DIETARY INTAKE AND FOOD PATTERNS OF PREGNANT AMERICAN INDIAN ADOLESCENTS IN OKLAHOMA

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DIETARY INTAKE AND FOOD PATTERNS OF PREGNANT AMERICAN INDIAN ADOLESCENTS IN OKLAHOMA

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INTRODUCTION

In 1975, it was estimated that 11 million teenagers were sexually active in the United States. In 1980, one in every five births was to a teenager (1). In Oklahoma, it was estimated that 150,000 teenagers were sexually active, resulting in 17,000 pregnancies and 10,000 births in 1980 (2).

Although births to teenagers in the United States aged 18 to 19 were reported to be declining, births to adolescents aged 17 and under continued to rise (3). Girls in this age group were considered to be especially at risk because they were faced with the physiological demands of pregnancy when not yet fully physically mature. The risks of complications such as pre-eclampsia and anemia during pregnancy were shown to be much greater for the adolescent than the adult, and the incidence of both premature and low birth weight infants increased.

It was shown that nutritional status at conception and dietary intake during pregnancy play a vital role in the outcome of the fetus. However, nutritional status surveys repeatedly showed that adolescent girls had the least favorable diets of any age group in the United States (4, 5, 6). Hemoglobin and hematocrit values were often identified as falling below acceptable reference standard levels, indicating nutritional deficiencies. This group was also faced with social and emotional problems unique to their situation. Lack of concern or denial

of pregnancy was common among this age group, causing them to delay seeking medical care.

The incidence of pregnancy among American Indian adolescents made this population one in need of special attention. The American Indian population was shown to be plagued with health problems, nutritional deficiencies, and disease. This group was found to be at a distinct health and nutritional disadvantage when compared with the general population. According to the Indian Health Service (IHS), mild to moderately severe nutritional deficiencies were found to be common among American Indians, expecially infants and preschool children and women in the childbearing years (7). Nutritional anemia was widespread, but was especially seen in infants and women of childbearing age (7). Both underweight and obesity were common. The average lifespan of 64 years for this population compared with 70 years for the general population. Although many factors contributed to this difference, diet was thought to be especially important (7).

Significance

The IHS reported that in 1976, 1,112 live births occurred in Oklahoma to American Indian adolescents of 19 years and under in age. Of these births, 21 infants were born to teenagers under 15 years of age. With the knowledge of poor or undesirable dietary habits of teenage girls in general, the incidence of nutritional deficiencies among American Indian females in the childbearing years, and the high birth rate among teenagers in this age group, the pregnant American Indian adolescent was shown to pose a special problem.

A review of the literature revealed no studies of the nutrient intake of pregnant American Indian adolescents. Therefore, it was the author's belief that a study of this population in Oklahoma would be of value to the Indian Health Service and to nutritionists and other health professionals working to improve the nutritional status of this population.

Purpose and Objectives

The purpose of this study was to assess dietary intake and identify food patterns of pregnant American Indian adolescents aged 18 and under in Oklahoma. The objectives of the study were as follows:

1. To assess the adequacy of the selected nutrients of pregnant American Indian adolescents in Oklahoma as compared with the 1980 Recommended Dietary Allowances for this age group during pregnancy.
2. To compare the caloric intake of pregnant American Indian adolescents in Oklahoma with that recommended for this age group during pregnancy.
3. To compare the hemoglobin and hematocrit levels of pregnant American Indian adolescents in Oklahoma with standard levels recommended during the stages of pregnancy.
4. To identify background information, food patterns, nutrition knowledge related to pregnancy, non-dietary practices, sources of nutrition information, and physical ailments of pregnant American Indian adolescents in Oklahoma.
5. To make suggestions and recommendations for nutrition education in prenatal services for pregnant American Indian adolescents in Oklahoma.

Hypotheses

For this study, the following hypotheses were postulated:

H_1: The mean nutrient intake of the group of pregnant American Indian adolescents in the study would be lower than the Recommended Dietary Allowances established for their age groups during pregnancy.

H_2: The mean caloric intake of the group of pregnant American Indian adolescents in the study would be lower than the Recommended Dietary Allowance established for their age groups during pregnancy.

H_3: The hemoglobin and hematocrit levels of the pregnant American Indian adolescents would fall below the reference levels established for the stages of pregnancy.

Assumptions

The study was planned on the basis of the following underlying assumptions.

