a cylindrical hole in the ground. A fire is started in the bottom, the bread is shaped into long, flat, rather thin cakes and pressed on the sides of the walls of the oven. Here it adheres until it is baked and then the bread is removed and eaten. These ovens are covered with a metal disk when not in use, but young children frequently fall into the ovens when the tops are uncovered and burn themselves severely.

Almost all of the population are Muslims. Men may have several wives and women are generally secluded. The wearing of the veil or "chadari" is not as common in the country as in the cities, but women still are mostly covered and expose little of their body to the sun. Men generally eat first and the women consume what remains. In small families all the members may eat together and food intake of the women may be improved.

No information is available as to the diets of pregnant and lactating women. The effects of maternal malnutrition on the course and outcome of pregnancy are fairly well established (4, 5). The WHO Expert Committee on Maternal Nutrition and Child Health (1969) stated, "All over the world there is a statistical relation between the number of pregnancies and maternal and infant death rates. High infant and child mortality rates reflect the dangers of excessive pregnancies for the health of mothers and children and the inability of large families in developing areas to feed and nurture all their children."

Data from developing countries in Central America appear to indicate that lactating women may weigh less than non-pregnant, non-lactating women. The incidence of birth weights at full term under 2,500 grams is about 7.5 per cent (6). Similar data are not available for Afghanistan.

A survey done in January, 1970 of families in Kabul showed that food consumption during pregnancy and lactation was approximately identical with the non-gravid, non-lactating state. Nan and soup were the foods most frequently consumed and foods of animal protein origin were in short supply. Data on the survival rate of children indicate a mortality rate of 210 per 1,000 pregnancies (7).

Another survey from Baghlan in Kunduz showed similar dietary patterns with eggs being consumed on the average of three times a week and milk approximately once per day by most families. The average family size was 5.9 persons per household with 11 per cent of the families having plural marriages. An average of 3.6 children per household was found. Eight premature babies were reported to have died at birth and 88 other children died within the first year of life. This represents a mortality rate of approximately 200 per 1,000 pregnancies (8).

Chapan and Baraki (9) conducted a study on the incidence of osteomalacia in pregnant women at Zahishgah Hospital, Sharaharh, Kabul during 1965. Patients with osteomalacia represented 59 per cent of all the Cesarean sections done at the hospital. The osteomalacia was more pronounced in multipara than in primagravidae. Many of the women had such severe pelvic contractures that they were unable to stand. Osteomalacia occurs from a deficiency of calcium or vitamin D or a combination of both nutrients in short supply. The low intakes of calcium and the practice of seclusion or covering of the body from head to foot, and thus eliminating the formation of vitamin D in the skin from sunlight, combine to precipitate this problem. Frequent pregnancies and long periods of lactation aggravate the calcium deficiency and thus the ground work is laid for this disease.

Little information is available on the diets consumed by other groups in the population. In the student hostels where food is provided by the government. three meals a day provide adequate kcalories and moderately adequate levels of other nutrients (1). Students who live at the University also receive meals at government expense, and Table 3 indicates the basic diet served in the University cafeterias. Table 4 gives a summary of the basic diet served

to hospital personnel (10). This diet is rarely available to patients. Both of these dietaries might be low in vitamin A and ascorbic acid content depending on the types of vegetables offered. Milk, and therefore calcium, appears to be in short supply in the diet of hospital personnel.

There is little accurate information on the prevalence and incidence of diseases caused by unsatisfactory diets in Afghanistan. According to the Ministry of Public Health, goiter is widespread in the high mountain regions of the eastern and central provinces. In the central valleys scurvy has been observed in the winter. Rickets is commonly found in the Kabul area and dental caries have been found in 70 to 80 per cent of the children in primary schools in the Kabul area (1).

A survey in the Kabul area by Dr. Samadi (11) indicated that 13.3 per cent of the children who visited the Pediatric Out-Patient Department of Kabul University Women' · Hospital had some form of malnutrition. The peak incidence was between one and three years of age. Most of these children were brought to the clinic for complaints other than malnutrition such as diarrhea, upper respiratory tract infections and fevers. The clinical picture of protein-calorie malnutrition revealed 49.5 per cent kwashiorkor and 50.5 per cent marasmus. The mean body weight of the kwashiorkor children, irrespective of their age, was under 8.5 kilograms. The incidence of vitamin A deficiency was 10.2 per cent and seen mostly in children over two years of age. Hemoglobin levels were low, with the lowest levels occurring in the children with kwashiorkor. Nearly all of these children belonged to families in the low socio-economic sector of the population.

Data for men in the armed services in Iran, a neighboring country with similar food habits, indicate that the diets are adequate except in calcium,

Table 3. Average Diet Provided by University Cafeterias. Afghanistan, 1957.

	Grams	Calories	Protein, Gm.	Animal Protein, Gm.	Calcium mg.
Bread	600	1590	54.9	—	162.0
Butter and fats	50	400	—	—	—
Sugar	36	138.6	—	—	—
Meat and bone	220	190	20.5	20.5	5.6
Fluid skim milk	415	166	14.8	14.8	500
Potatoes (retail weight)	350	210	5.9	—	21
Vegetables (spinach, etc. retail weight)	300	90	5.3	—	100
Rice	25	90	1.7	—	2.5
		2874.6	103.1	35.3	791.1

Source: Dols, M. J. L.: Report on Nutrition and Supplementary Feeding in Afghanistan. Food and Agriculture Organization 9/6465. 1957.

Table 4. Average Diet Provided by Hospitals. Afghanistan, 1957.

	Grams	Calories	Protein, Gm.	Animal Protein, Gm.	Calcium mg.
Meat and bone	354	303.4	32.55	32.55	8.9
Rice	230	320	15.40	—	23
Bread	600	1828.5	63.15	—	186.3
Vegetables (retail weight)	345	48.3	4.83	—	115
Sugar	29	115	—	—	—
Fats and butter	48	384	—	—	—
Fruits	115	53	0.60	—	11
Salt	7	—	—	—	—
Tea	1.8	—	—	—	—
		3052.20	116.53	32.55	344.2

Source: Dols, M. J. L.: Report on Nutrition and Supplementary Feeding in Afghanistan. Food and Agriculture Organization 9/6465. 1957.

riboflavin and ascorbic acid (12). Diets of adult men in Afghanistan might be expected to be the most adequate of all segments of the population.

Residents of many areas of the Hazarajat have never seen a physician and home remedies abound. Hyssop is used for the drawing of abscesses. Honey is soaked into a piece of cotton and placed in the ear to relieve an earache. Naswar (a type of tobacco mixed with ashes) is used to stop the pain of a decayed tooth. A Tawis or talisman is hung about the neck or pasted on to the skin for the relief of pain and to cure various disorders. Kohl, a kind of stone, is ground and placed around the eyes for a cosmetic and for minor eye problems (13). Quorskamar, a large brown bean, is rubbed on the back to decrease pain, and Zard Chabah is a type of yellow stone which is ground and consumed for sore throat. Foods are classifed as to whether they are hot or cold. Meat, eggs and fat are considered hot foods and restricted for certain illnesses. Vegetables and fruits are generally cold foods (14).

The five most prevalent diseases diagnosed in the Medical Assistance Program Afghanistan Project mobile medical clinics in 1969 in the Hazarajat include intestinal parasites (41.6%), trachoma (11.2%), chronic pulmonary disease excluding tuberculosis (9.4%), bacillary and amebic dysentery (8.0%), and tuberculosis (6.0%). All diseases other than intestinal parasites are significant from the standpoint of serious impairment of health. Intestinal parasites were particularly prevalent in the Panjaw area. Other significant diseases found were otitis media (3.8%), leprosy (2.1%), osteomyelitis (1.9%), and malaria (1.0%). The incidence of leprosy is particularly high. Undernutrition and understature were frequently observed as were some cases of extreme malnutrition and marasmus. Preliminary calculations of survival rate data for 1966-1969 indicate that 50.5 per cent of the children born survived.

There were 5.6 children born to each woman and the younger age groups of women showed almost as much loss as the older groups. This suggests that most of the deaths occur in infancy and early childhood (15).

Intestinal parasites such as ascaris tend to interfere with protein digestion and absorption and thereby act as precipitating factors for protein-calorie malnutrition (16, 17). Frequent upper respiratory tract infections and attacks of gastro-enteritis assist in the development of protein-calorie malnutrition and reduce the food absorption of children (18). Increased protein may be required by children to produce immunity factors as a response to zymotic disease (18-20). The high incidence of intestinal parasites found in the Hazarajat should be of concern for the health of young children.

Studies by Monckeberg (21) and others (22) have indicated correlations between animal protein intake and intelligence quotient, with those children who consume a smaller proportion of animal protein having significantly lower intelligence quotients. There is still confusion as to whether this retardation is permanent or transitory, but the negative effects of malnutrition on the learning performance of children has been demonstrated to exist. There seems to be strong evidence that malnutrition "per se" affects not only the expression of genetic potential in physical development, but intellectual development as well. Chronic subalimentation of school age children would appear to affect their ability to learn at maximum efficiency. The major need of developing countries is an alert, creative and intelligent citizenry who can contribute to the expansion of the gross national product. Nutrition plays a major part in facilitating this development (23).

An appraisal of the nutritional status of the Hazarajat would give useful directions towards programs designed to alleviate and improve the conditions which are detrimental to family life and health.

Methods

Three mobile medical clinics were held in the Hazarajat during the summer months of 1970. These were at Panjaw in July, Lal-O-Sarjangal in August, and Waras in September. (See map in front of the report for location of clinics.) Each clinic lasted for three weeks and the time in between each clinic was used for replenishing of supplies, travel to the next camp and clerical work on patient records. The total number of patients attending the three clinics was 7,498, of which 5,324 were males and 2,174 were females. Patients came mostly from the village within which the clinic was held and the surrounding areas, but many walked or rode for several days from outlying areas to bring their sick and injured to see the physician. Severely sick and emergency patients were deleted from the nutrition study.

The subjects for the nutrition survey were drawn from the population attending the mobile medical clinics and consisted of a total of 1,011 patients (13.5% of the total clinic population), ranging in age from one month to over 70 years. This included 644 males (12% of the total male population) and 367 females (17% of the total female population).

The sample represented various villages and included some nomads and government workers. In much of the sample no attempt was made to separate the various data components according to this parameter. The nomads and government workers comprised less than 10 per cent of the total clinic sample. In the data which is separated by village just those who indicated that they lived in the village or immediate surrounding area were included.

Each morning and afternoon, metal tickets with numbers were distributed by the staff to the patients who were waiting in line for entrance to the clinic. Different colored tickets were used for the various stations in

the clinic. A specially colored ticket indicated that the patient was to be a part of the nutritional status survey and to receive the complete clinic work-up. These tickets were distributed on a random basis to every fifth patient in the line until the quota for the day had been dispensed. Due to the large number of patients and the limited number which could be seen each day for the complete evaluation, the tickets were often gone before the end of the line had been reached. Because of the desirability of examining the subjects separately by sex, women and girls were usually evaluated in the morning and men and boys in the afternoon for the nutritional part of the clinic.

Appraisal stations were set up in the mobile clinic and the patients rotated from one to the other until they culminated at the pharmacy. Patients who were given the nutrition tickets visited the nutrition, medical, dental, laboratory and pharmacy sections and any others which were necessary for the treatment of their complaints. Stations included:

1. Nutrition, where diet interviews, pregnancy histories, anthropometric measurements, heights and weights, skinfold thicknesses and observations of signs of nutritional deficiencies were done;
2. Men's or women's medical, where clinical evaluations of disease, physical examinations, blood pressure, pulse, and temperature readings, and pharmacy and treatment instructions were written;
3. Dental, where the evaluation of dental problems and necessary extractions or scaling were performed;
4. Laboratory, where blood chemistries and urinalyses were done;
5. Nursing, where any treatments such as injections, inoculations, casts and dressings were done;

6. Soak room, where cleansing of wounds and treatment of leprosy patients were done;
7. Pharmacy, for the distribution of medicines.

Heights and weights, anthropometric measurements, skinfold thicknesses and observations of signs of nutritional deficiencies were done by the nutritionist with the aid of an Afghan physician. Clinical evaluations were done by the physicians and ophthalmologists. Dental evaluations were done by the dentist. Blood chemistries were done by the clinic laboratory technician and the staff of the Department of Biochemistry, School of Medicine, Kabul University. The total clinic team consisted of four physicians, one dentist, one nutritionist, one laboratory technician, one pharmacist, five nurses, one occupational therapist and several supportive staff who helped with registration of patients and various clerical activities. Dietary interviews and pregnancy histories were done by bilingual interpretors. At two of the clinics an ophthalmologist from the NOOR Eye Hospital in Kabul visited the area and evaluated eye disorders.

Standing and sitting heights were done using the Paper Scale for Measuring Children and Adults in English and Metric Units obtained from the Iowa Child Welfare Research Station, University of Iowa (Iowa City, Iowa, U.S.A.). Shoes and head coverings were removed for the standing and sitting heights. Weights were taken on a platform beam balance (Homs Beam Scale, Belmont, California, U.S.A.). Infants and young children were weighed without clothing; older children and adults were asked to remove all clothing and heavy jewelry except the loose trousers worn by both sexes. A pair of trousers was tared and this weight was subtracted from the scale weight for each subject.

Anthropometric measurements of eight bony diameters and nine soft tissue circumferences were done (see Figure on page 20 for location of measurements). In addition, measurements of head circumference were made of infants. All anthropometric measurements were done on the right side of the body using a flexible centimeter tape. Bony diameters were measured using a calibrated large body anthropometer.

Skinfold thicknesses were done on the triceps area midway between the olecron and acromial processes and the subscapular area obliquely to the tip of the bottom of the scapula using the Lange Skinfold Caliper (Cambridge Scientific Industries, Inc., Cambridge, Maryland, U.S.A.).

Observations of signs of nutritional deficiencies were done using guidelines from the I.C.N.N.D. Manual for Nutrition Surveys (see Appendix for form used). Dietary intakes and food preferences were obtained through interviews using the form shown in the Appendix. Interviews were also used to obtain the pregnancy histories and feeding practices during pregnancy and for infants and young children. These were done for all women who had had at least one pregnancy (see Appendix for form used). Twenty-four recall diet intakes (see Appendix for form used) were coded and analyzed for kcalories, protein, fat, carbohydrate, calcium, iron, vitamin A value, thiamin, riboflavin, niacin and ascorbic acid, using the IBM 6400 computer and a program developed in cooperation with the Department of Nutritional Sciences, University of California, Berkeley, California, U.S.A. Intakes were compared with various dietary recommendations established by the Food and Agriculture Organization of the United Nations and the World Health Organization for developing countries and standards for sufficient intakes developed by the Interdepartmental Committee for Nutrition for National Defense (see Appendix for Tables of Standards).

