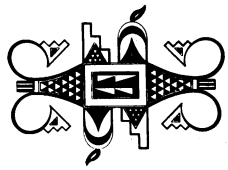

Diet Counseling to Improve Hematocrit Values of Children on the Blackfeet Reservation

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ONCE the territory of the Blackfeet was bounded by the western fringes of the Rocky Mountains and the southern part of the present Yellowstone Park and extended from the headwaters of the Mississippi to Canada's North Saskatchewan River. They numbered 60,000 and were called the Blackfeet Nation. Demanding respect as warriors, yet honest and fun-loving, the Blackfeet commanded war, women, horses, and buffalo with equal delight. The divisions of the tribe have been known to the white man for two centuries by separate names, the Piegans of Montana and the Bloods and Siksika of Canada. Together they were the most powerful Indians in the northwest plains; having a common language, similar customs, and intermarrying, they sometimes met together against a common enemy.

Today the lifestyle of a Blackfeet Indian is very different. After the rages of smallpox and the last hours of the buffalo, the "Great White Father" fenced the Blackfeet on a reservation and declared them a "sovereign independent nation" (*1*). Much has occurred since. Most of the Piegans live on the Blackfeet Reservation in the town of Browning, Mont., the reservation's headquarters. After decades of tragedy, caused by outsiders and sometimes by the Blackfeet themselves, the tribe today works for self-improvement with an eye toward the future. There is much to be accomplished.

The reservation has about 5,600 people on approximately 1,500,000 acres; weather changes in this part of Montana are extreme. Although most homes have electricity, many do not have proper water or plumbing facilities. Accomplishments so far, however, have been heartening and continue to be impressive. Many reservation families now live in housing projects that have electricity and adequate plumbing facilities. These are

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luxuries that were not enjoyed by the Blackfeet until a short while ago, and they remain a fantasy to some.

Of the roughly 1,800 families on the reservation, a majority are not self-supporting. Perhaps the most crucial situation on the reservation is this lack of employment, although a somewhat limited expansion of both new and old industry has made jobs more plentiful.

Health problems on the reservation range from alcoholism to upper respiratory tract infections. Poor dental health and poor nutrition have been long-standing problems. The Indian Health Service Hospital in Browning provides health care to the Indians; it operates with five physicians, two dental officers, and a complement of allied health personnel in a 35-bed hospital and clinic facility. In the 9-month period from July 1970 to March 1971, there were some 25,000 outpatient visits and more than 230 hospital admissions.

The nutritional status of the tribe, in general, has been poor since the disappearance of the buffalo as a food source. The traditional foods of the Blackfeet—buffalo, elk, venison, and berries—have been supplanted by a marginal diet, often prepared in much less-than-modern kitchens with nutritionally inadequate items and supplemented with surplus commodity foods. These surplus foodstuffs are provided for some members of the tribe by the Montana State Deparment of Public Welfare under the auspices of the Department of Agriculture. They are distributed according to demonstrable need.

The tribe applied for and received Federal funds for a demonstration nutrition program. The goals set for it were to create an awareness of nutrition, to demonstrate methods of preparing foods unique to the reservation, and to eradicate malnutrition and ignorance of proper nutrition. The program is staffed by a director, nutritionist, secretary, and eight health aides, all Blackfeet tribe members. The Center for Disease Control supplied a full-time advisor to the program. The project described in this paper is only a part of the total Blackfeet Demonstration Nutrition Program, but it does provide some measure of that program's effect and potential.

The staff of the Indian Health Service Hospital had a clinical impression that there was a high frequency of iron deficiency anemia in preschool children. As part of the tribe's demonstration nutrition program, my project was designed to determine the extent of this anemia and possibly to begin to rectify the deficiency.

Method

The total population of children ages 0–5 years (those born between July 1, 1966, and July 1, 1971) was determined from the Glacier County (Mont.) Birth Registry to be 830. Subsequently, a systematic sample of 99 children, about 10 percent, was selected. Those children with a history of iron deficiency or a current illness and those on medications were eliminated from this study. Four children were excluded for these reasons.

With one or two of the health aides who had been trained in nutritional education, I then visited the homes of the selected children and obtained a blood sample by finger-stick or heel prick. A slide smear was made and blood was drawn into two heparinized micro-hematocrit tubes. These were stoppered with clay and then numbered. The micro-hematocrit tubes were then taken to the hospital, where the laboratory technician centrifuged the samples, determined the hematocrit, and stained the blood smear with Wright's stain. Values were written against an identifying number. Later I matched the identification number to the name of the child.

By the standards shown in table 1, the children were judged to have hematocrit values above or below normal for purposes of this study (unpublished paper, "Retrospective Study of Hematocrits of 195 Children Ages 0 to 59 Months in the Fort Belknap Service Area," by S. G. Morrison, Fort Belknap Service Area,

Table 1. Distribution of 79 Blackfeet children in relation to criteria for abnormal hematocrit values

Age group (weeks)	Criterion for abnormal hematocrit (percent)[1]	Mean hematocrit (percent)	Percent of children
8–43	≤ 33	36.8	9.2
44–95	≤ 32	39.6	23.7
96–143	≤ 33	36.5	19.7
144–191	≤ 33	40.0	17.1
192–726	≤ 34	37.4	30.3
Total			100.0

[1] Values for abnormal hematocrit, in percent of packed red blood cells per total sample of blood for the various age groups, are those given in reference 2.