1. The 24-hour dietary recall was a valid method for assessing the adequacy of food intake of the subjects.
2. The dietary intake of the subjects could be typical of the food patterns of pregnant American Indian adolescents in Oklahoma.
3. The implications of the findings could be applicable to all pregnant American Indian adolescents aged 18 and under in Oklahoma.
4. The data could be useful in developing future nutrition education programs to assist pregnant American Indian adolescents to meet their nutrient needs during pregnancy.

Limitations

The following limitations were made for this study:

1. The data for the study was collected by nutritionists and dietitians of Indian Health Service in Oklahoma, so there may have been some variation in style and method of obtaining the data.
2. The data was collected from a sample population of pregnant American Indian adolescents who visited an IHS clinic in Oklahoma during March and April of 1981.
3. The subjects were 18 years of age or younger and were identified by genetic lineage to be at least one-quarter American Indian.

Definitions

The following terms were identified for this study:

1980 Recommended Dietary Allowances:

> The levels of intake of essential nutrients considered in the judgement of the Committee on Dietary Allowances of the Food and Nutrition Board on the basis of available scientific knowledge, to be adequate to meet the known nutritional needs of practically all healthy persons (8, p.1).

American Indian: A native of the United States who has been identified by genetic lineage to be at least one-quarter American Indian.

Food patterns: "Food habits derived from man's earliest experiences and influenced by his family as well as by the social, economic, geographic, ethnic, and religious environment" (9, p. 215).

Hemoglobin: "The oxygen-carrying pigment of the red blood cells measured in grams per 100 ml" (10, p. 30).

Hematocrit: "The volume of packed red blood cells found in 100 ml of blood" (10, p. 30).

Anemia: "A significant reduction in hemoglobin and red blood cells, as measured by (1) concentration of hemoglobin per 100 ml of blood, (2) volume of packed red blood cells per 100 ml of blood, or (3) number of mature red blood cells per cubic millimeter of blood" (11, p. 105).

Preeclampsia:

> A term that describes a potentially life-threatening condition occurring in a small percentage of pregnant women, usually after twentieth week of pregnancy. Most important symptoms of preeclampsia are sudden onset of hypertension, proteinuria, and generalized edema leading to dramatic weight gain. Dizziness, headache, visual disturbances, nausea, and vomiting may also be present (12, p. 483).

Pica: "The practice of eating nonnutritive substances such as clay or laundry starch" (13, p. 426).

CHAPTER II

REVIEW OF LITERATURE

The first scientific article concerning pregnancy in the adolescent girl was published in 1922 (14). In the years following, pregnancy in this age group became one of our most studied medical problems. This research study was conducted to determine dietary intake and food patterns of pregnant American Indian adolescents in Oklahoma. Therefore, a detailed review of the literature pertaining to development of the fetus, hemoglobin and hematocrit levels and nutrient needs during pregnancy, complications of adolescent pregnancy, nutritional status of adolescent females, American Indians, American Indian food habits, and methods for conducting dietary surveys, was undertaken.

Development of the Fetus

Early embryological studies (12, 13) showed that growth of the fetus was divided into three separate stages. The first stage, blastogenesis, began after fertilization and was complete in approximately two weeks. The fertilized egg repeatedly divided and formed a hollow sphere of cells, called the blastula. The cells continued to divide, and soon formed an inner mass of cells which would become the embryo, and an outer coat of cells, called the trophoblast, which would become the placenta. The blastula then attached itself to the walls of the uterus,

where the trophoblast penetrated the uterine lining and began absorbing material to provide nourishment for the new organism. At the same time, the inner cell mass was dividing into the embryonic disc, the amniotic sac, and the yolk sac.

In the embryonic stage, the embryonic disc developed into three germinal layers; the ectoderm, which would form the brain, nervous system, skin, hair, and sensory organs; the mesoderm, which would become the muscle, connective tissue, bone, and parts of the cardiovascular, excretory, and reproductive systems, and the endoderm, which would form the lining of the digestive, respiratory, and urinary tracts. The embryonic stage was completed in six weeks.

The third stage, the fetal stage, was a time of rapid growth. During this period, fetal weight was shown to increase nearly 500-fold from about six grams to 3000-3500 grams at birth (11). Growth was found to occur in three phases; during the first, known as hyperplasia, increase in size was almost completely due to the increase in the number of cells. In the next phase, hyperplasia continued but an increase in cell size, or hypertrophy, also occurred. In the third phase, growth was entirely due to an increase in cell size (13).

Changes in Hemoglobin and Hematocrit Values During Pregnancy

During pregnancy, the maternal blood volume was found to increase, reducing the concentrations of many constituents in the blood. It was demonstrated that red blood cell production was increased, but was not in proportion to the expanding plasma volume. Thus it was concluded that a drop in hemoglobin and hematocrit values during pregnancy was normal and was to be expected.