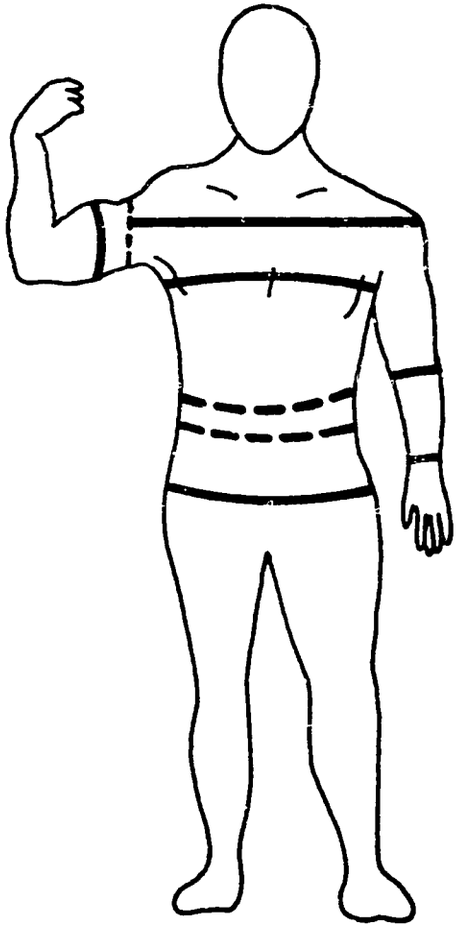
Values for nutrient content of foods were obtained from various food tables including the Composition of Foods, Agriculture Handbook No. 8, Agriculture Research Service, United States Department of Agriculture; and analyses of local food samples obtained from the villages in which the clinics were held and analyzed by the Food Analysis Laboratory of the Public Health Institute, Royal Ministry of Public Health, Kabul, Afghanistan (see Table in Appendix for Panjaw values.)

Pregnancy histories and feeding practices during pregnancy and of infants and young children were coded and analyzed using the IBM 6400 computer and a program especially written for this data.

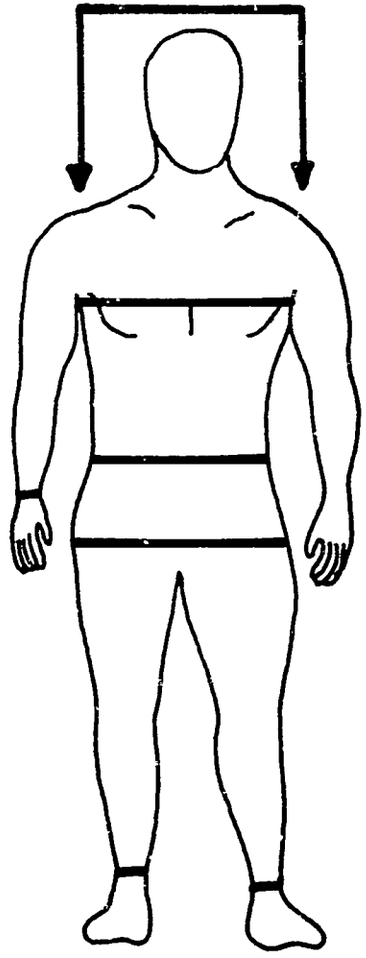
Hemoglobins were done using finger tip blood and the American Optical Company, Spencer Hemoglobinometer (battery operated). Hematocrits were measured on finger tip blood using microhematocrit tubes sealed with Critoscal and centrifuged for 4 minutes. Samples were read using standardized charts published by Biological Research, Inc. (St. Louis, Missouri, U.S.A.). Samples of venous blood were drawn using a vacutainer apparatus, chilled, allowed to clot, centrifuged and the serum eluted. Serum was kept chilled and delivered to the Biochemistry Department, School of Medicine, Kabul University for various tests.

Incidence, percentages, means, standard deviations and "t" values were calculated and compared for the various age-sex groups.

LOCATION
OF CIRCUMFERENCE
MEASUREMENTS



LOCATION OF
BONE DIAMETER
MEASUREMENTS



Results and Discussion

The results of this study are divided into several sections. These include data on pregnancy, birth history and mortality of children; blood analyses and clinical evaluations; incidence of dental problems; anthropometric measurements and evaluation of signs of nutritional deficiencies; and adequacy of dietary intakes.

Data in Table 5 indicate the pregnancy and birth frequencies for mothers ages 16-20 attending the clinic during the summer of 1970. It should be noted that ages for other than young children are rather relative. Most of the patients do not know their age. Birthdays are not recorded and when asked, patients may reply with any number which they have heard recently. Ages were estimated by a combination of questioning of the patient regarding number of children, when married and the age of the oldest living child, and a calculated guess by the staff. One-sixth of the mothers had had as many as four pregnancies by age 20. There was an average of 1.9 children born per mother in this age group. Mortality was approximately 56 per cent. No stillbirths were reported and abortions occurred to 16.7 per cent of the women.

Mothers who were ages 21-45 at the time of interview reported a total of 806 live births and 211 deaths giving an average of 4.8 children born per mother and a mortality rate of 26.3 per cent (Table 6). Twenty-nine stillbirths were reported and 70 abortions.

Older women ages 46 or more reported a total number of 60 children born or 6.9 per mother and a mortality rate of 48 per cent. No still births were reported and 5 abortions occurred (Table 7).

Table 5. Pregnancy and Birth Frequencies for Mothers Ages 16-20 Years at Time of Interview.

Category		Number of Happenings 1	2	3	4	Total Mothers Interviewed
Gravida	A	5	9	1	3	18
	B	27.8	50.0	5.6	16.7	
Para	A	7	7	3	1	18
	B	38.9	38.9	16.7	5.6	
Abortions	A	3				
	B	16.7				
(Note: 83.3% of the mothers of this age group reported no abortions.)						
Stillbirths		None reported.				
Live Births	A	7	7	3	1	18
	B	38.9	38.9	16.7	5.6	
Number Living	A	11	2	1	1	18
	B	61.1	11.2	5.6	5.6	
(Note: 16.7% reported no living children.)						
Number of Males Living	A	6	1	1		18
	B	33.3	5.6	5.6		
(Note: 55.6% reported no living male children.)						

A = The number of women reporting this number of happenings in each category.

B = The percentage of the number of women reporting this number of happenings in each category.

Table 6. Pregnancy and Birth Frequencies for Mothers Ages 21-45 Years at Time of Interview.

Category		Number of Happenings 1	2	3	4	5	6	7	8	9	10	11-14	Total Mothers Interviewed
Gravida	A	8	7	23	21	17	21	15	11	10	9	14	156
	B	5.1	4.5	14.7	13.5	10.9	13.5	9.6	7.1	6.4	5.8	8.9	
Para	A	9	9	26	21	19	24	16	11	10	6	5	156
	B	5.8	5.8	16.7	13.5	12.2	15.4	10.3	7.1	6.4	3.8	3.2	
Abortions	A	21	15	5	1				1				156
	B	13.5	9.6	3.2	0.6				0.6				
(Note: 72.4% of the mothers reported no abortions.)													
Stillbirths	A	8	5	1	2								156
	B	5.1	3.2	0.6	1.3								
(Note: 89.7% of the mothers reported no stillbirths.)													
Live births	A	9	9	30	19	21	22	16	10	10	5	4	156
	B	5.8	5.8	19.2	12.2	13.5	14.1	10.3	6.4	6.4	3.2	2.5	
(Note: 0.6% of the mothers reported no live births.)													
Number living	A	26	25	39	29	15	10	5	2				156
	B	16.6	16.0	25.0	18.6	9.6	6.4	3.2	1.3				
(Note: 3.2% of the mothers reported no living children.)													
Number of Males living	A	53	43	23	4	3	1				6		156
	B	34.0	27.6	14.7	2.6	1.9	0.6						
(Note: 18.6% of the mothers reported no living male children.)													

A = The number of women reporting this number of happenings in each category.

B = The percentage of the number of women reporting this number of happenings in each category.

Table 7. Pregnancy and Birth Frequencies for Mothers Ages 46+ Years at Time of Interview

Category		Number of Happenings 1	2	3	4	5	6	7	8	9	10	11-14	Total Mothers Interviewed
Gravida	A		1			2	1	1	1	1	2	1	10
	B		10.0			20.0	10.0	10.0	10.0	10.0	20.0	10.0	
Para	A		1			2	1	2	2		1	1	10
	B		10.0			20.0	10.0	20.0	20.0		10.0	10.0	
Abortions	A	2		1									
	B	20.0		10.0									
(Note: 70.0% of the mothers of this age group reported no abortions.)													
Stillbirths		None reported											
Live Births	A		1			2	1	2	2		1	1	10
	B		10.0			20.0	10.0	20.0	20.0		10.0	10.0	
Number Living	A	1	3	1	2	3							10
	B	10.0	30.0	10.0	20.0	30.0							
Number of Males living	A	4	2	2	1								10
	B	40.0	20.0	20.0	10.0								
(Note: One mother reported no living male children.)													

A = The number of women reporting this number of happenings in each category.

B = The percentage of the number of women reporting this number of happenings in each category.

Difficulties were encountered with older mothers remembering their lengthy pregnancy history and memory of long-past events was often sketchy. Many abortions or very early terminations of pregnancy might have been missed. The mortality rates appear to be similar to those reported previously for this area (7, 8, 15), but are considerably above the rates for developed countries (30).

A comparison of the sex of children born by their birth order (Table 8), indicates that in most cases more male children were born than female. These data are similar to reports from other countries. In the United States there is about a six per cent excess of males over females at birth (30).

Frequent pregnancies and short intervals between pregnancies tend to lower the chance for survival of children and infants. Infants in the Hazarajat are generally breast fed anywhere from 18 months for girls to 24 months for boys. The arrival of another sibling not only deprives the previous child of a much needed protein source but places an excessive nutritional strain on the mother. Table 9 shows the interval between pregnancies as related to birth order for all mothers interviewed at the clinic. The most frequent interval between pregnancies was two years with three years being fairly frequent in the early years of child bearing. Twenty-eight mothers had at least one child within one year after a previous child had been born.

Table 10 indicates the age of death of children by birth order for all mothers interviewed. Most children died before one year of age, the highest incidence being for children who were in the second and third birth orders. This appears to indicate that these children had less chance of survival due to competition with siblings for protein and other aspects of maternal care.

Table 8. Sex of Children by Birth Order; 183 Mothers Interviewed.

Birth Order	Mothers Bearing Zero Children		Mothers Bearing Male Children		Mother Bearing Female Children	
	No.	%	No.	%	No.	%
1			98	53.6	85	46.4
2	16	8.7	87	47.5	80	43.7
3	34	18.6	80	43.7	69	37.7
4	67	36.6	54	29.5	62	33.9
5	85	46.4	50	27.3	48	26.2
6	112	61.2	43	23.5	28	15.3
7	134	73.2	28	15.3	21	11.5
8	151	82.5	18	9.8	14	7.7
9	162	88.5	11	6.0	10	5.5
10	172	94.0	4	2.2	7	3.8
11	178	97.3	1	0.5	4	2.2
12	179	97.8	1	0.5	3	1.6
13	182	99.5	1	0.5		

Table 9. Interval between Pregnancies by Birth Order; 183 Mothers Interviewed

Birth Order	No Child Born or Child Dead	Age of Last Child When Next Child Born* 1	2	3	4	5	6	7-9	
1	68	2	66	27	13	4	2	1	No. of Mothers
	37.2	1.1	36.1	14.8	7.1	2.2	1.1	0.5	Percentage
2	89	5	58	16	7	4	1	3	
	48.6	2.7	31.7	8.7	3.8	2.2	0.5	1.5	
3	113	8	43	11	3	3	1	1	
	61.7	4.4	23.5	6.0	1.6	1.6	0.5	0.5	
4	121	7	40	8	3	2		2	
	66.1	3.8	21.9	4.4	1.6	1.1		1.1	
5	132	2	30	10	2	2	3		
	72.1	1.1	16.4	5.5	1.1	1.1	1.6		
6	151	3	18	6	1	2	1	1	
	82.5	1.6	9.8	3.3	0.5	1.1	0.5	0.5	
7	163	1	15	2	1		1		
	89.1	0.5	8.2	1.1	0.5		0.5		
8	173		4	3	2	1			
	94.5		2.2	1.6	1.1	0.5			
9	180		1	1	1				
	98.4		0.5	0.5	0.5				
10	180		2	1					
	98.4		1.1	0.5					

*Age is the interval within the specified time period. Age 1 is from birth to 12 months.

Table 10. Age of Death of Child by Birth Order; 183 Mothers Interviewed.

Birth Order	No Child Born or Child Living	Age at Death* 1	2	3	4	5-9	10-14	15-19	20+	
1	111	44	10	7		3	4	2	2	Number of Mothers
	60.7	24.0	5.5	3.8		1.6	2.1	1.0	1.0	Percentage
2	104	50	14	5	2	4	3	1		
	56.8	27.3	7.7	2.7	1.1	2.1	1.6	0.5		
3	117	46	7	4	2	7				
	63.9	25.1	3.8	2.2	1.1	3.8				
4	136	35	7	1	1	2			1	
	74.3	19.1	3.8	0.5	0.5	1.0			0.5	
5	152	23	3	1	1	3				
	83.0	12.6	1.6	0.5	0.5	1.5				
6	156	22	2		1	2				
	85.2	12.0	1.1		0.5	1.1				
7	167	12	3			1				
	91.3	6.6	1.6			0.5				
8	168	13	1			1				
	91.8	7.1	0.5			0.5				
9	172	8	3							
	94.0	4.4	1.6							
10	180	1	1		1					
	98.4	0.5	0.5		0.5					

*Age is the interval within the specified time period. Age 1 is from birth to 12 months.

Deaths of children in the first and second birth order under two years of age represent approximately 30 per cent of all deaths of children.

Data from the United States indicate that males suffer a higher mortality at every age, so that the excess of males at birth is gradually reduced until beyond age 20 females are in excess in the population (30). Table 11 shows that at almost all ages and for almost every birth order deaths of males are higher than females. Again the largest number of deaths occurs in the under one year age group.

The relationship between the age of death of the last born child and the age of the prior child when he (last child) was born is illustrated in Table 12. Birth intervals of less than two years are especially disastrous. This effect is seen even if the second youngest child survives the initial competition with his younger sibling. High death rates in children under five may be attributed in large measure to the frequency of pregnancy and competition for maternal nourishment and care.

Questions were asked of the mothers interviewed to elicit information on eating practices during pregnancy and lactation. When asked the question, "When you were pregnant how did you eat?", 39.5 per cent of the mothers had the same appetite as usual, 47.6 per cent reported less appetite than usual, and only 7.2 per cent reported more appetite than usual. When asked the amount eaten during pregnancy, 37 per cent ate the same amount as usual, 52.5 per cent ate less than usual, and only 7.2 per cent ate more than usual. Pregnancy requires that the mother increase her intake of foods and protective nutrients and these results appear to indicate that many Hazarah women do not.

Replies to the question regarding eating practices during breast feeding indicated that 40.7 per cent of the women had the same appetite as usual,

Table 11. Sex vs. Age of Death by Birth Order; 183 Mothers Interviewed

Birth Order	No Child Born or Child Living	Age at Death* 1	2	3	4	5-9	10-14	15-19	20+	
1	55	29	6	2		2	2	1	1	Males
	56	15	4	5		1	2	1	1	Females
2	41	34	6	3		2	1			
	47	16	8	2	2	2	2	1		
3	48	20	6		1	3			2	
	35	26	1	4		3				
4	36	15	3							
	34	20	4	1	1	2				
5	31	15	2			1				
	35	8	1	1	1	1				
6	27	13	1	1	1					
	17	9	2			1				

*Age is the interval within the specified time period. Age 1 is from birth to 12 months.

Table 12. Age When Next Child Was Born vs. Age of Death of Previous Child by Birth Order; 183 Mothers Interviewed.