Harlem, Mont.) The criteria for abnormal hematocrits in table 1 are those cited by Meyers (*2*), and these criteria are below the 10th percentile in a survey by the Child Research Council of a Denver population (*2*). The blood smears of those children declared to have an iron deficiency were examined by microscope to confirm the deficiency.

Families with children in the "iron deficient" category were counseled in their homes by the health aides. The aides explained that iron is needed for good health and indicated which foods are high in iron content, particularly which of the surplus commodity foods available. Various methods of preparing these foods were discussed and demonstrated. Periodic counseling continued for 5 to 7 weeks. Then a second blood sample was taken from the child, and the hematocrit determination was repeated in the same manner as the previous one.

Results

Hematocrit values, blood smears, and physical data were obtained on 79 of the 99 children. The parents of nine children refused, four children were eliminated because of the criteria given previously, two children had moved off the reservation, one had been adopted (parents unknown), and four had died.

Of these 79 hematocrits, the mean value was 37.7 percent and the median 36.5 percent. By the standards in table 1, 11 children, or 15.2 percent of those whose hematocrits were determined, were found to be iron deficient for the purposes of the study. These 11 children demonstrated an average hematocrit value of 33.0 percent. After 5 to 7 weeks of diet counseling, with the aides urging the families to consume available foods high in iron, the hematocrit determinations were repeated. An average increase of 2.4 hematocrit percentage points was observed. This increase is not dramatic; however, for none of the children did the values fall. This observation is statistically significant ($P<.0020$) and probably represents a real, though small increase in hematocrits, especially in view of the short interval between the determinations of the values (table 2).

Table 2. Changes in hematocrit values of 11 anemic children after counseling of families

Child	Age (weeks)	1st hematocrit value (percent)[1]	2d hematocrit value (percent)[1]
HBR	29	33	34
SBC	130	33	34
JC	58	33	35
AF	228	33	35
GG	201	33	37
RG	249	34	39
RM	114	33	36
KRC	229	34	34
JRR	232	34	37
HSC	124	33	33
JR	226	30	34
Total		33.0	35.4

[1] Percent of packed red blood cells per total sample of blood.

Comment

One may reasonably question what constitutes hematologic norms (*3,4*) and, even more crucially, what determines a child's nutritional status. However, what is probably important in this study is not that a proportion of the children were judged iron deficient, but that none of the hematocrits of the 11 children dropped, and 9 increased after nutritional counseling. The deficient group increased values an average of more than 2 percent.

The health aides and I were able to enter the homes of the sample children, determine target families, and concentrate efforts on certain persons. This was difficult at times because of preconceived prejudices against the Indian Health Service and against intruders in Indian home life, and because of difficulties in finding people at home. Entry to the homes was greatly facilitated by the Blackfeet health aides' introduction to the families. Knowing most of the community members and being part of the culture, the aides were able to initiate the crucial first step in the study. Therapy consisted of teaching proper nutrition and persuading people to change food habits, not prescribing temporary pharmacological agents to overcome defined deficiencies in iron.

It was not possible to follow a representative control group, so that there is a possibility that some constituent of the diet of the entire community changed over this period, resulting in a general increase in hematocrit values on the reservation. This event is perhaps particularly likely in a community where the diet can be expected to change with the seasonal variation in local food supplies. However, no such dietary changes were known

to have occurred during this time.

The quantitative results for the sample population indicate that perhaps 100 other children on the Blackfeet Reservation are suffering from borderline or frank iron deficiency. The hospital's physicians as well as public school officials have been alerted to this possibility. By mutual cooperation between these persons and the Blackfeet Demonstration Nutrition Program, it is hoped that the same methods of visiting and counseling will be used as other cases are identified.

In addition to the direct benefits of the project as indicated by the increase in hematocrits, other benefits have accrued. Medical conditions of other children in the homes were discovered and referred for treatment. The hematocrits of 45 additional children were checked on the request of concerned parents. By such incidental visits and other medical referrals, it is hoped that greater trust between the Indian Health Service staff and the Blackfeet people was fostered.