The Interdepartmental Committee on Nutrition for National Defense established standard ranges for both hemoglobin and hematocrit levels during the stages of pregnancy (15). Table I identified these ranges by trimester.

TABLE I

ACCEPTABLE RANGES FOR HEMOGLOBIN AND HEMATOCRIT VALUES DURING PREGNANCY

Trimester	Hemoglobin mg/ml	Hematocrit %
First	11.0-14.4	38-42
Second	10.5-12.9	35-37
Third	10.5-12.9	33-34

Source: Interdepartmental Committee on Nutrition for National Defense (15).

Nutrient Needs During Pregnancy

The Food and Nutrition Board of the National Research Council recommended that several nutrients be increased during pregnancy (8). Table II showed these recommendations for teenage girls under 18 years of age.

Energy

Past research showed that energy needs during pregnancy were influenced by a variety of factors. Added maternal tissue, increased maternal

TABLE II

RECOMMENDED DIETARY ALLOWANCES FOR ADOLESCENT FEMALES

Nutrient	Non-Pregnant Age Groups (11-14)	(15-18)	Pregnancy
Energy (kcal)	48 kcal/kg	38 kcal/kg	+300
Protein (g)	1.0 g/kg	0.9 g/kg	+30
Vitamin A (RE)	800	800	+200
Vitamin D (μg)	10	10	+5
Vitamin E (mg α-TE)	8	8	+2
Ascorbic Acid (mg)	50	60	+20
Thiamin (mg)	1.1	1.1	+0.4
Riboflavin (mg)	1.3	1.3	+0.3
Niacin (mg NE)	15	14	+2
Vitamin B_6 (mg)	1.8	2.0	+0.6
Folacin (μg)	400	400	+400
Vitamin B_{12} (μg)	3.0	3.0	+1.0
Calcium (mg)	1200	1200	+400
Phosphorus (mg)	1200	1200	+400
Magnesium (mg)	300	300	+150
Iron (mg)	18	18	18+
Zinc (mg)	15	15	+5
Iodine (μg)	150	150	+25

Source: National Academy of Sciences (8).

metabolism, and the growth of the fetus and placenta were estimated to require approximately 80,000 extra kilocalories over the course of pregnancy (8). The World Health Organization (16) recommended that energy intake should be increased by 150 kilocalories during the first trimester, and by 300 kilocalories during the second and third trimesters. Energy requirements were found to be greater during the second trimester due to the expansion of blood volume, growth of the uterus and breasts, and accumulation of fat. During the third trimester, the growth of the fetus and placenta required increased energy intake.

In the past, recommendations for weight gain during pregnancy varied greatly. In the late nineteenth century, weight limitation was generally advised in order to produce infants who were small and therefore more easily delivered. This practice persisted well into the twentieth century. Another recommendation quite popular during the 1900's was based on the belief that the fetus was actually a parasite and drew all needed nutrients from the mother's body. Thus, the recommendation offered was "eat for two". In more recent years, controlled studies indicated that an optimal amount of weight gain during pregnancy was from 24 to 28 pounds (11). Table III identified the average weight of the products of pregnancy. Weight gain substantially below or above this range was found to greatly decrease the chances of a pregnancy without complications. Unlimited weight gain throughout pregnancy was found to lead to a higher incidence of toxemia, difficulties in labor with increased risk to the mother, and the birth of large babies with multiple complications in early life. Women who gained weight excessively during the latter half of pregnancy, or who were overweight at conception, were more likely to develop eclampsia with convulsive

TABLE III

AVERAGE WEIGHT OF THE PRODUCTS OF PREGNANCY

Products	Weight (lb)
Fetus	7.5
Placenta	1.0
Amniotic fluid	2.0
Uterus (weight increase)	2.5
Breast tissue (weight increase)	3.0
Blood volume (weight increase)	4.0 (1500 ml)
Maternal stores	4.0 to 8.0
Total	24 to 28 lb

Source: Worthington, B.S., Vermeersch, J., and Williams, S.R. (11).

seizures. Women who failed to gain weight in the second trimester were more likely to suffer from toxemia or preeclampsia and have premature deliveries. Eclampsia with convulsive seizures was found to be most severe in women who were underweight at conception and who failed to gain weight (13).