Birth Order	Age of Death of Previous Child*	Age When Next Child Was Born* 1	2	3-5	6+
1	1	1			No. of Deaths
	2		3		
	3		3		
	4				
2	1	1		3	
	2	1	2		
	3		2	1	
	4		1		
3	1	2			
	2		2		
	3		2	1	
	4		1		
4	1				
	2		2		
	3		1		
	4		1		
5	1				
	2		1		
	3		1		
	4		1		

*Age is the interval within the specified time period. Age 1 is from birth to 12 months.

26.0 per cent had more appetite, and 22.3 per cent had less appetite than usual. Questions regarding the amount of food consumed elicited responses of 40.0 per cent eating the same amount, 25.5 per cent eating more, and 29.3 per cent eating less than usual. The nutrient requirements for a lactating mother are even higher than those during pregnancy. Further study is needed to clarify the reasons for the large number of women who do not appear to consume sufficient food during these stress periods on the maternal organism.

Foods that often could not be tolerated during pregnancy included nan (bread), dogh (buttermilk), warm foods (meat, etc.), milk and fat. Foods that could not be tolerated during breast feeding included nan and dogh. Since nan and dogh are the principal staples of the Hazarah diet and are the main sources of protein, calcium and iron, the large number of women who indicated intolerance of these foods is of concern. The intolerance during pregnancy may be a function of early nausea, but this certainly should not last throughout the pregnancy.

Sixty-seven per cent of the women stopped breast feeding suddenly and 80 per cent had sufficient breast milk to feed their children for almost two years. The amount of breast milk was not ascertained and may have diminished in quantity toward the end of the two-year period. This information was difficult to glean from the mothers by questioning. The most frequent reason given for the cessation of breast feeding was that the infant had reached the age of weaning. Only occasionally were pregnancy, sickness or insufficient milk mentioned as reasons.

Sixty-seven per cent of the mothers indicated that they gave additional foods to the breast fed child. Foods most frequently given were dogh (buttermilk), halwa (a wheat porridge), butter and nan (bread). When the child was

weaned to solid foods he was usually given nan, dogh, halwa, and fat or butter. Eggs were infrequently mentioned. Many Afghan mothers believe that feeding eggs to a young child will retard his speech development. Some also believe that eggs are difficult to digest and will sit in a lump in the child's stomach. Nutrition education to counteract these ideas would allow children to consume one of the best protein sources available in the area.

Children were fed from the mother's hand in the beginning and later given a small bowl of their own. Children usually did not eat with the adults until they were eight to ten years old. Most of the foods were from the respondent's own field or herd and sugar and tea were purchased in the bazaar. Men did most of the shopping and gathered the food from the fields.

Questions were asked regarding the special foods given to various age groups. The special foods for pregnant women were considered to be nan (bread), dogh (buttermilk), meat, dried cheese (qurout), and egg. Nan, dogh, mast (yogurt) and eggs were considered auspicious for the lactating women. Halwa (wheat porridge), fat and nan were recommended for the breast fed child; nan, dogh, halwa, animal milk, rice and fat for the weaning child; and nan, dogh, meat and fat for the young child.

Replies to questions asking what foods would be recommended or not recommended for feeding to children with diarrhea or fever indicated that chaka (cottage cheese), qurout (dried cheese), hot dogh (buttermilk), green tea and nan (bread) were considered good for children with diarrhea. Butter, meat, cold water, animal milk and eggs were considered not advisable to feed children with diarrhea. Nan (bread), chaka (cottage cheese), tea, dogh (buttermilk), rice cooked in water, broth and cold water were recommended for children with fever. Placing a goat skin on the body was also recommended by

some mothers. Fat, meat, eggs, and animal milk were not recommended for children with fever. These are considered "warm foods" and would not be given for "warm" conditions.

Children were thought to grow faster if they were given meat, dogh, sugar, nan, eggs, fat, qurout, rice and potatoes. All of these foods except sugar would contain protective nutrients and could form a base for nutrition education programs in maternal child health. The restriction of protein during fever is of concern. Elevated body temperatures increase protein and calorie requirements and mothers should be encouraged to feed foods that would contain these nutrients and be easily tolerated by the sick child.

Blood samples were particularly difficult to obtain. Many villagers had never observed laboratory procedures before and the taking of blood especially from the vein was thought to have dire consequences. Many believed that blood in this area of the body came directly from the heart and taking a sample would perhaps render the men impotent or even cause death. Finger tip blood was more easily obtained. Simple urinalysis for protein, glucose and specific gravity were done. Collection of specimens was not without difficulties as again this was a new procedure for most of the patients.

Data in Table 13 indicate the mean hemoglobin and hematocrit values for the different age-sex groups seen in the clinic. Mean values for hemoglobin and hematocrit were within the acceptable ranges when compared with the I.C.N.N.D. Guide (see Appendix) and with values given for the United States (31). It must be remembered, however, that the Hazarajat is a very high altitude area with the valleys of the villages where the clinics were held being approximately 9,250 to 9,500 feet elevation. Hemoglobin and hematocrit

Table 13. Hemoglobin and Hematocrit Values by Age and Sex.

Age-Sex Group	Age (yrs.)	Hemoglobin g/100 ml		Hematocrit %	
		Mean	Std. Dev.	Mean	Std. Dev.
Males (15)	0-1	11.3	1.12	37.1	2.52
Females (8)		12.4	2.70	40.8	5.27
Males (65)	2-5	11.8	2.38	38.5	4.16
Females (36)		11.7	2.10	37.8	4.34
Males (263)	6-15	14.6	2.06	43.5	4.36
Females (101)		14.5	1.78	43.7	3.92
Males (60)	16-20	16.0	1.64	47.4	4.79
Females (41)		14.7	1.80	44.4	5.00
Males (166)	21-45	17.2	1.89	51.5	5.36
Females (142)		14.9	2.41	46.0	6.01
Males (37)	46+	18.0	1.71	55.4	7.43
Females (7)		15.2	3.30	47.8	8.54

Note: Numbers in parentheses indicate the number of subjects of each Age-Sex group.

values usually increase as a response to the low barometric pressure and, therefore, would be expected to be higher for healthy persons than averages at sea level. In other words, values that would be acceptable at sea level may be borderline or too low at high altitude for maximum health. Standard deviations for hemoglobin and hematocrits, especially in young children, were quite high. Some children who attended the clinic had hemoglobin values as low as 3.0 g./100 ml. and hematocrit values of 13 per cent.

A study by Homayon, Zaheer and Ghazanfar (32) in Kabul indicated the hematological values for healthy young men and women as shown below.

Sex	Number Studied	Hemoglobin g./100 ml.	Hematocrit %
Males	75	17.0 ± 2.2	52.0 ± 5.4
Females	35	15.0 ± 2.0	47.0 ± 6.0

Kabul is approximately 6,000 feet elevation and, therefore, even lower than the Hazarajat. It would appear, then, that the mean values for adults seen in the clinic compares with those of healthy individuals from Afghanistan, but that the levels of children and young adults may be lower than desirable. As an arbitrary measure, all children and adults seen at the clinic with hemoglobin levels less than 13.0 g./100 ml. were given supplemental iron medication.

Analysis of venupuncture blood serum samples for total protein, albumin-globulin ratio, protein electrophoresis, ascorbic acid, vitamin A and β-carotene have not been completed. The results will be given in a supplementary report as soon as available. Preliminary evaluation appears to

indicate that most values for total protein in blood serum are within the range of normalcy.

Analysis of urine specimens revealed only two cases of glucose and one of protein spillage. Specific gravities were all within normal ranges except for those individuals with renal disease. Numerous cases of urinary tract infections were found especially in school aged boys.

Data in Table 14 indicate the systolic and diastolic blood pressures for the various age-sex groups. These all appear within normal ranges. It may be noted that the blood pressure appears to increase slightly with age, a not uncommon phenomenon throughout the world. Table 15 gives the pulse rate and temperature for the various age-sex groups. Again these are within normal ranges.

Observations of smallpox history and prevention through vaccination or variolation were made. Table 16 indicates that 16 individuals had evidence of smallpox scarring. Few had had a vaccination, but 33.5 per cent of the 6-15 year old males, 48.5 per cent of the 16-20 year old males, 47 per cent of the 21-45 year old males and 48.5 per cent of the over 46 year old males had evidence of variolation. Variolation was less for females with only 15.2 per cent of the women 21-45 years of age having this kind of protection. Vaccinators were available in each of the villages visited by the clinic and the low number of women availing themselves of this protection is probably due to the practice of seclusion.

Subjects were observed for signs of various nutritional deficiencies (see Appendix for form used). Table 17 indicates the incidence of eye signs observed. Pale conjunctiva is often a symptom of anemia and 5.2 per cent of the females 21-45 years of age exhibited this sign. Conjunctivitis and

Table 14. Systolic and Diastolic Blood Pressures by Age-Sex Group.

Age-Sex Group	Age (yrs.)	Systolic Pressure mm Hg		Diastolic Pressure mm Hg	
		Mean	Std. Dev.	Mean	Std. Dev.
Males (16)	6-15	101.4	9.8	68.0	10.2
Females (4)		102.0	14.6	62.0	0.0
Males (25)	16-20	109.2	11.5	72.3	8.6
Females (18)		100.8	16.7	63.2	14.0
Males (59)	21-45	117.9	13.7	77.7	10.5
Females (34)		96.5	13.9	61.1	12.8
Males (18)	46+	120.8	11.8	79.6	10.9
Females (4)		168.0	0.0	92.0	0.0

Note: Numbers in parentheses indicate the number of subjects in each Age-Sex group.

Table 15. Pulse Rate and Temperature by Age-Sex Group.

Age-Sex Group	Age (yrs.)	Pulse Rate Beats per Minute		Temperature Degrees Farenheit	
		Mean	Std. Dev.	Mean	Std. Dev.
Males (7)	2-5	112.5	17.8	99.9	0.5
Females (2)		No data		103.4	0.0
Males (136)	6-15	99.9	16.2	99.6	1.5
Females (31)		100.4	16.7	98.8	1.1
Males (25)	16-20	89.9	15.2	99.4	0.5
Females (18)		96.9	17.0	98.9	0.7
Males (70)	21-45	88.4	14.1	99.0	1.1
Females (35)		90.6	14.2	98.8	0.8
Males (18)	46+	86.1	12.6	98.7	0.5
Females (4)		99.0	13.1	99.2	0.5

Note: Numbers in parentheses indicate the number of subjects in each Age-Sex group.

Table 16. Incidence of Disease History and Prevention by Age-Sex Group.

Age-Sex Group	Age (yrs.)	Smallpox			
		Scarring	Vaccination	Variola	None
Males	0-1				4
Females					4
Males	2-5			2	9
Females		1	2	1	2
Males	6-15	3	2	93	14
Females		1	3	5	4
Males	16-20	1	1	29	29
Females				8	36
Males	21-45	8	1	80	81
Females		2	2	23	125
Males	46+			21	22
Females				3	6

Table 17. Incidence of Signs of Nutritional Deficiencies by Age-Sex Group.

Eye Symptom		Age Group (years)					
		0-1	2-5	6-15	16-20	21-45	46+
Xerosis	Males					2	
	Females		1				
Trachoma	Males			12	5	2	2
	Females			2	1	8	
Conjunctivitis	Males	2	3	13	2	12	5
	Females	3	1	9	1	7	2
Pale Conjunctiva	Males			4	3	2	
	Females			1	5	8	1
Bitot's Spots	Males		1				1
	Females					1	
Spring Catarrh	Males			7		3	1
	Females						
Xerophthalmia	Males				1	3	
	Females	1				2	
Corneal Leucoma	Males						
	Females			1			
Keratomalacia	Males				1		3
	Females			1	1		
Night Blindness	Males			2		1	
	Females						

trachoma are infectious diseases of the eyes not related to nutrition but more to environmental conditions such as sanitation, personal hygiene and dust. Males ages 6-15 years exhibited 4.5 per cent trachoma and 4.7 per cent conjunctivitis. Males 21-45 years exhibited 7.1 per cent conjunctivitis, and 5.2 per cent of the females of the same age group exhibited trachoma. Night blindness, xerophthalmia and keratomalacia are indications of vitamin A deficiency and sixteen individuals of various age groups had these observable signs.

Data in Table 18 indicate the incidence of deficiency symptoms of the face and neck structures. Xerosis may be an indication of early vitamin A deficiency or merely the reaction of the skin to a dry, dusty climate. Observations appear to indicate that the 6-15 year age group is particularly susceptible to this symptom and 21.9 per cent of the males and 15.2 per cent of the females were affected. Cheilosis consists of edema and chapping of the lips often accompanied by flaking and/or crusting. This may be routinely seen in riboflavin deficiency, but may also arise from recent fever, constant mouth breathing or too much exposure to sun and wind. Again the 6-15 year age group was affected, with 15.8 per cent of the males and 14.2 per cent of the females exhibiting this symptom. Sun and wind conditions were a problem in the Hazarajat, but the high incidence in the growing age group combined with the low incidence in adults who have great exposure to the elements would lead one to conclude that this probably represents a nutrient deficiency.

Goiter incidence was relatively low in the population seen at the clinic. The five goiters observed, however, were enlarged 3-4 times normal size.

Table 19 illustrates the incidence of signs of nutritional deficiencies of the oral cavity. Gingivitis and similar conditions were especially

Table 18. Incidence of Signs of Nutritional Deficiencies by Age-Sex Group.

Face and Neck Symptoms		Age Group (years)					
		0-1	2-5	6-15	16-20	21-45	46+
Skin-Face:							
Nasolabial Seborrhea	Males						1
	Females						
Xerosis	Males		2	61	1	2	1
	Females		1	16	1		
Lips:							
Angular Lesions	Males			7	1	1	
	Females			1		1	
Angular Scars	Males			1		3	6
	Females					1	
Cheilosis	Males		1	44	5	3	2
	Females			15	2	1	
Glands:							
Sl. Thyroid Enlargement	Males			2			
	Females						
Parotid Enlargement	Males			1			
	Females			1			
Goiter	Males						
	Females					5	

Table 19. Incidence of Signs of Nutritional Deficiencies by Age-Sex Group.

Mouth Symptoms		Age Group (years)					
		0-1	2-5	6-15	16-20	21-45	46+
Tongue:							
Atrophic Papillae	Males						
	Females			2	4	8	
Glossitis	Males						
	Females						
Magenta Colored	Males						
	Females						
Red tip or Margins	Males						
	Females					1	
Fissures	Males			2	1	1	1
	Female					1	
Gums:							
Marginal Redness	Males					2	1
	Females						
Swollen Red Papillae	Males		1	108	31	52	7
	Females		1	28	23	54	1
Gingivitis	Males			30	16	73	24
	Females			10	8	53	2
Bleeding Gums	Males				1	1	
	Females			1			
Gum Recession	Males						
	Females					2	1

prevalent. Gingival changes are usually the hallmarks of scurvy, but inflammatory changes of non-specific origin may be common in certain population groups. The interdental papillae, the marginal gingivae, and the attached gingival tissues are sequentially involved in scurvy. In the advanced stages the spongy, bleeding and infected gums appears. Excess accumulation of tartar beneath the gums can also lead to a secondary infection resulting in gingival changes that mimic scurvy. The incidence of mouth signs appeared to progress with age. Mouth care was particularly bad, and patients were advised on methods for removal of tartar and debris from the teeth. Many patients exhibited teeth that were relatively free of tartar, but they had gingivitis of varying degrees. Red, inflammed gums were a common sight and gingivitis of a 4+ nature was frequently seen.

