The Nutritional Adequacy of the Diet of Young Indian Children of Oklahoma[1]

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Although Oklahoma has the second largest Indian population of all the states of the United States, little is known concerning the nutritional status or dietary habits, especially of young Indian children. Since the nutritional status and dietary patterns of infants and children have a definite effect upon the growth and nutritional condition of people as they grow, it was felt important that these factors be investigated in young Indian children.

With the approval of the Public Health Service, Division of Indian Health, Washington, D.C. and the cooperation of the Oklahoma City Area Office, permission was granted to visit Indian Health Clinics in the Oklahoma Area. At the time the study was made, Dr. George Lythcott, an Oklahoma City Pediatrician, under contract to the Public Health Service, was conducting well-baby clinics at Anadarko, Carnegie and Clinton. He agreed to let one of the authors of this study (E.K.W.) accompany him on his visits to the clinics in order to obtain the necessary information. Accordingly, a visit was made weekly to one of these clinics, a different one each week. Three visits were made to each clinic during the winter and spring of 1958.

A questionnaire was worked out consisting mainly of four parts. The first section served as an introduction to the child and dealt with general topics regarding him, and with items related to the family set-up, the number of persons in the family, the income, degree of Indian blood, and similar topics.

The second part was designed to gain information regarding the child's past history — his length and weight at birth, whether breast fed or formula fed, what illnesses he had had, whether he had previously been to the clinic, and if so the reason.

Part three dealt with the present food intake of the child. Questions were asked to determine whether prepared baby foods had been used, whether the child ate eggs, meats, cheese, vegetables, fruits, cereals, breads, the amount of milk, how often each one was eaten and how the food was prepared. Questions concerning the kinds of meat, cheese, vegetables, fruit, cereal, bread and milk were also included, as well as whether the child had "pop," coffee, or candy, and his attitude during the meal. A twenty-four hour recall was obtained from the adult accompanying the child in order to ascertain the food intake for the previous three meals.

The fourth section of the questionnaire was a general appearance check list. The child's physical appearance was evaluated by the pediatrician. The factors included were posture, body build, condition of the skin, flesh, eyes, hair, mouth, and the expression and attitude of the child. If the doctor suspected that a child was anemic, he had blood drawn for a hemoglobin level determination. This test was made on forty-three of the children. The check list for this part of the study was

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taken from "Roberts' Nutrition Work With Children" (Martin, 1954). Although this list was designed for use with school children, it was felt that with a few minor changes it could easily be adapted to infants and young children.

The questionnaire as first set up was tested and changes were made as seemed necessary to make it more easily administered and evaluated. Difficulties arose at times as the Indian values his privacy and resents prying into his family affairs. Also, the clinic seemed to serve as a social center as well as a medical center. Whole families came, often from long distances, and there was considerable visiting among the groups, making it difficult sometimes to get the necessary information. Seventy-five interviews were held, thirty-three at Anadarko, twenty-two at Carnegie and twenty at Clinton. There were thirty-seven male subjects and thirty-eight females.

Almost three-fourths of the subjects were two years of age or younger, most of them being one year or less. Seventy-one percent were full blood Indians. Almost two-thirds of the children belonged to just one tribe, although some of them belonged to as many as three tribes.

Not much information concerning the income was obtained as the answers were unwillingly given or were evasive. In general, the group belonged in the low income bracket.

Most of the children had come to the clinic for "check ups" or "shots." Only thirteen were brought because of illness, and the illness was a cold in half of the cases. Ninety-six percent of the children had visited the clinic two or more times, mainly for "check ups" or "shots." One might think from these results that the Indians are taking advantage of the health opportunities offered them. However, the Public Health nurses constantly tour the area to encourage families to avail themselves of the services of the well-baby clinic.

Ten children were "only" children. In the rest of the families, there were from one to nine other children in the family, with almost half of them having from one to three additional children. One household had eighteen dependents, but most of the families had from three to nine dependents.

Thirty-eight of the children had been breast-fed at least some time during their lives. Of these five had been breast-fed from one year one month to two years.