Protein

Pregnancy was shown to require additional protein intake for both the mother and the fetus. This nutrient was found to be necessary for the synthesis of hormones, cells, and tissues in the fetus, placenta, and mother. Amino acids were found to be transferred to the fetus and used for protein synthesis. Protein restriction during pregnancy led to

a decreased number of cells in tissues at the time of birth, which was particularly detrimental to brain development (13). In establishing recommendations for an increase in protein intake during pregnancy, the National Research Council considered research estimating amounts of protein deposited in the fetus, placenta, and maternal tissues to be an average of 10 grams/day; recent data on nitrogen balance observing nitrogen gains to be approximately twice the amount originally thought to be retained; evidence that protein intakes above the requirements tended to correlate with improved reproductive outcome; and data indicating an increased risk associated with low protein intake (8).

Vitamins

Vitamins were shown to be required for metabolism of nutrients, energy metabolism, maintenance of healthy tissues, and reproduction. It was found that ascorbic acid was necessary for the development of collagen and for a number of other functions in the body. Low maternal intakes of vitamin C were associated with premature rupture of fetal membranes and increased neonatal death rates (13). The B vitamins thiamin, riboflavin, and niacin were shown to be essential for key reactions in energy production. Vitamin B_6 and folacin were found to be necessary for protein synthesis, and folacin and vitamin B_{12} were required for the synthesis of red blood cells.

Vitamin A, required for the development of skin and epithelial tissue, was shown to be stored in the fetus (13). Vitamin D, important for regulating calcium and phosphorus metabolism, was shown to be needed for the proper development of bones and teeth. Vitamin E was found to help protect cell membranes.

Minerals

A variety of minerals were found to be necessary for optimum development of the fetus during the course of pregnancy. Calcium and phosphorus were found to be vital for proper development of the fetal skeleton. Phosphorus was also shown to activate glucose and glycogen to enable them to produce energy and to aid in the conversion of several B vitamins to coenzymes. Iron was identified as a component of hemoglobin, myoglobin, and several enzymes, and increased amounts were needed during pregnancy. Past research indicated that approximately 290 milligrams (mg) were required for additional hemoglobin in the expanding maternal blood volume, 134 mg were stored in the placenta, and 246 mg were found in the blood and body stores of the fetus (12). Iron needs were also increased due to blood loss during childbirth. Zinc, identified as one of the constituents of enzymes involved in several metabolic pathways, was shown to be required for growth of the fetus and placenta. Iodine was demonstrated to be essential for regulating basal metabolism. Magnesium was found to maintain electrical potential in nerves and muscle membranes.

Complications of Adolescent Pregnancy

In 1961, Aznar and Bennett (17) published a study of 1,137 pregnant girls under 17 years of age in Cleveland, Ohio. They found an increased incidence of severe toxemia and prolonged labor among this population when compared to a similar control group. Israel et al. (18) studied 3,995 pregnant girls in 1963 under age 20, and found a much higher incidence of toxemia and anemia when compared with a similar control group. A 1964 study by Claman et al. (19) of 224 pregnant girls under

16 years of age showed once again a much greater incidence of toxemia in the young girls.

In 1970, Coates (20) administered a tightly-controlled study of 137 unmarried pregnant black females under 15 years of age. He concluded that the incidences of acute toxemia, uterine dysfunction, one-day fever, and cardiovascular system anomalies were higher among the younger girls than a comparable control group. King et al. (21) reported that 85 percent of the 47 pregnant teenagers studied had some problems during pregnancy, including clinical edema, proteinuria, inadequate weight gain, anemia, and glycosuria. From their study of 414 births to girls under 15 years of age in Louisiana in 1976, Dott and Fort (22) concluded that pregnant teenagers were at a greater risk of increased fetal wastage, infant morbidity, and infant death. In 1979, the Committee on Adolescence of the American Academy of Pediatrics published a "Statement on Teenage Pregnancy". The complications of pre-eclampsia and low-birth weight infants were considered to be the greatest health risks (23).

Nutritional Status of Adolescent Females

Previous nutritional status surveys indicated that teenage girls consumed the worst diets of any segment of our population. Their diets were reported to be low in iron, calcium, vitamin A, and ascorbic acid (4). Teenage girls were often found to skip meals, particularly breakfast, largely due to peer pressure to be slender. Snacks such as candy, potato chips, and carbonated beverages were very popular and often made up a large portion of total daily calories.