Swollen red papillae were observed in 39 per cent of the males and 26.7 per cent of the females ages 6-15 year; 51.7 per cent of the males and 52.5 per cent of the females ages 16-20 years; 30.6 per cent of the males and 33.5 per cent of the females ages 21-45 years; and 15.3 per cent of the males over 46 years of age.

Gingivitis of varying degrees was found in 10.8 per cent of the males and 9.5 per cent of the females 6-15 years old; 26.7 per cent of the males and 18.2 per cent of the females 16-20 years old; 43 per cent of the males and 33 per cent of the females 21-45 years; and 56 per cent of the males over 46 years of age. Gum recession and loose teeth were found infrequently and when found were more common in the older age group.

Data in Table 20 give the incidence of skin signs of nutritional deficiencies. Folicular hyperkeratosis can often be a sign of vitamin A deficiency. Hyperkeratosis has also been seen in children with kwashiorkor

Table 20. Incidence of Signs of Nutritional Deficiencies by Age-Sex Group.

Skin-General Symptoms		Age Group (years) 0-1	2-5	6-15	16-20	21-45	46+
Folicular Hyperkeratosis	Males	1	6	56	5	18	2
	Females		2	17	3	6	
Scrotal Dermatitis	Males						
Pellagrous Dermatitis	Males						
	Females						
Xerosis	Males		1	47	5	4	1
	Females			10	1	4	1
Acneform Eruption	Males					1	
	Females						
Purpura or Petechiae	Males		2	6		10	6
	Females	2	2	5	3	22	1

and recently it has been proposed that this symptom may be associated with essential fatty acid and/or vitamin B complex deficiency. Of the patients observed in the clinic, 8.5 per cent of the males 2-5 years old; 20 per cent of the males and 16.2 per cent of the females 6-15 years old; and 10.3 per cent of the males and 3.9 per cent of the females 21-45 years of age had some degree of folicular hyperkeratosis, mostly on the arms and legs. Occasionally patients were found with the condition in a diffuse form which included the entire body. Xerosis of the body was exhibited by 16.8 per cent of the males and 9.4 per cent of the females 6-15 years of age. As has been mentioned previously, there is debate as to the cause of this condition, but most of the bodies of these youngsters were covered and perhaps this symptom might be considered an indication of poor nutrition during this growth period.

Purpura or petechiae are often indications of ascorbic acid deficiency. Difficulties are encountered in distinguishing between the residua of flea bites and true hemorrhages of the hair follicles due to scurvy. Close examination of the skin signs and questioning of the patients were used. Occasionally trauma was applied to the skin to observe any hemorrhaging which occurred. Tourniquet tests were not done. Results showed that 2.1 per cent of the males and 4.7 per cent of the females 6-15 years of age and 5.9 per cent of the males and 14.5 per cent of the females 21-45 years of age were affected. It appeared that the gingival symptoms of ascorbic acid deficiency were more prevalent in this population than were the skin signs. No incidence of pellagrous dermatitis were seen.

Examination of children revealed that 19.2 per cent of the males under 1 year and 11.2 per cent of the children age 2-5 years had some evidence of cranial bossing (Table 21). Other signs of rickets were not very prevalent.

Table 21. Incidence of Signs of Nutritional Deficiencies by Age-Sex Group.

Skeletal Symptoms		Age Group (years)		
		0-1	2-5	6-15
Costochondral Beading	Males		1	1
	Females	1		
Cranial Bossing	Males	4	8	3
	Females		1	1
Flared Ribs	Males			
	Females			
Pigeon Breast	Males			1
	Females			
Rickets signs-General	Males			2
	Females			
Muscle Wasting	Males		2	
	Females			

Flattening of the heads of children and adults was often a result of the swaddling or binding practiced with infants. Care was taken to distinguish the distortion of the head due to bossing from that due to binding.

Hair changes and abdominal symptoms of protein-calorie malnutrition were observed in infants and young children. Table 22 indicates that 15.4 per cent of the males and 28.4 per cent of the females 2-5 years of age had dry, dull and lifeless hair. Males in the 2-5 year age group showed 7.1 per cent having dyspigmentation of the hair. There was one case of an infant age 2 years with a flag sign, or hair that had bands of pigmentation and dyspigmentation. Mothers were asked whether the child's hair had changed color when children were observed with hair other than the expected black characteristic of mogul people. Potbelly was fairly frequent with 50.5 per cent of the males and 42.5 per cent of the females ages 2-5 years exhibiting this sign. Care must be taken with this condition as it may also be a result of parasite infestation which was quite prevalent in this population.

A clinical impression was made for children who appeared grossly malnourished and 15.4 per cent of the males 2-5 years were thought to have the condition of marasmus. Only one case of kwashiorkor was found in a female child. Many children were grossly underweight for age.

It appears that the incidence of signs of nutritional deficiencies in this population would indicate that vitamin A and ascorbic acid are the nutrients commonly in short supply and that children in the periods of most rapid growth after weaning are highly affected. Correlations need to be made for these individuals with dietary intake data and serum analyses for these nutrients before complete conclusions can be drawn.

Table 22. Incidence of Signs of Nutritional Deficiencies by Age-Sex Group.

Protein-Calorie Malnutrition Symptoms		Age Group (years) 0-1	2-5	6-15
Hair:				
Dry	Males	1	11	
	Females		12	
Dyspigmentation	Males		5	2
	Females		1	
Thin and Easy Pluckable	Males			
	Females			
Abdomen:				
Hepatomegaly	Males			
	Females			
Splenomegaly	Males			
	Females			
Potbelly	Males	3	36	3
	Females		18	1
Impression:				
Marasmus	Males	2	11	
	Females		1	
Kwashiorkor	Males			
	Females		1	

An analysis of the incidence of intestinal parasites was done and ascaris infestation was found to be particularly high. Many patients gave "worms in the belly" as their major health complaint. Stool specimens were not examined, but the patient was questioned thoroughly as to the description of the worms seen in the stools. Ascaris were often described as being as long as a snake or the patient's arm. Pinworms were described as looking like a thread on the end of one's finger. Tapeworms were described as being square-like segments. All patients examined in the nutritional evaluation were asked whether they had worms. Those replying negatively said they had not observed any in their stools. Infestation may be higher than actually reported.

Data in Table 23 indicate that 15.4 per cent of the 2-5 year old males; 11.8 per cent of the males and 13.3 per cent of the females ages 6-15 years; 15 per cent of the males 16-20 years; and 14.6 per cent of the males and 6.4 per cent of the females ages 21-45 years were infected with pinworms. Ascariasis was reported by 53.5 per cent of the males and 47.8 per cent of the females 2-5 years of age; 75 per cent of the males and 66.7 per cent of the females 6-15 years of age; 72 per cent of the males and 43.2 per cent of the females 16-20 years of age; and 64.5 per cent of the males and 46 per cent of the females 21-45 years old. Tape worms were reported by eleven individuals. Ascaris infestation of the young and growing children should be of concern due to interference with protein utilization in the gut coupled with high protein needs of children during this age period. All patients who complained of intestinal parasites were treated for the disorder before they left the clinic grounds, but re-infestation was probably high due to poor sanitary and personal hygiene practices. The elimination of worm infestation

Table 23. Incidence of Intestinal Parasites by Age-Sex Group.

Type of Parasite		Age Group (years)					
		0-1	2-5	6-15	16-20	21-45	46+
Pinworms	Males	1	11	33	9	25	3
	Females		2	14	2	10	
Ascaris	Males	1	38	209	43	110	18
	Females	1	20	77	19	70	4
Tapeworms	Males		1			5	2
	Females					3	

is probably impossible unless the construction and use of latrines can be encouraged.

The total number of patients seen in the entire clinic as compared with a similar age-sex breakdown of patients selected for the nutrition study can be found in the appendix. Analysis of the percentage of individuals with each health complaint in the total clinic was not yet available and, therefore, these comparisons cannot be made. It was assumed that the subjects in the nutrition study were representative of the total population with the exception of the severely ill and emergency patients.

Analysis of the incidence of chief health complaints by age-sex group of the patients attending the clinic and participating in the nutritional status survey are shown in Tables 24 and 25. These are summarized in Table 26 by sex category. Intestinal parasites; enteric infections such as bacillary and amebic dysentery; ear, nose and throat problems (such as rhinitis and otitis media); dematitis (this included scabies); genito-urinary problems (stones and infections); and nutritional deficiencies were particularly prevalent. Leprosy was included under communicable diseases. Several patients with extrapulmonary tuberculosis and osteomalacia were analyzed for only portions of the nutritional study as their conditions made measurement of body dimensions particularly difficult.

Evaluations of dental health were made by the dentist. Data in Table 27 indicate the incidence of gingivitis, pyorrhea, tartar and worn teeth by degree of severity. Gingivitis appeared to increase in both incidence and severity with age and very severe cases exhibited teeth which were loose and easily moved in the gum tissues. The incidence of tartar was high in all age groups after six years and the degree of involvement of the teeth

Table 24. Chief Health Complaint Indicated by Clinical Evaluation by Age-Sex Group.

Health Complaint		Age Group (years)					
		0-1	2-5	6-15	16-20	21-45	46+
Intestinal Parasites	Males	1	11	86	25	53	6
	Females		8	34	3	20	1
Other Parasites	Males						
	Females					1	
Enteric Infection	Males	5	19	10	1	4	3
	Females	3	13	10	6	15	2
Gastro-Intestinal	Males			2		5	3
	Females				2	7	
Eye	Males	2	2	13	2	10	4
	Females	2		2		6	2
Ear, Nose Throat	Males	2	14	41	7	9	2
	Females	1	5	13	7	18	1
Skin	Males	2	4	33	4	5	1
	Females		4	19		10	
Orthopedic	Males			7	2	8	5
	Females			3	4	3	1
Pulmonary	Males	1		5	1	9	6
	Females	1		1	1	8	
Tuberculosis	Males			9	3	6	
	Females		1	4	3	8	
Communicable Diseases	Males			3		3	
	Females		1	2	5	2	

Table 25. Chief Health Complaint Indicated by Clinical Evaluation by Age-Sex Group.

Health Complaint		Age Group (years)					
		0-1	2-5	6-15	16-20	21-45	46+
Genito-Urinary	Males	1	9	27	6	6	
	Females		1	2		2	
Cardiovascular-Renal	Males		2	1		2	
	Females						
Neuro-Psychiatric	Males			1		3	1
	Females					1	1
Obstetrical-Gynecological	Females				3	6	
Metabolic-Endocrine	Males					1	
	Females						
Tumors	Males			2			
	Females					1	
Accidents and Violence	Males			2			
	Females						
Handicaps and Congen. Malform.	Males			2			
	Females						
Non-Specific Illness	Males	6	1	14	3	18	4
	Females	1	1		1	20	
Nutritional Deficiencies	Males	3	8	20	4	27	8
	Females	5	8	14	9	26	1
Dental	Males			1	1		
	Females			1			

Table 26. Summary of Chief Health Complaint, All Ages Combined.

Health Complaint	Males (644)			Females (367)		
	No.	%	Total	No.	%	Total
Intestinal Parasites	22	3.4	2.2	66	16.2	6.6
Other Parasites				1	0.2	0.1
Enteric Infections	42	6.6	4.2	49	13.2	4.9
Gastro-Intestinal	10	1.6	1.0	9	2.5	0.9
Eye	33	5.2	3.3	12	3.3	1.2
Ear, Nose, Throat	75	12.0	7.5	45	12.2	4.5
Skin	49	7.7	4.9	33	9.1	3.3
Orthopedic	22	3.4	2.2	11	3.0	1.1
Pulmonary	22	3.4	2.2	11	3.0	1.1
Tuberculosis	18	2.8	1.8	16	4.4	1.6
Communicable Disease	6	0.9	0.6	10	2.7	1.0
Genito-Urinary	49	7.7	4.9	5	1.4	0.5
Cardiovascular-Renal	5	0.8	0.5	0		
Neuro-Psychiatric	5	0.8	0.5	2	0.5	0.2
Obstetrical-Gynecological				9	2.5	0.9
Metabolic-Endocrine	1	0.1	0.1	0		
Tumors	2	0.3	0.2	1	0.2	0.1
Accidents and Violence	2	0.3	0.2	0		
Handicaps; Congen. Malform.	2	0.3	0.2	0		
Non-Specific Illness	46	7.6	4.6	23	6.3	2.3
Nutritional Deficiencies	70	14.0	7.0	63	16.1	6.3
Dental	2	0.3	0.2	1	0.2	0.1

Note: Numbers in parentheses indicate the total number of males and females of 1011 patients evaluated.

Table 27. Incidence of Dental Problems by Age-Sex Group.

Dental Problem		Age Group (years)					
		0-1	2-5	6-15	16-20	21-45	46+
Gingivitis:							
Slight	Males		2	54	22	64	9
	Females		1	20	18	48	1
Moderate	Males			23	10	28	13
	Females			6	9	33	2
Severe	Males			1	2	7	8
	Females			1	1	17	3
Very severe	Males					12	6
	Females				1	17	2
Pyorrhea:	Males			9	6	27	3
	Females			2	4	23	1
Tartar:							
Less 1/3 of teeth	Males			96	25	62	12
	Females			32	22	68	
1/3 to 2/3 of teeth	Males			12	5	12	3
	Females			10	5	23	1
More 2/3 of teeth	Males			2		2	
	Females			1		1	
Worn:							
Slight	Males			3	6	9	1
	Females				4	9	
Moderate	Males			5	8	51	6
	Females				11	39	1
Severe	Males			2	3	75	30
	Females			1	5	50	6

increased with age. Worn teeth were frequently found in the older age groups and this was thought due to the practice of chewing Naswar (a tobacco mixed with ashes) and the type of diet consumed. Worn teeth are not uncommon where the diet is rather unrefined and requires much grinding by the teeth in order to be swallowed. Teeth were frequently worn almost to the gum line with the interior portions of the dentin being easily seen. Pain was not a problem, as this wearing had occurred over a long period of time and the nerves of the teeth had receded. Infections of the oral cavity from poor mouth hygiene or from extractions (done by the barber or another person in the village) were common. Facilities were available in the clinic for extracting teeth that were badly decayed, but no fillings were done.

The incidence of dentures (Table 28) indicated that replacement of lost teeth was not very common. Many patients were almost edentulous. Dentures were more common in males who were able to travel to Kabul to have the necessary work done.

Table 29 shows the incidence of dental abnormalities, congenitally missing and supernumerary teeth. Supernumerary teeth were rather frequent in the younger age groups. These were extracted by the dentist and in her opinion were more prevalent than usually encountered.

The incidence of decayed, missing and filled teeth is often used as an indication of dental health and can be related to nutrition status to a minor extent. Filled teeth were infrequently found and usually when a tooth was badly decayed it was extracted. Decayed and missing teeth were found, but not to the extent seen in populations from developed countries. Sucrose intakes were fairly high in this population, but this did not appear to result in a high incidence of dental decay. Perhaps the practice of

Table 28. Incidence of Dentures by Age-Sex Group.

Group	Age (yrs.)	Full Denture	Partial Denture
Males	16-20		1
Females			
Males	21-45	1	8
Females			4
Males	46+	1	6
Females			

Table 29. Incidence of Abnormalities, Congenitally Missing and Supernumerary Teeth by Age-Sex Group.