Slightly over eighty-five percent of the children were, according to the adult accompanying the child, not sick very often while the rest were said to be sick often. However, when the adult was asked to list the illnesses the child had had, it was noted that of the eighty-five percent of the supposedly healthy children, thirty-four of them suffered from frequent colds, eight had had pneumonia and three had had ear infections. For the whole group frequent colds were most often mentioned. Ear infections, measles and diarrhea were next most frequent. Of the "well" children, twenty had had one disease, twenty-three two diseases, three had had three diseases and one had had four diseases. Twenty-two children had been in the hospital at various times since they were born. Sixteen children of this group were those rated "not sick very often." The rest had been rated as being sick very often.

Only four of the children at the time of the survey were taking no solid food, and they were all under six months of age. Four-fifths of the rest of the children had begun taking solid food between the ages of one month and six months. The remaining children in this group had had their first solid food between six and eleven months of age.

Eggs are important for their content of iron, vitamin A, thiamine and riboflavin (two members of the vitamin B complex) and high quality protein. They also are good sources of energy. It is considered advisable by most authorities that egg yolk be given the child anywhere from the third to the fifth month. Fifty-three of the children were reported as eating eggs (Table I). The times they ate them varied from "unknown" to two a day. Thirty-two of these children ate an egg daily, eight of them ate one every other day, and one had two eggs per day. Twelve of them varied from five to six times a week to "unknown." Twenty-two children, or almost thirty percent, up to the age of one year four and one-half months, did not eat eggs. Scrambled was the preference of most of the children although fried and boiled eggs were also popular.

Chaney (1954) and other authorities recommend that meat be included fairly early during the infant's first year. It is a good source of high quality protein, iron and some of the B vitamins. Fifty-six of the seventy-five children were being fed meat (Table I). All of the children above the age of one year, one and one-half months were reported to be eating meat. Beef was the preference of fifty-one children. Twenty-seven ate chicken and twenty-one ate pork. Only six of the children ate liver. The intervals when the meat was fed varied from twice a day for five children to once a week for four children. Twenty-two of the children had meat once a day, and nine every other day. Both boiled and fried meat was mentioned by the respondents as the way the meat was cooked. Broiling, roasting and stewing were also mentioned, but less frequently.

It was interesting to note that cheese was eaten by almost half of the children (Table I). However, it was not eaten as often as meat or eggs. In fact, of the seven food groups listed in this study, it was the least often eaten. Most of the children ate it only once or twice a week. It is a valuable food as it is a good source of protein and calcium, particularly if it is the "American" type of cheese. This variety is also a fairly good source of some other mineral elements, vitamin A and riboflavin.

Vegetables should be added to the infant's diet anywhere from four to six months of age as they are important sources of mineral elements and vitamins. Green vegetables, especially the leafy ones, are valuable for carotene, the precursor of vitamin A, ascorbic acid, iron and also copper which aids in the utilization of iron (Taylor *et al.*, 1956). Some of them furnish calcium. They are introduced gradually to accustom the child to the flavor and texture. They are usually added in the form of pulp when the infant is four to five months of age (Chaney, 1954). By the second year of age the child should be well acquainted with green and yellow vegetables (Marriott, 1931).

It was rather disturbing that fifteen of the children, or twenty percent, were eating no vegetables (Table I). However, most of the non-vegetable eaters were in the younger age bracket. Green beans, carrots and peas were most frequently mentioned as eaten by the children. The next most frequently mentioned were lettuce and spinach. Squash, sweet potatoes, broccoli, asparagus, turnips, cabbage and greens were less frequently mentioned. Fifty children had at least one vegetable per day and ten received a vegetable from two to five times a week (Table I).

Fruits as a class are valuable for mineral elements, vitamins, their laxative effect and their base-forming properties. The yellow fruits are good sources of carotene while the citrus fruits are excellent sources of ascorbic acid. Sixty-one of the children were reported to be eating fruit (Table I). Of these, thirty-one had at least one serving per day and twenty-nine received fruit from one to five times a week. One child was reported as eating fruit "once in a while." Fourteen children had no fruit in their diet. Apples, applesauce, peaches, bananas, and pears were the most often mentioned. Thirty-seven mothers reported that their children

TABLE I
FOOD INTAKE OF THE INFANTS AND CHILDREN

Intervals	Eggs	Meat	Cheese	Vegetables	Fruit	Cereal	Bread
Times Per Day							
5							1
3							18
2	1	5		9	3	7	5
1-2							2
1	32	22	4	41	28	46	18
Every other	8	9	2	2	4	4	1
Times Per Week							
5-6	1						
5		1					
4-5		1			1		
4	1	4		2		2	
3	3	3	5	4	7	4	
2-3	2	1			1	3	
2	2	5	8	2	11	1	
1-2		1			2		
1	1	4	11		3		
1 or less			4				
1 every other			1				
Other							
Once in a while	1		1		1		
Not very often			1			1	
Unknown	1						
Total	53	56	37	60	61	68	45

ate oranges and twenty-two that their children drank orange juice.