Several studies of the food habits and nutritional status of pregnant adolescents were conducted in recent years. In 1969, McGanity et

al. (24) surveyed the health status of 550 pregnant teenagers in Texas. They were found to be low in calcium, iron, niacin, vitamin A and ascorbic acid intake. Over 18 percent were found to have hemoglobin levels less than 10.0 gm per 100 ml, and over 40 percent had less than 11.0 gm per 100 ml. Pica in the form of starch, clay, dirt, and refrigerator frost was practiced by 28 percent of the adolescents in the study. Daniel et al. (25) studied 114 folate-deficient pregnant adolescents, and found that 97.4 percent consumed less than 100 percent of the Recommended Dietary Allowance (RDA), and 52 percent consumed less than 10 percent of the RDA for folacin. The whole-blood folate and plasma folate values revealed that a significant number of the pregnant girls were deficient in folic acid. In 1972, Van de Mark and Wright (26) studied the hemoglobin and folate levels of 114 pregnant adolescents in Alabama. The average hemoglobin value for pregnant and nonpregnant girls were both found to be below acceptable levels. Intake of folic acid, along with the whole blood folate levels, were found to be far below the RDA for both groups of teenagers.

King et al. (21) assessed the nutritional status of 18 pregnant adolescents 14 to 18 years of age in 1972. They found very low intakes of calcium, iron, vitamin A, and energy. The teenagers had attempted to improve the quality of their diet while pregnant, but no nutrient was found to be adequately supplied to all girls. Prescribed mineral supplements were not taken on a regular basis by most of the girls. Seiler and Fox (27) studied 30 pregnant adolescents under 17 years of age in Nebraska, and found that more than 50 percent had intakes below recommended levels for calcium, iron, and vitamin A. Once again it was stated that most girls did not appear to take prescribed supplements on

a regular basis. Kaminetzky et al. (28) studied 142 pregnant teenagers in New Jersey, and reported that many exhibited considerable evidence of nutritional deficiencies. Approximately 50 percent did not improve their diets despite dietary counseling. Fourteen percent reported engaging in pica practice at the time they were interviewed, with laundry starch, clay, baking soda, raw rice, flour, and refrigerator frost being the most common substances consumed.

Morse et al. (29) compared the nutritional status of 43 pregnant adolescents with 59 adult pregnant women. The older group had higher mean intakes of vitamin A, niacin, thiamin, and ascorbic acid. Hemoglobin levels, although acceptable, were lowest in the 12 to 17 year olds. The 18 to 19 year olds had the lowest ascorbic acid mean intakes and the 12 to 17 year olds had the next lowest. Mean carotene values were lower in these groups as well. The authors concluded that adolescents need greater nutritional support during pregnancy than older women.

Osofsky et al. (30) assessed the nutritional status of low-income pregnant teenagers, aged from 11 to 18, in New York. Although an adequate meal was provided daily, almost all were found to have nutritional deficiencies. Of the 88 girls studied, approximately 95 percent were below recommended levels for iron and calcium, and approximately 90 percent for vitamin A. Low intakes of niacin, riboflavin, and thiamin were also reported. The girls reported high intakes of potato chips, carbonated beverages, and other snack foods popular among adolescents.

American Indians

Studies of American Indians showed that the majority lived on

Federal Indian Reservations or in rural Indian communities (7). In general, they had kept their traditional cultures, causing conflict with the values of modern society. They were frequently cited as a population plagued with poverty and hunger. The average income of this population was found to be among the lowest in the United States, averageing less than $2,000 annually per family in 1972 (7).

Several studies indicated that poor nutrition was a major factor in prolonging the health problems of the Indian population (7, 31, 32, 33). Mild to moderately severe nutritional deficiencies were found to be relatively common. The average age of death was found to be lower than that of the general population, and the incidence of disease was higher. Tuberculosis and other respiratory infections, gastroenteric infections, diabetes, gallbladder disease, otis media, and parasitosis were prevalent (7, 33). Dental health was found to be generally poor. Both underweight and obesity were common.

The mortality rate of American Indian infants under 12 months of age was found to be three times that of the general population (7). A Cornell-Navajo Project study showed a high morbidity and mortality rate in Navajo children from birth to two years of age (32). A five-year study of Navajo children under five years of age revealed that a large number were suffering from malnutrition and were below the norms for height and weight for their chronological ages. Calorie- and protein-deficiency diseases were also diagnosed in this group (32).

American Indian Food Habits

Prior to the assigning of American Indians to reservations, tribes hunted large areas in search of food. Several groups were differentiated

by descriptive titles related to sources of food. Originally there were about seven distinct cultural goups: the woodsmen of the eastern forests; the hunters of the plains; the Navajo shepherds; the pueblo farmers; the desert dwellers; the northern fishermen; and the seed gatherers (34).

The basic instinct to satisfy hunger, along with the kind of foods available, originally shaped the dietary practices of each Indian nation (34). When hunting seasons were good, food supplies provided diets high in protein. Meat was considered the most important food in the diet. Generally, all parts of the animal were consumed except the bones. Roots, wild plants, fruits, and wild berries were also consumed in some areas (34). Acorns, the vines of the bittersweet and the stems of prickly pears were consumed when other food was scarce (34).