Group	Age (yrs.)	Abnormalities		Congenitally Missing		Supernumerary Teeth	
		Mean*	Std. Dev.	Mean*	Std. Dev.	Mean*	Std. Dev.
Males (10)	6-15	3.0	2.1	1.3	0.4	1.3	0.7
Females (4)				5.0	3.7	1.0	0.0
Males (3)	16-20	1.0	0.0	2.0	1.0		
Females (2)		1.0	0.0			1.0	0.0
Males (4)	21-45	1.6	0.9	1.0	0.0	1.0	0.0
Females (5)		1.0	0.0	1.6	0.4	1.0	0.0
Males (1)	46+	2.0	0.0				
Females (0)							

*Indicates the mean number of teeth involved.

Note: Numbers in parentheses indicate the number of subjects with the disorder.

Table 30. Incidence of Decayed, Missing and Filled Teeth by Age-Sex Group.

Group	Age (yrs.)	Decayed		Missing		Filled	
		Mean*	Std. Dev.	Mean*	Std. Dev.	Mean*	Std. Dev.
Males (0)	2-5						
Females (1)		4.0	0.0	4.0	0.0		
Males (10)	6-15	2.3	3.1	1.3	0.4		
Females (8)		1.6	0.9	1.3	0.4		
Males (7)	16-20	1.7	1.1	1.4	0.5		
Females (6)		1.6	0.9	2.3	1.2		
Males (22)	21-45	2.3	1.6	3.6	4.4	2.0	0.0
Females (17)		2.7	2.0	5.3	5.2		
Males (32)	46+	1.8	0.9	10.0	6.6		
Females (12)		1.3	0.4	15.6	8.7		

*Indicates the mean number of teeth involved.

Note: Numbers in parentheses indicate the number of subjects with the disorder.

consuming the sugar in a liquid form dissolved in tea accounted for this difference. Consumption of candy and other sticky sweets was very low. Poor dental health and missing teeth were more often related to the supporting oral tissues rather than the teeth themselves. Fluorosis of the teeth was found to be normal in all but one subject and enamel hypoplasia was not found.

Health education programs should focus on the improvement of mouth hygiene and increasing the intake of calcium, vitamin D and ascorbic acid to alleviate dental problems.

Evaluations of anthropometric measurements of height, weight and various body dimensions were made. These data are given for the various age-sex groups in Tables 31-33. As can be readily observed, heights and weights increased gradually with age and mean values for males were consistently higher than those for females. Standard deviations were particularly large for the 6-15 year age group as this age span represents great variability in growth. Data for the 0-1 year age indicate that these infants were smaller in both height (length) and weight than average infants from the United States (33). Children in developing countries often have lower birth weights than American Caucasian infants.

The following figures give a comparison of mean heights and weights for Hazarah infants and children with those reported for similar ages in Japan (34) and the United States (35). Hazarah children appear to be understatured and underweight in both age categories and for both sexes. Japanese were selected for comparison since they would be similar racially to the Hazarahs. These data appear to indicate that growth retardation had occurred in infants and young children from the areas surveyed.

Table 31. Anthropometric Evaluation of Infants and Young Children.

Measurement	Males		Females	
	Mean	Std. Dev.	Mean	Std. Dev.
0-1 Year	(N = 19)		(N = 8)	
Height dm.	6.30	0.48	6.22	0.74
Weight kg.	6.08	0.82	5.86	1.89
Chest Circ. cm.	39.18	3.20	38.98	4.79
Abdomen Circ. cm.	38.70	9.86	39.16	4.24
Biceps Circ. cm.	10.66	2.95	11.40	2.04
Head Circ. cm.	42.96	2.54	40.37	4.26
2-5 Years	(N = 61)		(N = 32)	
Standing Height dm.	7.93	1.35	7.81	1.13
Sitting Height dm.	4.90	0.54	4.87	0.48
Weight kg.	11.18	11.16	9.22	2.97
Biacromial Diam. cm.	21.58	2.11	22.04	1.13
Chest Diam. cm.	16.58	1.47	16.61	0.58
Biiliac Diam. cm.	15.93	1.91	16.75	0.67
Bitrochanteric Diam. cm.	16.16	1.68	16.73	0.83
Right Wrist Diam. cm.	3.43	0.35	3.42	0.19
Left Wrist Diam. cm.	3.44	0.31	3.42	0.28
Right Ankle Diam. cm.	4.31	0.48	4.47	0.18
Left Ankle Diam. cm.	4.32	0.50	4.40	0.23
Shoulder Circ. cm.	58.62	10.65	57.11	3.77
Chest Circ. cm.	46.64	5.69	46.21	4.24
Upper Abdomen Circ. cm.	48.16	5.25	46.56	5.57
Lower Abdomen Circ. cm.	50.50	3.85	51.63	2.82
Buttocks Circ. cm.	46.65	5.13	47.68	2.94
Biceps Flexed Circ. cm.	14.30	1.88	13.89	1.13
Biceps Relaxed Circ. dm.	12.21	2.01	12.69	1.59
Forearm Circ. cm.	13.77	1.70	13.65	1.14
Wrist Circ. cm.	9.93	1.48	9.90	0.78
Head Circ. cm.	45.74	1.79	46.42	1.89

Group	Height dm.		Weight kg.	
	0-1 yr	2-5 yrs	0-1 yr	2-5 yrs
Males:				
Japanese	7.89	10.89	10.51	18.20
American	7.55	10.85	10.59	18.32
Hazarah	6.30	7.93	6.08	11.81
Females:				
Japanese	7.78	10.79	9.99	17.80
American	7.35	10.85	9.86	18.59
Hazarah	6.22	7.81	5.86	9.22

When mean values for heights and weights for older children were compared between Japanese (34), American (35) and Hazarah subjects, the following table resulted:

Group	Height dm.		Weight kg.	
	7-9 yrs	10-13 yrs	7-9 yrs	10-13 yrs
Males:				
Japanese	12.19	14.35	23.15	36.25
American	12.13	14.53	24.61	38.63
Hazarah	12.79*		26.26*	
Females:				
Japanese	12.37	14.72	23.90	39.50
American	12.50	14.88	26.00	42.91
Hazarah	12.68*		26.25*	

*The means for Hazarah are for children 6-15 years.

Comparison is made difficult by the large age span of the data for Hazarah population, but it appears that most of the children in the Hazarajat

were more similar in height and weight to the younger aged group of both Japanese and American children. Again there was an indication of growth retardation in the children measured in this study.

A comparison of mean heights and weights of young adults from the Hazarajat (Table 32) with similar aged young adults from Japan (34) and the United States (35) is shown in the following table:

Group	Height dm.	Weight dm.
Males:		
Japanese	16.72	57.90
American	17.45	63.55
Hazarah	16.19	46.60
Females:		
Japanese	15.59	50.90
American	16.61	57.27
Hazarah	15.18	45.00

Growth retardation was again evident from these data. Both understature and underweight were exhibited by the young adults of the Hazarajat.

Sitting heights are often measured and compared with standing heights and weights to give indications of growth retardation. Studies with Japanese have indicated that the trunk length (sitting height) was relatively unaffected by nutrient deprivation, such as lack of protein. Growth retardation usually occurs in the long bones of the lower limbs and, therefore, results in shortened standing heights. Increase in stature with improved nutritional environment is due largely to the increase in femur length (36, 37). A comparison of mean values of these measurements from the Hazarajat

Table 32. Anthropometric Evaluation of School Age Children and Adolescents.

Measurement	Males		Females	
	Mean	Std. Dev.	Mean	Std. Dev.
6-15 Years	(N = 259)		(N = 87)	
Standing Height dm.	12.79	1.90	12.68	1.58
Sitting Height dm.	6.58	0.77	6.47	0.61
Weight kg.	26.26	9.07	26.25	20.84
Biacromial Diam. cm.	27.98	3.77	31.15	30.31
Chest Diam. cm.	20.28	2.24	32.26	86.90
Biiliac Diam. cm.	21.16	2.84	31.04	66.63
Bitrochanteric Diam. cm.	21.26	3.39	30.35	55.96
Right Wrist Diam. cm.	4.40	0.63	4.33	0.73
Left Wrist Diam. cm.	4.36	0.59	4.27	0.65
Right Ankle Diam. cm.	5.59	0.63	5.28	0.68
Left Ankle Diam. cm.	5.60	0.63	5.33	0.65
Shoulder Circ. cm.	82.48	78.32	90.32	97.18
Chest Circ. cm.	69.10	59.70	71.91	70.33
Upper Abdomen Circ. cm.	65.28	59.69	66.74	71.10
Lower Abdomen Circ. cm.	64.30	54.11	74.50	91.47
Buttocks Circ. cm.	67.17	57.05	71.45	67.15
Biceps Flexed Circ. cm.	18.24	2.78	18.00	2.82
Biceps Relaxed Circ. cm.	16.51	2.36	16.38	2.42
Forearm Circ. cm.	18.05	2.56	17.34	2.21
Wrist Circ. cm.	13.07	1.90	12.72	1.82
16-20 Years	(N = 54)		(N = 34)	
Standing Height dm.	16.19	1.06	15.18	0.83
Sitting Height dm.	8.15	0.60	7.71	0.43
Weight kg.	46.60	9.75	45.00	8.93
Biacromial Diam. cm.	36.16	3.33	33.83	2.35
Chest Diam. cm.	24.91	2.12	24.57	1.73
Biiliac Diam. cm.	26.80	2.34	27.13	2.17
Bitrochanteric Diam. cm.	28.65	2.67	29.21	2.78
Right Wrist Diam. cm.	5.43	0.42	5.08	0.31
Left Wrist Diam. cm.	5.33	0.40	5.02	0.29
Right Ankle Diam. cm.	6.48	0.42	5.86	0.36
Left Ankle Diam. cm.	6.55	0.39	5.91	0.30
Shoulder Circ. cm.	94.24	7.76	89.55	6.54
Chest Circ. cm.	81.70	6.89	78.33	5.90
Upper Abdomen Circ. cm.	69.96	5.93	70.88	7.93
Lower Abdomen Circ. cm.	70.99	6.32	74.38	8.19
Buttocks Circ. cm.	82.35	7.39	83.56	7.57
Biceps Flexed Circ. cm.	24.57	3.03	24.01	3.25
Biceps Relaxed Circ. cm.	21.96	2.66	21.61	3.17
Forearm Circ. cm.	23.38	2.00	21.88	1.75
Wrist Circ. cm.	16.31	1.05	15.09	0.96

for young adults with that for Japanese-Americans (37) and Caucasian-Americans (38) is shown in the following table:

Group	Standing Height dm.	Sitting Height dm.	Weight kg.
Males:			
Japanese-American (17 yrs)	16.67	9.06	63.3
Caucasian-American (17 yrs)	17.66	9.18	66.9
Hazarah (16-20 yrs)	16.19	8.15	46.6
Females:			
Japanese-American (17 yrs)	16.68	8.54	52.4
Caucasian-American (17 yrs)	16.54	8.30	60.9
Hazarah (16-20 yrs)	15.18	7.71	45.0

Both male and female young adults in the Hazarajat appeared to have not only reduced standing heights and weights, but also trunk length was less than young adults from a developed country. The short trunk length may indicate an actual difference in this racial stock from other populations or that growth retardation had affected all three parameters measured. If, however, the mean values for Hazarah males and females are compared with limited data for African school children (39), the Hazarah young adults were found to be similar in all three measurements as shown in the following table. These comparisons may be taken to mean that the values are representative of growth retardation in developing countries.

Group	Standing Height dm.	Sitting Height dm.	Weight kg.
Males:			
African (16-20 yrs)	16.53	8.17	55.8
Hazarah (16-20 yrs)	16.19	8.15	46.6
Females:			
African (16-20 yrs)	15.77	7.82	53.2
Hazarah (16-20 yrs)	15.18	7.71	45.0

When comparison was made of data from Table 33 for adults in the Hazarajat with mean values for similar measurements for Japanese (34) and Americans (40), it was interesting to note that differences between the Hazarahs and Japanese, which were pronounced in the early years, were no longer apparent. The following is a summary of this data:

Group	Standing Height dm.	Weight dm.
Males:		
Japanese	16.10	57.07
American	17.28	77.41
Hazarah	16.53	59.61
Females:		
Japanese	15.11	50.40
American	16.00	62.66
Hazarah	15.25	45.48

The large difference between mean heights and weights of Hazarahs and Americans was obvious. While these measurements for Hazarahs and Japanese were similar, the evidence of growth retardation may still be thought to

Table 33. Anthropometric Evaluation of Young and Older Adults.

Measurement	Males		Females	
	Mean	Std. Dev.	Mean	Std. Dev.
21-45 Years	(N = 144)		(N = 111)	
Standing Height dm.	16.53	1.05	15.25	0.94
Sitting Height dm.	8.41	0.44	7.72	0.28
Weight kg.	59.61	38.54	45.48	6.93
Biacromial Diam. cm.	44.57	48.55	37.02	29.20
Chest Diam. cm.	35.17	81.14	26.71	20.08
Biiliac Diam. cm.	38.93	86.19	30.09	24.83
Bitrochanteric Diam. cm.	37.03	70.57	31.78	25.51
Right Wrist Diam. cm.	5.65	0.39	5.11	0.39
Left Wrist Diam. cm.	5.63	0.56	5.05	0.36
Right Ankle Diam. cm.	6.61	0.53	5.93	0.49
Left Ankle Diam. cm.	6.60	0.57	5.97	0.53
Shoulder Circ. cm.	107.32	57.23	98.42	78.41
Chest Circ. cm.	92.07	44.97	86.49	68.78
Upper Abdomen Circ. cm.	75.46	14.06	79.48	69.40
Lower Abdomen Circ. cm.	77.44	21.17	83.67	70.49
Buttocks Circ. cm.	93.02	61.39	91.08	72.73
Biceps Flexed Circ. cm.	26.91	2.35	24.52	2.02
Biceps Relaxed Circ. cm.	23.67	2.15	22.36	2.00
Forearm Circ. cm.	24.59	1.47	21.99	1.30
Wrist Circ. cm.	16.74	1.13	15.19	0.99
46+ Years	(N = 26)		(N = 5)	
Standing Height dm.	16.74	0.76	15.40	0.81
Sitting Height dm.	8.43	0.39	7.84	0.27
Weight kg.	56.93	7.93	45.52	2.59
Biacromial Diam. cm.	38.65	2.23	34.40	1.84
Chest Diam. cm.	25.97	1.83	24.14	2.09
Biiliac Diam. cm.	29.73	1.86	29.42	1.00
Bitrochanteric Diam. cm.	30.88	2.04	30.72	1.07
Right Wrist Diam. cm.	5.75	0.35	5.30	0.10
Left Wrist Diam. cm.	5.64	0.37	5.38	0.13
Right Ankle Diam. cm.	6.57	0.37	6.30	0.10
Left Ankle Diam. cm.	6.57	0.36	6.32	0.08
Shoulder Circ. cm.	100.53	4.59	87.36	5.51
Chest Circ. cm.	87.61	5.08	80.08	2.76
Upper Abdomen Circ. cm.	77.35	7.66	72.24	2.30
Lower Abdomen Circ. cm.	79.14	8.33	76.32	3.32
Buttocks Circ. cm.	88.04	4.97	85.48	2.91
Biceps Flexed Circ. cm.	26.63	1.97	24.84	1.15
Biceps Relaxed Circ. cm.	23.65	1.58	23.70	1.22
Forearm Circ. cm.	24.34	1.30	22.24	0.36
Wrist Circ. cm.	16.82	0.75	15.70	0.34

exist as comparisons of native Japanese with Japanese reared in the United States, with the greater availability of calcium and protein, indicated that increase in height was easily achieved by Japanese within two generations (41).