Cereals are a good source of energy, and the whole grain and enriched ones are satisfactory sources of iron. However, some pediatricians feel that egg yolk, vegetables and fruits are better for meeting the needs of infants than whole grain cereals. Nevertheless, according to Jeans, it is almost the universal custom to give cereals as the baby's first "solid food" (Handbook of Nutrition, 1951). All but seven of the children ate cereal (Table I). All of these seven children were under eight and one-half months of age. Fifty-three of the children had cereal at least once a day (Table I).

It was surprising that only forty-five children had bread. These children had it from every other day to five times a day. The greatest number had it three times a day and once a day (Table I). Usually it was light bread, although one mother stated that she fed her four and one-half month old infant small squares of fried bread in warm milk.

Milk, a rich source of calcium, a good source of high quality protein and riboflavin, and a fair source of some other nutrients, was not fed all of the children. Sixty-two had milk in the form of formula or whole, homogenized or powdered milk. The amount ranged from one-half cup to six cups per day with only twenty-one receiving a quart or more per day. One respondent stated "not very often" and another did not know the amount used.

Some bad habits noted were pop drunk by forty-three of the children (twelve of them daily), coffee used by seven of the children once to twice a week, and candy eaten by forty children at least once a week. Seven of these children had it daily.

In general, the majority of the children outwardly appeared in good health. Only six general appearance check lists scored by the pediatrician indicated poor physical appearance. The unsatisfactory conditions were flabby flesh, marked pallor, rounded shoulders, shallow chest, markedly protruding abdomen and circles under the eyes. Restlessness and irritability were also observed. As stated previously, hemoglobin evaluations were made on forty-three children whom the pediatrician suspected of being anemic. The mean hemoglobin level for these children was 10 grams per 100 ml. of blood. According to Mackey (1931) the normal hemoglobin level for infants is 11 grams per 100 ml., while Elvehjem, *et. al.* (1935) and Merritt and Davidson (1933) consider 12 to 13 grams per 100 ml. as normal for infants. The latter authors found no sign of anemia in infants with this level of hemoglobin in the blood. In the present study only four children had a value as high as 12 grams per 100 ml. The values for the remaining thirty-nine children ranged from 8 to 11.5 grams per 100 ml. of blood. The lowest values were in the infants from one month through one year eleven months. Twenty-eight babies were in this group. Only one infant in this group had a value of 12 grams per 100 ml. of blood.

To sum up, although the physical appearance for almost all of the children proved satisfactory according to a general appearance check list, hemoglobin levels of forty-three of the children indicated the group was at least slightly anemic. This condition probably can be laid to the dietary pattern of the group. Less than one-half of the children had an egg daily and less than one-third had meat daily. Fifteen of the children ate no vegetables and of the rest only two-thirds had one vegetable daily. These three groups of foods are all good sources of iron. Sixty-two children had milk daily, but less than thirty percent had as much as one quart a day.

Another indication of the health of the children concerns the amount of illness reported. Although slightly over eighty-five percent of the children were reported not sick very often, thirty-four of these children had

frequent colds, and eight had had pneumonia. Also, sixteen of these children had been in the hospital at various times. About fifteen percent of the total group were reported as being sick very often. Diet might have been at least partly responsible for these conditions, as it is well-known that nutrition is important in the physical condition of infants and children.

More emphasis needs to be placed on nutrition education and the role food plays in the life of the child. Pre-natal and well-baby clinics can play an important part in this educational program. Specific information concerning diet and its effect upon the welfare of the child should be emphasized. The changing attitude of the Indians toward the health facilities available to their people can provide a new avenue for nutrition education. Dietary standards may gradually be raised to insure a healthier future for the current, rapidly-increasing Indian population.

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