The establishment of reservations severely restricted the sources of food for the Indians confined there. Therefore, the use of traditional foods by most native Americans drastically declined. Indians were forbidden to leave the reservation without permission, prohibiting them from seeking food over large areas. The supply of game and wild foods within the reservations soon became exhausted. The Army periodically issued rations of meat, flour, coffee, and sugar as a substitute (34).

A recent study of the Navajos (35) showed that three meals a day were usually eaten, but varied from two to four. Basic menu items included mutton, potatoes, onions, bread, coffee, and tea. In a study of the Navajos of Arizona, Darby (36) found that the common foods eaten were tortillas, lard, vegetable shortening, potatoes, coffee and tea, and sweets. A basic meal pattern for the low-income Navajo was a breakfast consisting of fried potatoes with onion, tortillas, and coffee with

sugar; a noon meal of boiled potatoes, tortillas, and coffee with sugar; and an evening meal of potatoes or tortillas and coffee with sugar. The higher-income families included meat, fried bread, and evaporated milk in their diets.

Hacker (37), in extensive food habit surveys of the Pueblo and Navajo Indians of New Mexico, found that the majority of the Pueblos and all of the Navajos surveyed were lacking in the foods essential for a good diet. An abundant use of sweets was also observed. Kunhlein (38) found that many traditional Hopi Indian foods were cornmeal based. Other common foods were melons, peaches, greens, tortillas, and fry bread. Bass and Wakefield (31) found that Sioux Indians living on Standing Rock reservation in North and South Dakota had no typical day's menu, but the diet lacked variety. Breakfast consisted of a hot or cold cereal, bread and/or fried potatoes, and sometimes fried eggs. Bologna sandwiches with potato chips and carbonated beverages were popular lunch items, and meat and fried potatoes were usually eaten at the evening meal.

Methods for Conducting Dietary Surveys

Given the need to find a simple, economical method for collecting dietary information, the twenty-four hour dietary recall became the most common method used in the field of nutrition. It was found to be easy and quick to administer. However, many began to question the accuracy of this method. In a frequently cited study, Young (39) compared the twenty-four hour recall with a seven day food record and a diet history, both of which were more extensive and elaborate food survey methods. It was found that the twenty-four hour recall gave approximately the same

results as the seven day record when used with groups of fifty or more. In a test of the validity of the twenty-four hour recall, Madden (40) reported no significant difference between the mean recalled and the mean actual intake of nutrients. Madden also recommended the twenty-four recall when estimating the mean intake of a group of fifty or more.

Based on these studies, the author chose to use the twenty-four recall for collecting dietary information. It was concluded that the other methods available for collecting data on food intake were too costly and time consuming.

CHAPTER III

METHODS AND PROCEDURES

The knowledge that anemia and other nutritional dificiencies were common to American Indian women throughout the childbearing years led to increasing concern regarding the outcome of pregnancy among American Indian adolescents. However, no previous research had been undertaken on the dietary intake and food patterns of American Indian adolescents in Oklahoma. An investigation to identify the nutrients consumed and the food patterns of pregnant American Indian adolescents in Oklahoma was therefore initiated.

Type of Research Design

A descriptive research design was developed to study nutrient intake and food patterns of pregnant American Indian adolescents. A 24-hour dietary recall to obtain information regarding nutrient intake, and a questionnaire to identify background information, food patterns, nutrition knowledge related to pregnancy, non-dietary practices, sources of nutrition information, and physical ailments was administered. Clinical data were also obtained. It was hoped that these findings would be useful in nutrition education in prenatal services for pregnant American Indian adolescents in Oklahoma.

Population and Sample

An agreement was made between the Indian Health Service (IHS) and

the Food, Nutrition, and Institution Administration Department of Oklahoma State University to study a group of gregnant American Indian adolescents (see Appendix A). Permission to interview participants for the study was obtained through the Nutrition Branch of IHS in Oklahoma City. The criteria used for the selection of the sample included that the participants be 18 years of age or younger and be identified by genetic lineage to be at least one-quarter American Indian. The subjects were to be receiving prenatal care through the IHS clinics across the state of Oklahoma, and were to have made at least one visit between March 18 and April 17, 1981. All those interviewed who satisfied the above criteria were included in the study.