Comparisons of standing heights, sitting heights and weights were made for the various age-sex groups by village. These results are shown in Tables 34 and 35. Similar values were found for all of the villages with the exception that young males ages 2-5 from Waras were slightly heavier than males of the same age from the other two villages. Males over 21 years from both Panjaw and Waras were significantly taller than males of the same age from Lal-O-Sarjangal. Sitting heights were also higher for both of these villagers. Further investigation is needed to elucidate the cause of this difference which was not seen in the female population.

Measurements of skinfold thicknesses of the triceps and subscapular areas are given in Table 36. The data appeared to indicate that skinfold thicknesses increased gradually with age and tended to be higher in females than in males. This phenomenon is common in other populations. The mean values for these measurements were significantly lower than values reported for Americans (42-44) and Japanese (45, 46) as shown in the following table:

Group	Age yrs	Triceps mm. Males	Triceps mm. Females
Japanese		7.12	8.82
American	6-15	13.9	16.1
Hazarah		4.21	5.20
Japanese		5.17	11.28
American	16-20	11.7	18.9
Hazarah		3.74	8.85
Japanese		7.03	14.40
American	21-45	12.50	23.64
Hazarah		5.06	8.57

Table 34. Comparison of Means of Heights and Weights by Village.

Measurement	Mean	Std. Dev.	"t" Value[a]	
0-1 year, both sexes				
Panjaw (N = 12)				
Standing Height dm.	6.20	0.76	0.05	Panjaw vs.
Weight kg.	6.00	2.15	1.29	Lal-O-Sarjangal
Lal-OSarjangal (N = 32)				
Standing Height dm.	6.18	0.63	-0.45	Lal-O-Sarjangal
Weight kg.	5.30	1.31	-1.65	vs. Waras
Waras (N = 12)				
Standing Height dm.	6.28	0.58	0.29	Waras vs.
Weight kg.	6.00	1.01	0.00	Panjaw
2-5 years, both sexes				
Panjaw (N = 23)				
Standing Height dm.	7.58	1.28	-0.87	Panjaw vs.
Sitting Height dm.	6.20	2.80	-0.50	Lal-O-Sarjangal
Weight kg.	9.19	2.55	0.26	
Lal-O-Sarjangal (N = 66)				
Standing Height dm.	7.80	0.97	-0.00	Lal-O-Sarjangal
Sitting Height dm.	6.63	2.85	-0.77	vs. Waras
Weight kg.	9.02	2.69	-1.75+	
Waras (N = 26)				
Standing Height dm.	7.80	1.46	0.56	Waras vs.
Sitting Height dm.	7.28	3.33	1.17	Panjaw
Weight kg.	12.80	17.04	1.00	

[a]Comparison of means between two groups.

+Significant at the 10 per cent level.

Table 35. Comparison of Means of Heights and Weights by Village.

Measurement	Mean	Std. Dev.	"t" Value[a]	
6-15 years, both sexes				
Panjaw (N = 50)				
Standing Height dm.	12.72	1.85	-0.15	Panjaw vs.
Sitting Height dm.	6.62	0.79	0.77	Lal-O-Sarjangal
Weight kg.	25.31	9.43	0.11	
Lal-O-Sarjangal (N = 97)				
Standing Height dm.	12.76	1.49	-0.30	Lal-O-Sarjangal
Sitting Height dm.	6.53	0.59	-0.03	vs. Waras
Weight kg.	25.15	6.64	-1.11	
Waras (N = 156)				
Standing Height dm.	12.83	1.84	0.37	Waras vs.
Sitting Height dm.	6.53	0.75	-0.70	Panjaw
Weight kg.	27.19	17.23	0.74	
21+ years, Males				
Panjaw (N = 41)				
Standing Height dm.	16.71	0.66	5.08*	Panjaw vs.
Sitting Height dm.	8.55	0.43	2.17**	Lal-O-Sarjangal
Weight kg.	57.57	10.34	-0.65	
Lal-O-Sarjangal (N = 99)				
Standing Height dm.	11.75	6.21	-5.19*	Lal-O-Sarjangal
Sitting Height dm.	7.99	1.61	-1.40	vs. Waras
Weight kg.	63.60	57.94	0.96	
Waras (N = 47)				
Standing Height dm.	16.49	0.69	-1.49	Waras vs.
Sitting Height dm.	8.31	0.40	-2.76*	Panjaw
Weight kg.	55.42	6.13	-1.21	
21+ years, Females				
Panjaw (N = 20)				
Standing Height dm.	15.17	0.59	-1.28	Panjaw vs.
Sitting Height dm.	7.70	0.29	0.13	Lal-O-Sarjangal
Weight kg.	44.73	5.77	-1.22	
Lal-O-Sarjangal (N = 35)				
Standing Height dm.	15.35	0.43	0.20	Lal-O-Sarjangal
Sitting Height dm.	7.69	0.26	-0.09	vs. Waras
Weight kg.	46.62	5.34	1.38	
Waras (N = 41)				
Standing Height dm.	15.33	0.50	1.06	Waras vs.
Sitting Height dm.	7.70	0.27	-0.06	Panjaw
Weight kg.	44.83	5.81	0.06	

[a]Comparison of means between groups.

*Significant at the 1 per cent level.

**Significant at the 5 per cent level.

Table 36. Skinfold Measurements by Age-Sex Group.

Group	Age (yrs.)	Triceps mm.		Subscapular mm.	
		Mean	Std. Dev.	Mean	Std. Dev.
Males (16)	2-5	6.31	2.67	3.37	1.62
Females (9)		5.88	1.61	3.25	0.88
Males (246)	6-15	4.21	1.69	3.36	1.00
Females (80)		5.20	2.80	4.83	9.87
Males (54)	16-20	3.74	1.56	4.88	1.65
Females (34)		8.85	4.56	8.76	4.49
Males (143)	21-45	5.06	7.56	7.40	7.12
Females (108)		8.57	4.37	8.86	4.37
Males (26)	46+	5.69	2.90	8.00	3.46
Females (5)		8.20	2.68	7.80	1.84

Note: Numbers in parentheses indicate the number of subject in each age-sex group.

As the measurement of skinfold thicknesses indicates the relative amount of subcutaneous fat of a population, it may be concluded that the people of the Hazarajat were rather lean. This correlated well with the low total body weights exhibited by this population.

Data in Tables 37-42 report mean values for the intake of various nutrients for each age-sex group analyzed. When the mean values for intake of different nutrients in a 24-hour period for infants 0-1 year of age (Table 37) were compared with recommendations established by the Food and Agriculture Organization and the World Health Organization (see Appendix), intakes of kcalories, protein, thiamin, riboflavin and niacin were below recommendations. When these same values were compared with I.C.N.N.D. standards (see Appendix), kcalories, protein and ascorbic acid were at acceptable levels; calcium and vitamin A were in the low range; and iron, thiamin, riboflavin and niacin were considered deficient. The adequacy of intakes of this age group in kcalories, protein and ascorbic acid was probably due to the intake of breast milk. The amount of ascorbic acid actually contained in the breast milk of mothers in this area was not known and may actually be lower than amounts given in the commonly used food analysis tables.

A comparison of mean values for intake of nutrients in a 24-hour period for young children 2-5 years (Table 38) with FAO/WHO recommendations indicated that kcalories, thiamin, riboflavin, and niacin were inadequate. When intakes were compared with I.C.N.N.D. standards, protein, thiamin and calcium (females) intakes were found to be in the acceptable range; calcium (males), riboflavin and ascorbic acid were in the low range; and iron, vitamin A and niacin were considered to be deficient.

Table 37. Evaluation of Nutrient Intake for 24 Hour Recall for Infants 0-1 Year

Nutrient	Mean	Std. Dev.	"t" Value[a]
Males: N = 21			
kcalories	827.38	107.57	1.12
Protein gm.	13.84	5.64	1.23
Fat gm.	42.14	4.91	1.43
Carbohydrate gm.	101.76	21.44	0.36
Calcium mg.	391.70	212.03	1.12
Iron mg.	1.32	0.74	0.77
Vitamin A I.U.	2428.19	284.21	1.00
Thiamin mg.	0.15	0.10	1.17
Riboflavin mg.	0.46	0.16	1.20
Niacin mg.	2.46	0.97	1.08
Ascorbic Acid mg.	47.74	8.95	0.23
Females: N = 16			
kcalories	788.83	97.03	
Protein gm.	11.98	2.45	
Fat gm.	39.76	5.12	
Carbohydrate gm.	99.42	15.54	
Calcium mg.	330.20	54.28	
Iron mg.	1.15	0.51	
Vitamin A I.U.	2335.75	268.98	
Thiamin mg.	0.11	0.05	
Riboflavin mg.	0.41	0.06	
Niacin mg.	2.16	0.69	
Ascorbic Acid mg.	47.16	5.25	

[a]Comparison of means between two groups.

Table 38. Evaluation of Nutrient Intake for 24 Hour Recall for Children 2-5 Years.

Nutrient	Mean	Std. Dev.	"t" Value[a]
Males: N = 65			
kcalories	1053.82	385.75	-0.33
Protein gm.	26.17	15.59	-0.98
Fat gm.	29.96	16.97	-0.02
Carbohydrate gm.	176.47	80.88	-0.13
Calcium mg.	323.45	281.36	-1.32
Iron mg.	4.66	3.54	-0.61
Vitamin A I.U.	1450.53	1125.35	0.27
Thiamin mg.	0.51	0.39	-0.87
Riboflavin mg.	0.57	0.42	-0.84
Niacin mg.	6.41	4.42	-0.72
Ascorbic Acid mg.	24.30	22.43	-0.69
Females: N = 33			
kcalories	1080.68	350.17	
Protein gm.	29.56	17.32	
Fat gm.	30.03	14.48	
Carbohydrate gm.	178.73	82.09	
Calcium mg.	404.02	288.65	
Iron mg.	5.13	3.72	
Vitamin A I.U.	1388.18	1030.20	
Thiamin mg.	0.59	0.44	
Riboflavin mg.	0.65	0.45	
Niacin mg.	7.11	4.63	
Ascorbic Acid mg.	27.53	20.96	

[a]Comparison of means between two groups.

A comparison of mean values for nutrient intakes for children ages 6-15 years (Table 39) was made with FAO/WHO recommendations, and kcalories, protein, thiamin, riboflavin and niacin appeared to be consumed at adequate levels. When these intakes were compared with I.C.N.N.D. standards, protein, iron, thiamin, riboflavin and niacin were within acceptable ranges, while calcium (females) was considered low; and calcium (males), vitamin A and ascorbic acid were deficient. The adequate intakes of the B vitamins and iron were largely due to the consumption of nan which forms a large portion of the diet.

When data for the calculated nutrient intake for adults ages 21-45 years (Table 41) were compared with FAO/WHO recommendations, protein, thiamin and niacin were sufficient and kcalorie and riboflavin intakes were considered deficient. A comparison of these intakes with I.C.N.N.D. standards showed protein, iron, thiamin, riboflavin (males) and niacin to be within acceptable levels; riboflavin (females) was considered low; and calcium, vitamin A and ascorbic acid intakes were in the deficient range. Similar relationships were seen in comparisons of the dietary intakes of young adults ages 16-20 (Table 40) and of older adults over 46 years of age (Table 42) with the FAO/WHO and I.C.N.N.D. standards and those expressed for adults ages 21-45.

The high incidence of gingivitis may be correlated with the commonly low intakes of ascorbic acid in the school-aged and adult population. The common diet of the adult population includes nan (bread), dogh (buttermilk) and occasionally fat (butter or tail fat from sheep).

The frequency of intake of various foods per week is shown in the following table (p. 81):

Table 39. Evaluation of Nutrient Intake for 24 Hour Recall for Children 6-15 Years.

Nutrient	Mean	Std. Dev.	"t" Value[a]
Males: N = 278			
kcalories	1825.66	729.49	2.43**
Protein gm.	59.52	26.03	2.63*
Fat gm.	22.19	14.64	1.42
Carbohydrate gm.	359.64	147.28	2.60*
Calcium mg.	297.62	343.37	-0.94
Iron mg.	12.81	5.71	3.34*
Vitamin A I.U.	669.31	2187.70	1.54
Thiamin mg.	1.37	0.63	3.07*
Riboflavin mg.	1.22	1.29	-0.44
Niacin mg.	16.78	7.68	2.70*
Ascorbic Acid mg.	3.83	5.45	-0.82
Females: N = 113			
kcalories	1628.37	714.08	
Protein gm.	51.98	24.64	
Fat gm.	19.83	15.32	
Carbohydrate gm.	316.95	146.26	
Calcium mg.	334.88	378.40	
Iron mg.	10.75	5.06	
Vitamin A I.U.	344.74	662.83	
Thiamin mg.	1.16	0.55	
Riboflavin mg.	1.29	1.47	
Niacin mg.	14.50	7.15	
Ascorbic Acid mg.	4.39	7.58	

[a]Comparison of means between two groups.

*Significant at the 1 per cent level.

**Significant at the 5 per cent level.

Table 40. Evaluation of Nutrient Intake for 24 Hour Recall for Young Adults 16-20 Years.

Nutrient	Mean	Std. Dev.	"t" Value[a]
Males: N = 59			
kcalories	2436.72	892.38	3.31*
Protein gm.	78.57	29.34	4.64*
Fat gm.	30.19	15.72	4.44*
Carbohydrate gm.	484.39	182.97	2.81*
Calcium mg.	237.12	300.17	1.05
Iron mg.	17.97	7.12	4.31*
Vitamin A I.U.	469.48	979.72	0.44
Thiamin mg.	1.90	0.73	4.54*
Riboflavin mg.	1.49	1.51	0.55
Niacin mg.	23.14	8.81	4.06*
Ascorbic Acid mg.	3.84	7.05	1.73+
Females: N = 45			
kcalories	1856.88	872.29	
Protein gm.	53.34	24.67	
Fat gm.	17.76	11.70	
Carbohydrate gm.	382.44	183.74	
Calcium mg.	175.28	292.37	
Iron mg.	12.35	5.79	
Vitamin A I.U.	384.99	969.67	
Thiamin mg.	1.29	0.60	
Riboflavin mg.	1.31	1.74	
Niacin mg.	16.32	8.04	
Ascorbic Acid mg.	1.89	2.94	

[a]Comparison of means between two groups.

*Significant at the 1 per cent level.

+Significant at the 10 per cent level.

Table 41. Evaluation of Nutrient Intake for 24 Hour Recall for Adults 21-45 Years.