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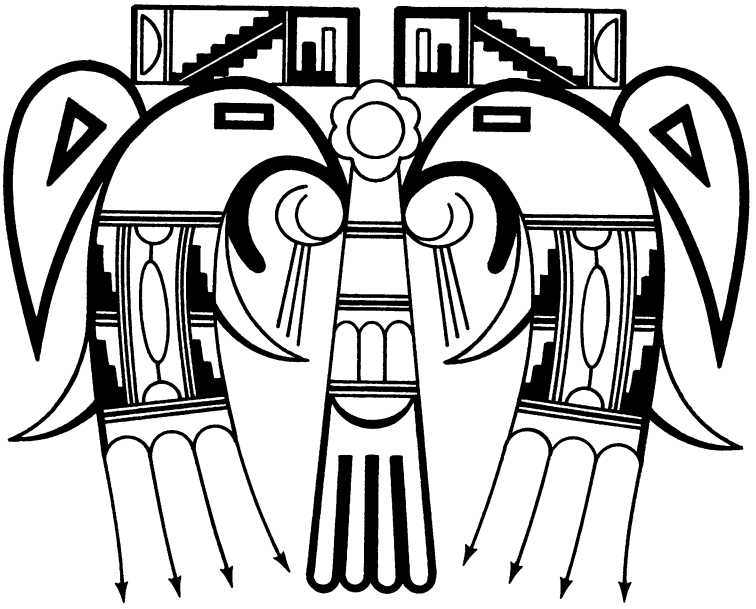
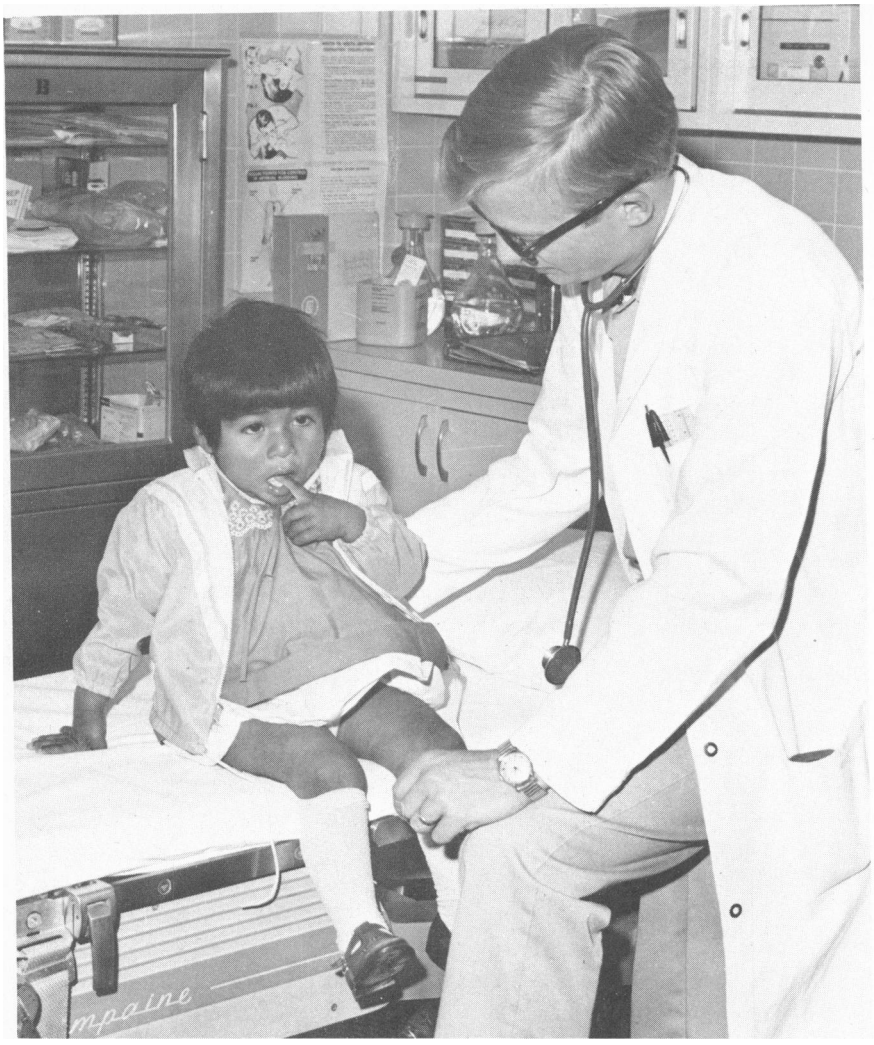
As part of the Blackfeet Demonstration Nutrition Program, the frequency of iron deficiency anemia in preschool children was investigated. A random sample of 99 children was systematically selected from the 830 children 0 to 5 years old living on the Blackfeet Reservation. The researcher and Blackfeet health aides trained in nutrition visited the children's homes and obtained blood samples.

The aides returned to the homes of 11 children found to have abnormally low hematocrit values and gave intensive counseling and demonstrations aimed at changing food habits. Repeat hematocrit determinations for these 11 children 5 to 7 weeks later showed an average increase of 2.4 percent, and there were no decreased values.

Because of the lack of a control group and the short followup period, the improved values cannot be attributed solely to the counseling. There may be other explanations for the changed values.





Public Health Service physicians staff Indian Health Service hospitals. Well-child care is given in fully equipped outpatient departments. Below, *a community health representative examines a patient at the Santa Rosa Clinic on the Papago Reservation in Arizona.*