Instrumentation

A modification of the Dietary Recall Instrument used in the Food, Nutrition, and Institution Administration Course 1113 at Oklahoma State University was used in the study (see Appendix B). Other questions in the instrument were modified from the Prenatal Nutrition Questionnaire currently in use by the Oklahoma Indian Health Service. Questions regarding food patterns, background information, non-dietary practices, and physical ailments during pregnancy were included. Additional questions to obtain specific information regarding nutrition knowledge related to pregnancy and sources of nutrition information were also included. Clinical data was obtained from the subjects' medical records.

Collection of the Data

The data was collected from March 18 through April 17, 1981, in IHS

clinics across Oklahoma. A total sample of 57 subjects was obtained from clinics located in McAlester, Lawton, Tahlequah, Claremore, Wewoka, White Eagle, Pawhuska, Eufaula, Ada, Okemah, and Shawnee (see Appendix C). In addition, three subjects attending an Indian WIC clinic in Sapulpa were interviewed and included in the total sample of 57. A registered dietitian, public health nutritionist, or nutrition technician employed with IHS conducted the interviews, with the exception of the clinics located in Okemah and Shawnee. At these two locations the interviews were conducted by the author. Each interviewer was mailed written instructions for administering the questionnaire and dietary recall, and was subsequently telephoned by the researcher to explain the procedure and to answer any questions that had arisen.

The interviewers were asked to conduct an interview with every pregnant adolescent who met the criteria for the study at the time she came to the clinic for prenatal care. The interviewers were asked to read aloud each statement from the questionnaire and further explain or expand any question not fully understood. The answers given by the subject were recorded by the interviewers, along with any additional comments pertinent to the study.

During the interview, a 24-hour recall of all food and beverages consumed during the previous 24 hours was administered. The interviewers were instructed to use food models and standard sized eating and drinking utensils to aid in the subjects' recall accuracy of amounts of food and beverages consumed. As the subject recalled the food and beverages consumed, the interviewers were instructed to write down the item and amount eaten, where the item was eaten, and the time the food was consumed. All items were later coded by the researcher for computer analysis.

Hemoglobin and hematocrit values and pre-pregnancy weights were obtained from the subjects' IHS medical records. These values were originally obtained prior to the collection of data for this study. Each subject's chart number was recorded on the questionnaire to ensure that data obtained from the records was transcribed to the proper questionnaire, and that the responses remained anonymous.

Analysis of Data

Analysis of each of the three hypotheses listed in Chapter I were performed. For hypotheses one and two, the food items from the dietary recall were coded in accordance with the United State Department of Agriculture's Home and Garden Bulletin Number 72 and keypunched for a computer program written in Fortran computer language. The number of calories and the amount of selected nutrients were determined from the 24-hour recall as reported by the subjects. The adequacy of calories, protein, calcium, iron, vitamin A, thiamin, riboflavin, niacin, and ascorbic acid was determined by comparing the amount of calories and nutrients consumed to the 1980 Recommended Dietary Allowances (RDA) for these age groups during pregnancy (see Chapter II, page 10). The pre-pregnancy weights of the subjects were used to calculate the calories and protein requirements. The calories and nutrients were categorized as 100 percent or more of the RDA, 75 to 99 percent of the RDA, 59 to 74 percent of the RDA, and below 50 percent of the RDA. The mean caloric and nutrient intake for the total sample was also calculated and compared with the 1980 RDA.

For hypothesis three, the hemoglobin and hematocrit levels were compared with established reference levels (see Chapter II, Table I,

page 9) in order to identify anemia in the subjects. The PearsonProduct Moment correlation (41) was used to determine if a correlation existed between the subjects' hemoglobin and hematocrit values and their one-day iron intake. The following formula was used:

$$r = \frac{\frac{\Sigma XY}{N} - (X)(Y)}{(S_x)(S_y)}$$

Where X and Y were paired observations,

XY=the product of each X value multiplied by its paired Y value,

X=the mean of variable X,

Y=the mean of variable Y, S_x=the standard deviation of variable X,

S_y=the standard deviation of variable Y,

N=the number of observations,

r=the correlation coefficient (41).

The closer the value of r was to one, the stronger was the correlation between variables.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this study was to determine food patterns and nutrient intake of a group of pregnant American Indian adolescents in Oklahoma. A descriptive analysis of the participants, their food patterns, nutrient intake, and selected clinical data follows.

Background Information

Age

Table IV showed the frequency and percentage of subjects according to age. The subjects ranged from 14 to 18 years of age, with 48 (84%) of the 57 between the ages of 16 and 18. Only one subject was aged 14.