Nutrient	Mean	Std. Dev.	"t" Value[a]
Males: N = 188			
kcalories	2318.98	892.72	5.15*
Protein gm.	74.29	28.81	5.68*
Fat gm.	31.52	16.46	6.56*
Carbohydrate gm.	457.36	186.93	4.42*
Calcium mg.	200.45	279.09	-0.72
Iron mg.	16.72	6.77	5.64*
Vitamin A I.U.	1011.59	1482.58	3.98*
Thiamin mg.	1.76	0.73	5.30*
Riboflavin mg.	1.24	1.41	0.46
Niacin mg.	21.54	8.92	5.38*
Ascorbic Acid mg.	3.17	4.71	-1.12
Females: N = 149			
kcalories	1833.43	812.92	
Protein gm.	56.79	27.05	
Fat gm.	20.59	13.35	
Carbohydrate gm.	369.82	171.64	
Calcium mg	223.11	290.63	
Iron mg.	12.72	6.04	
Vitamin A I.U.	440.25	1046.58	
Thiamin mg.	1.35	0.66	
Riboflavin mg.	1.17	1.39	
Niacin mg.	16.48	8.06	
Ascorbic Acid mg.	4.01	8.74	

[a]Comparison of means between two gro ps.

*Significant at the 1 per cent level.

Table 42. Evaluation of Nutrient Intake for 24 Hour Recall for Older Adults 46+ Years.

Nutrient	Mean	Std. Dev.	"t" Value[a]
Males: N = 28			
kcalories	2083.29	1058.42	0.96
Protein gm.	68.98	36.40	1.54
Fat gm.	27.21	18.01	0.38
Carbohydrate gm.	410.03	220.11	0.94
Calcium mg.	273.05	354.31	1.21
Iron mg.	14.95	8.29	1.42
Vitamin A I.U.	1244.98	1773.20	1.15
Thiamin mg.	1.59	0.90	1.54
Riboflavin mg.	1.17	1.39	0.15
Niacin mg.	19.41	10.64	1.28
Ascorbic Acid mg.	5.11	9.35	0.65
Females: N = 6			
kcalories	1624.11	1059.39	
Protein gm.	44.62	26.36	
Fat gm.	24.13	15.59	
Carbohydrate gm.	317.45	216.39	
Calcium mg.	92.58	135.59	
Iron mg.	9.82	6.48	
Vitamin A I.U.	389.67	511.95	
Thiamin mg.	0.99	0.67	
Riboflavin mg.	1.07	1.53	
Niacin mg.	13.42	8.89	
Ascorbic Acid mg.	2.50	4.62	

[a]Comparison of means between two groups.

Group	Food	Mean No. of times per week consumed
Males	Rice	0.5
Females		0.3
Males	Meat	1.2
Females		1.1
Males	Eggs	1.2
Females		1.0
Males	Pulses	1.0
Females		1.0
Males	Mast and Chaka	1.5
Females		1.5
Males	Dogh	30.5
Females		21.3
Males	Onion	1.0
Females		1.0
Males	Potato	0.7
Females		0.3

As may be noted, dogh was frequently consumed and often several times per day. The consumption of onions and potatoes was very low. Meat, eggs and pulses as sources of protein were infrequently consumed by both sexes. Villagers were questioned as to the difference in their food consumption patterns during the winter and summer. Vegetables and fruits were non-existent in the winter and the diet consisted mostly of nan, dogh and occasionally pulses or legumes. This diet was particularly low in vitamin A and ascorbic acid and deficiencies of these nutrients can be assumed to occur in this population. The consumption of whole wheat as a staple food combined with dogh does yield adequate protein of a good quality and growth retardation, therefore, can be thought due to the low kcalorie intakes which cause some of the protein to be used for energy needs rather than for growth.

Data in Tables 43-45 show comparisons of nutrient intakes for young and older males by village. Intakes of kcalories, iron, thiamin, riboflavin and niacin were significantly higher for residents of Lal-O-Sarjangal as compared with Panjaw. When intakes for males 6-15 years in Panjaw were compared with young males of similar ages in Waras, intakes for kcalories, protein, calcium, iron, thiamin, riboflavin, niacin and ascorbic acid were higher for Waras and intakes for vitamin A were higher for Panjaw youngsters.

Comparison of mean values for various nutrients for a 24-hour period for adult males in Panjaw with adult males in Waras showed that intakes of kcalories, protein, iron, vitamin A, riboflavin and niacin were significantly higher for Panjaw residents and intakes of riboflavin were higher for residents of Waras. Mean values for intakes of females in these three villages showed no statistical differences. The villages all have the same basic foodstuffs available to residents, except Panjaw was a more readily accessible area to Kabul and had a larger variety of fresh fruit and vegetables in the bazaar in the summer months. Additional study is needed to determine the cause for these differences between villages.

In general, the diets of the people of the Hazarajat were adequate in protein, thiamin, riboflavin, niacin and iron. This was thought to be due to the consumption of wheat bread as the basic staple of the diet which was often combined with a milk product giving a protein mixture of good quality. Nutrients generally low in the average intakes of the villagers were kcalories, vitamin A, calcium and ascorbic acid. The understature and underweight was probably due to the inadequacy of the kcalories and calcium. Growth requires that both protein and calories be in sufficient supply. Iron intakes, except for the very young who subsist almost entirely on milk products, were

Table 43. Evaluation of Nutrient Intake for 24 Hour Recall for Males Ages 6-15 by Village.

Nutrient	Mean	Std. Dev.	"t" Value[a]
Panjaw: N = 56			
kcalories	1495.04	593.06	-2.32**
Protein gm.	52.68	24.74	-0.98
Fat gm.	21.69	14.91	-0.25
Carbohydrate gm.	287.65	118.06	-2.68*
Calcium mg.	232.79	287.35	-0.01
Iron mg.	10.68	5.23	-2.08**
Vitamin A I.U.	1064.73	1392.73	0.43
Thiamin mg.	1.15	0.57	-1.83+
Riboflavin mg.	0.69	0.33	-2.41**
Niacin mg.	13.49	6.67	-2.28**
Ascorbic Acid mg.	3.17	5.57	-0.46
Lal-O-Sarjangal: N = 79			
kcalories	1737.16	597.90	
Protein gm.	56.81	23.54	
Fat gm.	22.32	14.31	
Carbohydrate gm.	343.06	117.92	
Calcium mg.	233.42	292.37	
Iron mg.	12.59	5.27	
Vitamin A I.U.	839.73	3697.96	
Thiamin mg.	1.33	0.57	
Riboflavin mg.	0.99	0.90	
Niacin mg.	16.17	6.76	
Ascorbic Acid mg.	3.63	5.89	

[a]Comparison of means between two groups.

*Significant at the 1 per cent level.

**Significant at the 5 per cent level.

+Significant at the 10 per cent level.

Table 44. Evaluation of Nutrient Intake for 24 Hour Recall for Males Ages 6-15 by Village.

Nutrient	Mean	Std. Dev.	"t" Value[a]
Panjaw: N = 56			
kcalories	1495.04	593.06	4.87*
Protein gm.	52.68	24.74	3.27*
Fat gm.	21.69	14.91	0.55
Carbohydrate gm.	287.65	118.06	4.94*
Calcium mg.	232.79	287.35	3.27*
Iron mg.	10.68	5.23	3.70*
Vitamin A I.U.	1064.73	1392.73	-3.41*
Thiamin mg.	1.15	0.57	3.55*
Riboflavin mg.	0.69	0.33	4.92*
Niacin mg.	13.48	6.67	4.62*
Ascorbic Acid mg.	3.17	5.57	2.06**
Waras: N = 111			
kcalories	2103.09	831.97	
Protein gm.	67.14	27.95	
Fat gm.	23.06	14.94	
Carbohydrate gm.	413.53	170.87	
Calcium mg.	423.96	385.79	
Iron mg.	14.27	6.20	
Vitamin A I.U.	424.46	999.49	
Thiamin mg.	1.53	0.69	
Riboflavin mg.	1 82	1.70	
Niacin mg.	19.43	8.38	
Ascorbic Acid mg.	4.85	4.64	

[a]Comparison of means between two groups.

*Significant at the 1 per cent level.

**Significant at the 5 per cent level.

Table 45. Evaluation of Nutrient Intake for 24 Hour Recall for Males Ages 21+ by Village.

Nutrient	Mean	Std. Dev.	"t" Value[a]
Panjaw: N = 59			
kcalories	1592.49	1390.42	-3.46*
Protein gm.	37.50	42.69	-2.08**
Fat gm.	16.06	18.87	-1.94+
Carbohydrate gm.	207.87	241.34	-1.85+
Calcium mg.	117.87	212.51	0.99
Iron mg.	14.19	17.40	-1.76+
Vitamin A I.U.	1641.47	1311.81	-2.63*
Thiamin mg.	1.31	1.35	-1.22
Riboflavin mg.	1.83	2.71	1.84+
Niacin mg.	18.66	13.89	-4.10*
Ascorbic Acid mg.	3.56	4.03	-1.35
Waras: N = 52			
kcalories	822.35	849.57	
Protein gm.	22.82	29.57	
Fat gm.	9.87	13.86	
Carbohydrate gm.	133.07	172.35	
Calcium mg.	166.28	295.93	
Iron mg.	8.62	15.61	
Vitamin A I.U.	1055.65	987.53	
Thiamin mg.	1.23	1.28	
Riboflavin mg.	2.90	3.41	
Niacin mg.	9.16	9.87	
Ascorbic Acid mg.	2.63	3.06	

[a]Comparison of means between two groups.

*Significant at the 1 per cent level.

**Significant at the 5 per cent level.

+Significant at the 10 per cent level.

acceptable and again most of the iron was derived from the consumption of whole wheat. The low intakes of ascorbic acid and vitamin A were correlated with the high incidence of deficiency signs exhibited by the population in this area.

Correlation may exist between the adequacy of nutrient intake and growth as shown by the significantly higher standing heights, sitting heights and weights of the Panjaw adult males coupled with their significantly higher intake of many nutrients when these subjects were compared for similar parameters with residents of Waras and Lal-O-Sarjangal. Further study is needed to clarify these relationships.

Summary and Conclusions

A study of nutritional status was done of 1011 subjects who attended the Medical Assistance Program Afghanistan Project mobile medical clinics in the summer of 1970 in the Hazarajat area of Afghanistan. The sample included 644 males and 367 females of ages one month to over 70 years. Appraisals were made of: (1) pregnancy and birth history of mothers; (2) child mortality; (3) food practices of mothers and children; (4) hemoglobin and hematocrit values; (4) blood pressure, pulse and temperature; (5) incidence of signs of nutritional deficiencies; (6) incidence of intestinal parasites; (7) chief health complaint; (8) dental health; (9) anthropometric measurements of height, weight, bony diameters and fleshy circumferences; (10) nutrient intake of kcalories, protein, calcium, iron, vitamin A, thiamin, riboflavin, niacin and ascorbic acid; and (11) frequency of intake of certain food commodities.

Mothers ages 21-45 years averaged 4.8 live births with a mortality rate of 26.3 per cent. Infant mortality rates for younger mothers were 56 per cent. Numerous stillbirths and abortions were reported. Most infant mortality occurred during the first year of life and was most pronounced when pregnancies were frequent with short intervals between births. Infant mortality was higher for males than for females.

Many mothers appeared to eat the same amount and kinds of foods during pregnancy and lactation as they had in the non-gravid, non-lactating state. Breast feeding was terminated suddenly when the child reached weaning age of eighteen months or two years, and buttermilk, porridge and bread were the most common foods fed infants in the second year of life and at weaning.

Hemoglobin and hematocrit values were within normal ranges when compared with international standards for sea level communities. When these mean values were compared with averages for a healthy population who were acclimatized to living at high elevations, the levels were considered to be of borderline adequacy. Blood pressure, pulse and temperature values were within normal ranges.

An analysis of the incidence of signs of nutritional deficiencies indicated that gingivitis, cheilosis and follicular hyperkeratosis were the most common symptoms found in this population. These signs could be correlated with the nutrient intake of ascorbic acid, B complex vitamins and vitamin A. Intestinal parasites were found in a large percentage of the population and ascaris infestation was of concern during the growing years due to its frequent interference with protein digestion.

The most common chief health complaints of the patients who participated in the nutrition survey were intestinal parasites, enteric infections, genitourinary problems, upper respiratory tract infections, and nutritional deficiencies. Fifteen children under five years of age were judged to have protein-calorie malnutrition.

Dental health and oral hygiene were poor and many patients had severe gingivitis, tartar accumulation, pyorrhea and excessively worn teeth. Decayed teeth were not common, but many teeth were missing due to home extractions or as a result of peridontal disease.

Anthropometric evaluations appeared to indicate that Hazarah men, women and children are understatured and underweight when compared with standards from developed countries. When values for these parameters were compared with standards from Japan, almost all age groups except adults exhibited low

standing and sitting heights and low body weights. Skinfold thickness measurements indicated that Hazarah villagers were very lean and had little subcutaneous fat. Females at all ages had higher skinfold measurements than did males. Body diameters and circumferences were proportional to stature and weight and did not show any gross differences from other populations with the exception that they were small and, therefore, correlated with the understature and underweight characteristic of this population.

Analysis of the intakes for a 24-hour period of several nutrients indicated that protein, thiamine, riboflavin and iron were adequate in all but the younger age groups. Diets were deficient in kcalories, calcium, vitamin A and ascorbic acid. The poor growth performance of children was thought to be due to the lack of sufficient kcalories and calcium so that part of the protein intake was used to meet energy requirements and thus was not available for skeletal incrementation. The low intakes of vitamin A and ascorbic acid correlated well with the clinical signs of deficiency symptoms of these nutrients.

The principal food items in the Hazarah diet were nan (bread made of wheat and/or barley), dogh (buttermilk) and tea with sugar. Occasionally pulses and legumes, eggs, meat and cheese were consumed. Fruits and vegetables were infrequently available in the summer months and not at all in the winter. The principal vegetable was the onion.

It may be concluded that residents of the Hazarajat were deficient in kcalories, calcium, vitamin A and ascorbic acid intakes. This subalimentation of protective nutrients was reflected in understature, underweight and low subcutaneous fat of the population. Dental health was poor and related in some way to the low intake of especially ascorbic acid and the lack of

oral hygiene. Intestinal parasites were common and represented a drain on the ability of young children to adequately utilize protein. Infant mortality was high and children in the first year of life fell victims to a combination of poor hygiene, infections and inadequate nutrient intake. Pregnancy frequency was high and many mothers were in a chronic state of undernutrition due to the stress of constant pregnancy or lactation. The exact relationships between the intake of specific nutrients and the evidence of poor nutritional status which was observed requires more detailed study on a longitudinal basis within a controlled environment.

An important direction for future studies would be the closer analysis and comparison of villages from nearby areas and the administration of therapeutic nutrient medications to experimental and control groups.

In general, the nutritional status of the people of the Hazarajat was adequate with respect to protein, iron and the B complex vitamins due to the high intake of wheat protein combined with milk products. The diet was almost devoid of sources of vitamin A and ascorbic acid and was low in calcium and total calories. These dietary deficiencies were reflected in the understature, underweight, high incidence of nutrient deficiency symptoms, poor dental health especially of the peridontal tissues, high infant mortality and borderline hemoglobin levels.

Recommendations and Implications for Future Study

The results of this analysis of the nutritional status of the Hazarajat would appear to indicate the following for consideration by the staff of the Medical Assistance Program Afghanistan Project and the Royal Ministry of Public Health of Afghanistan:

1. Controlled studies be undertaken with the use of supplemental vitamin and mineral preparations to determine if the nutritional status of the population might be improved. These should most certainly include the youngest segments of the population and if done on a longitudinal basis, would give indications for improvements in stature and weight of children.
2. Programs be developed for health education in the area of dental health and oral hygiene.
3. Programs be developed for health education in the area of sanitation and environmental hygiene to reduce the level of respiratory and enteric infections.
4. Programs be developed in nutrition education for mothers and children focused on the increased use of locally available foodstuffs and their proper preparation for consumption by infants and preschool children.
5. Programs in nutrition education be developed to counteract prejudice against the consumption of eggs by young children and to encourage poultry raising and egg consumption by the entire population.
6. Programs in nutrition education designed to acquaint mothers with early signs of nutritional deficiencies and other health problems of infants and children and possible courses of action to alleviate these conditions and thereby reduce infant and child mortality.

7. Continued reinforcement of the current practices of the consumption of nan and dogh which supply such a large proportion of the intake of protective nutrients in the diet.
8. Encouragement for farmers of the planting and consumption of root vegetables such as potatoes and carrots which can be cultivated in this area, are acceptable as foodstuffs for the population, can be stored for winter use and are excellent sources of ascorbic acid and vitamin A.
9. Encouragement for farmers of the planting and consumption of pulses and legumes such as mushung and bacquli and their incorporation into the basic breadstuff.
10. Nutrition education programs be developed within the framework of comprehensive maternal child health and family planning services. Greater yield would be achieved when all aspects of child bearing and child care are interwoven.

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APPENDIX

Nutrition Appraisal

Name _____ Card No. _____

District _____ Village or Tribe _____

Height dm. _____ Weight kg. _____ Triceps mm _____ Sub-Scapular mm _____

Sitting height dm. _____ Hemoglobin _____ Hematocrit _____

Ascorbic Acid _____ Serum Albumin _____ Total Protein _____

Vitamin A _____ Carotene _____

Diameters:

Biacromial _____

Chest _____

Biiliac _____

Bitrochanteric _____

Wrist R. _____ Wrist L. _____

Ankle R. _____ Ankle L. _____

Flesny Circumferences:

Shoulder _____

Chest _____

Upper Abdomen _____

Lower Abdomen _____

Buttocks _____

Biceps Flexed _____

Biceps Relaxed _____

Forearm _____

Wrist _____

Food Intake for Previous Day:

1st Meal

2nd Meal

3rd Meal

How Many Times a Week Do You Eat?

Rice
Meat
Eggs
Vegetables
Pulses
Fruit
Mast and Chaka
Dogh

What Do You Usually Eat in Winter?

Occupation of Head of Household _____ No. in Household _____

NUTRITIONAL EVALUATION

Name _____ s/o,d/o,w/o _____ M/F | Day | Mo | Yr | No

Village _____ Area _____ V | N | O

Age: 5-15 ___ 16-20 ___ 21-45 ___ 46 ___

Recent History

__Malaria __TBC __Pneumonia __Diarrhea __ .....

Smallpox Sc Vc Va N | BCG

Height dm. Weight kg. Std. Wt. kg. | B.P. | Pulse

Hair

1. ____ Depigmentation

Eyes

2. ____ pale Conjunctiva
3. ____ Night Blindness
4. ____ Xerosis Conj.
5. ____ Keratomalacia
6. ____ Bitot's spots
7. ____ Circumcorneal Inj.
8. ____ Spring Catarrh
9. ____ Angular blepharitis
10. ____ Optic atrophy
11. ____ Trachoma
12. _____ Other

Skin: Face and Neck

13. ____ Nasolabial Seb
14. ____ Other Seb
15. ____ Pigmentation (malar)

Lips

16. ____ Angular lesions
17. ____ Angular scars
18. ____ Cheilosis
19. _____ Other

Gums

20. ____ Marginal Redness
21. ____ Atrophy Papillae
22. ____ Recession of Gums
23. ____ Swollen, Red Papillae
    ____ localized ____ diffuse
24. ____ Bleeding gums

Glands

25. ____ Parotid Enlarged
    ____ bilateral
26. ____ Thyroid Enlarged

Tongue

27. ____ Geographic
28. ____ Furrows or scrotal
29. ____ Fissures, erosions, ulcers
30. ____ Serrations, swellings
31. ____ Red tip or margins
32. ____ Red, scarlet, beefy
33. ____ Magenta
34. ____ Papillary atrophy filiform
    ___sl ___mod ___sev
35. ____ Papillary atrophy fungiform
    ___sl ___m/s
36. ____ Papillary hypertrophy or hyperemia
37. _____ Other

Skin: General

38. ____ Follicular hyperkeratosis
    ____ arms ____ back ____thighs
39. ____ Perifolliculosis
40. ____ Dry or scaling (xerosis)
41. ____ Crackled skin
42. ____ Acneform eruption
43. ____ Thickened pressure points
44. ____ Purpura or petechiae
45. ____ Hyperpigmentation hands
46. ____ Pellagrous Dermatitis
    Neck ____ Hands ____ Other ____
47. ____ Scrotal Dermatitis
48. _____ Other

Skin Thickness

49. Triceps ____mm Scapula ____ mm

Abdomen

50. ____ Hepatomegaly
51. ____ Splenomegaly
52. _____ Other

Lower Extremities

53. ____ Bilateral Edema
54. ____ Loss of Ankle jerk ___R ___L
55. ____ Calf tenderness
56. ____ Loss of Knee jerk ___R ___L
57. ____ Loss vibratory s ___R ___L
58. ____ Motor weakness

Skeletal

59. ____ Costochondral beading
60. ____ Epiphyseal Enlargement
61. ____ Bowlegs

Cardio Vascular

62. ____ Blood Pressure (150/100)
63. ____ Pulse Rate (100)
64. Murmur _____
65. ____ Tourniquet Test _____ - +

Laboratory

Blood

Hemoglobin _____gm/100 ml
Hematocrit _____%
Total Protein _____gm/100 ml
Serum Albumin _____gm/100 ml
Serum Vit A _____mcg/100 ml
Serum Vit C _____mg/100 ml
Serum Carotene _____mcg/100 ml

Urine

Protein _____ Blood _____
Sugar _____
Micro _____
_____RPR
_____Tine Test

Chief complaint:

Diagnosis:

R_x:

FOOD QUESTIONNAIRE FOR MOTHERS

Name _____ Wife of _____ Card No. _____

Village _____ Area _____ Age _____

_____ Gravida

_____ Para

_____ Abortions

_____ Stillborn

_____ Live Births

_____ No. Living

_____ No. Males Living

_____ Abnormal Labor

I. Pregnancy and Breast Feeding

1. Interval between pregnancies:

	Sex	Age	Age when next born	Age of death
a.				
b.				
c.				
d.				
e.				
f.				
g.				
h.				
i.				
j.				
k.				

2. When you were pregnant how did you eat?
   a. the same appetite as usual
   b. more appetite
   c. less appetite
   d. eat the same amount
   e. eat more
   f. eat less

3. When you were breast feeding your last child did you?
   a. have the same appetite as usual
   b. more appetite
   c. less appetite
   d. eat the same amount
   e. eat more
   f. eat less

4. What foods could you not tolerate when you were pregnant?

5. What foods could you not tolerate when you were breast feeding?

6. Did you stop nursing: a. gradually? b. suddenly?

7. How many months was your breast milk sufficient for the baby?

8. Reasons for stopping breast feeding:

This child

a. had reached the age of weaning
b. you became pregnant again
c. you didn't have sufficient milk
d. sickness of baby or yourself
e. other reasons _____

Previous children

a. had reached the age of weaning
b. you became pregnant again
c. gave birth to another baby
d. didn't have sufficient milk
e. sickness of baby or yourself
f. other reasons _____

9. During weaning did the baby remain

a. happy and healthy
b. cry a lot
c. become thinner
d. have diarrhea
e. have vomiting

10. Do you give additional food to the breast fed child?

a. Yes b. No

11. What foods did you give the child while he was fed from the breast?

a. Bread (Nan)
b. Yogurt or cheese (Mast or Chaka)
c. Fruit
d. Meat or Eggs
e. Other: _____

12. What foods did you give the child after he was weaned?

13. How much did he eat?

14. At what age did you begin to feed the child foods?

15. Did you feed him with your hand?

16. At what age did the child begin to eat by himself?

a. from a small bowl
b. from the family dish

17. At what age did the boy child begin to eat with the men?

18. Where do you get most of the foods you prepare for your husband?

    a. Bazaar
    b. Garden or farm
    c. Other _____

19. Who goes to get the food for the family?

20. What are the special foods which are given to:

    a. A pregnant woman
    b. A nursing mother
    c. A breast fed child
    d. Weaning child 12-24 months
    e. Young child 2-5 years

21. What foods would you give a child with diarrhea?

22. What food is NOT good to give a child with diarrhea?

23. What foods would you give a child with fever?

24. What foods are NOT good to give a child with fever?

25. What foods are good for children to help them grow faster?

Table A-1. ICNND Suggested Guide to Interpretation of Blood Data (24).

	Deficient	Low	Acceptable	High
Hemoglobin gm/100 ml				
Men	<12.0	12.0-13.9	14.0-14.9	≥15.0
Women*	<10.0	10.0-10.9	11.0-14.4	≥14.5
Children (3-12 years)	<10.0	10.0-10.9	11.0-12.4	≥12.5
Plasma ascorbic acid mg/100 ml	< 0.1	0.1-0.19	0.2-0.39	≥ 0.40
Plasma vitamin A μg/100 ml	<10	10-19	20-49	≥50

*Non-pregnant, non-lactating ≥ 13 years.

Table A-2. Suggested Guide to Interpretation of Nutrient Intake Data for Physically Active Young Adult Males* (24).

Nutrient	Deficient	Low	Acceptable	High
Niacin (mg/day)	< 5	5-9	10-14	≥15
Riboflavin (mg/day)	< 0.7	0.7-1.1	1.2-1.4	≥ 1.5
Thiamine (mg/1000 calories)	< 0.2	0.2-0.29	0.3-0.4	≥ 0.5
Ascorbic acid (mg/day)	<10	10-29	30-49	≥50
Vitamin A (IU/day)	<2000	2000-3499	3500-4999	≥5000
Calcium (gm/day)	< 0.3	0.30-0.39	0.4-0.7	≥ 0.8
Iron (mg/day)	< 6.0	6-8	9-11	≥12
Protein (gm/kg body weight)	< 0.5	0.5-0.9	1.0-1.4	≥ 1.5

*Twenty-five years of age, 170 cm in height, weighing 65 kg.

Table A-3. Calculation of the Upper Level of Protein Requirements (26).*

	Average body weight (kg)	Requirement per kg body weight per day (g)	Requirement per caput per day (g)
Infants 0-1 yr, non-breast-fed	9	1.70	15.30
Children 1-3 yrs, non-breast-fed	12	1.06	12.72
" 4-6 yrs	18	0.97	17.46
" 7-9 yrs	27	0.92	24.84
" 10-12 yrs	35	0.86	30.10
Male adolescents 13-15 yrs	49	0.84	41.16
" " 16-19 yrs	63	0.77	41.58
Females adolescents 13-15 yrs	46	0.84	38.64
" " 16-19 yrs	54	0.77	41.58
Adults — Men	65	0.71	46.15
" — Women	55	0.71	39.05
Allowance for pregnancy			6.00
Allowance for lactation			15.00

*The calculations apply to a country having a mean annual temperature of 30°C in which the duration of lactation is 8 months and the protein value of the diet 65.

Table A-4. Daily Recommended Intakes of Thiamine, Riboflavin and Niacin (28, 29)

Age	Calories/day	Thiamine (mg)	Riboflavin (mg)	Niacin[1] equivalents
0-3 months[2]	120/kg	—	—	—
4-6 " [2]	110/kg	—	—	—
7-12 "	1,000	0.4	0.6	6.6
1 year	1,150	0.5	0.6	7.6
2 years	1,300	0.5	0.7	8.6
3 "	1,450	0.6	0.8	9.6
4-6 years	1,700	0.7	0.9	11.2
7-9 "	2,100	0.8	1.2	13.9
10-12 "	2,500	1.0	1.4	16.5
13-15 (boys)	3,100	1.2	1.7	20.4
(girls)	2,600	1.0	1.4	17.2
16-19 (boys)	3,600	1.4	2.0	23.8
(girls)	2,400	1.0	1.3	15.8
Adults (man)	3,200	1.3	1.8	21.1
(woman)	2,300	0.9	1.3	15.2

[1]A niacin equivalent is 1 mg niacin or 60 mg L-tryptophan.

[2]For children 0 to 6 months it is accepted that breast feeding by a well-nourished mother is the best way to satisfy the nutritional requirements for thiamine, riboflavin and niacin.

Table A-5. Estimation of Recommended Intakes of Vitamin A-Active Compounds[1] (29).

Age	Recommended intake, μg/person/day	
	Retinol	Vitamin A-active compounds
0-6 months	[2]450	1,194
7-12 "	300	800
1-3 years	250	675
4-6 "	300	800
7-9 "	400	1,075
10-12 "	575	1,530
13-15 " (boys)	725	1,950
13-15 " (girls)	725	1,950
16-19 " (boys)	750	2,000
16-19 " (girls)	750	2,000
Adults (man)	750	2,000
Adults (woman)	750	2,000

[1]The calculations apply to a country where the proportion of carotene in the national diet is generally 75 per cent.

[2]This figure represents the additional requirements for lactation. There is no additional requirement for pregnancy.

Table A-6. Analysis of Food Samples from Panjaw Area per 100 gram portion.

Kind of sample	Moisture %	Protein gm.	Fat gm.	Carb.* gm.	Ash gm.	Iron mg.	Calcium mg.	Niacin mg.
Rice: uncooked								
Qalami	10.75	7.8	1.27	79.24	0.94	9.72	19.2	1.20
Shirkati	7.54	7.4	1.29	82.75	1.02	7.54	22.7	3.76
Kanabad	7.50	7.3	1.37	82.98	0.85	14.85	27.7	3.98
Laghmani	6.66	6.8	1.42	84.19	0.93	7.20	23.2	4.20
Peshawri	4.95	6.8	1.41	85.74	1.10	6.41	19.7	5.34
Legumes:								
Kalol, raw	8.27	19.2	2.57	67.33	2.58	19.96	171.0	3.10
Peas, roasted	5.81	11.5	4.73	75.41	2.50	19.60	130.0	3.62
Beans, raw	7.30	12.3	0.96	77.24	2.20	5.90	127.5	1.35
Beans, raw	—	16.4	0.89	82.41	0.30	11.85	52.5	1.46
Peas, raw	8.30	18.4	1.10	69.80	2.40	12.50	89.2	3.90
Wheat	7.40	10.9	1.72	78.49	1.49	7.70	184.5	3.03
Wheat flour	4.75	11.2	1.66	80.54	1.85	7.20	75.4	2.12
Fruit:								
Dried Mulberries	4.40	2.8	1.42	89.96	4.40	18.45	54.2	0.56
Dried Apricots	6.12	6.8	1.13	80.75	5.20	3.11	53.0	1.96
Qurout (cheese)	5.10	51.8	12.10	23.11	7.89	4.62	258.0	—

*Calculated by difference and includes fiber.

Table A-7. Patients Seen in the Mobile Medical Clinics, Summer 1970, by Age-Sex Group

Group	Age (years)	All Patients	Nutrition Study
Males	0-1	133	21
Females		103	15
Males	2-5	136	71
Females		87	42
Males	6-15	800	279
Females		370	105
Males	16-20	700	60
Females		204	44
Males	21-45	2327	170
Females		1068	152
Males	46+	1228	43
Females		344	9
Totals			
Males		5324	644
Females		2174	367
		7498	1011