Educational Achievement

Table V identified educational achievement of the subjects by grade levels. At the time of the interview, 23 subjects (40%) were enrolled in ninth to twelfth grade. Thirty-four (59%) had discontinued their education. Their last grades completed ranged from seventh to twelfth grade, with the majority falling between ninth to eleventh grade. Two of the participants reported completing their high school degree through a correspondence course. Of the subjects who had not completed high school, 21 (61%) indicated they planned to return to school in the future.

TABLE IV

FREQUENCY AND PERCENTAGE OF SUBJECTS ACCORDING TO AGE

Age	N	%
14	1	1.7
15	8	14.0
16	14	24.5
17	19	33.3
18	15	26.3
Total	57	99.8*

*Does not equal 100% due to rounding

Employment

Of the sample population, five subjects (8%) were employed outside the home. One had a full-time job, and four worked part-time.

Number and Stage of Pregnancy

Forty-seven subjects (82%) were experiencing their first pregnancy. The remaining ten subjects (18%) had had one previous pregnancy. Table VI showed the stages of pregnancy for the subjects. Thirty-one (54%) were in the second trimester, 19 (33%) were in the third trimester, and seven (12%) were in the first trimester. This distribution suggested that many subjects delayed seeking medical care, which was shown in other studies of pregnant adolescents (42, 43, 44).

TABLE V

FREQUENCY AND PERCENTAGE OF SUBJECTS
BY EDUCATIONAL ACHIEVEMENT

Grade Level	In School		Out of School	
	N	%	N	%
7	-	-	2	3.5
8	-	-	1	1.7
9	1	1.7	6	10.5
10	8	14.0	10	17.5
11	7	12.2	11	19.2
12	7	12.2	4	7.0
Total	23	40.1	34	59.4

TABLE VI

FREQUENCY AND PERCENTAGE OF SUBJECTS
BY STAGE OF PREGNANCY

Trimester	N	%
First	7	12.2
Second	31	54.3
Third	19	33.3
Total	57	99.8*

*Does not equal 100% due to rounding

Residence

Table VII showed the frequency and percentage of subjects according to residence. Thirty-seven subjects (65%) were single, and 20 (35%) were married. Of the total 57 interviewed, 24 (42%) lived with their parents, and 17 (30%) lived with a guardian or with relatives other than parents, grandparents, or husbands. Twelve (21%) lived with their husbands, and two lived with their husband, parents, and grandparents. None of the participants in the study lived alone.

Food Patterns

The participants were asked a number of questions in order to identify food patterns and dietary practices. Questions regarding food purchasing, meal planning and preparation, meal patterns and omissions, food likes and dislikes, milk consumption, beverage consumption, and use of prescription and non-prescription drugs were asked.

Food Buying, Meal Planning, and Meal Preparation

Table VIII identified the person responsible for food buying, meal planning, and meal preparation in each of the subject's households. For a majority of subjects, meals were usually planned by themselves or by their mother or grandmother. Twenty-three respondents (40%) planned most of their meals themselves, and 16 (28%) reported that their mother or grandmother usually planned the meals. However, 22 of the subjects (38%) indicated that their mother or grandmother usually bought the food, and only 16 (28%) did the grocery shopping themselves. Meals were usually prepared by the subjects themselves or by their mother or grand-

TABLE VII

FREQUENCY AND PERCENTAGE OF SUBJECTS BY RESIDENCE

Residence	N	%
Parents	24	42.1
Other Relatives Or Guardian	17	29.8
Husband	12	21.0
Husband, Parents, Grandparents	2	3.5
Parents and Grandparents	1	1.7
Grandparents	1	1.7
Total	57	99.8*

*Does not equal 100% due to rounding

mother. Twenty-one subjects (36%) reported that they usually prepare their own meals, and 11 (19%) reported that their mother or grandmother prepared the meals most often.

Meal Patterns

The participants were asked with whom they usually ate most meals. Responses in rank order were:

Parents	42.1%
Other	29.8%
Husband	21.0%
Husband, Parents, Grandparents	3.5%
Parents, Grandparents	1.7%
Grandparents	1.7%

According to these responses, the majority of subjects ate most meals with their parents, husband, or someone other than parents or grandparents, such as other relatives or friends.

TABLE VIII

FREQUENCY AND PRECENTAGE OF MEAL PLANNING, FOOD BUYING, AND MEAL PREPARATION BY PERSON RESPONSIBLE

Person Responsible	Plans Meals		Buys Food		Prepares Meals	
	N	%	N	%	N	%
Mother/Grandmother	16	28.0	22	38.5	11	19.2
Self	23	40.1	16	28.0	21	36.8
Other	11	19.2	14	24.5	11	19.2
Sibling	3	5.2	3	5.2	2	3.5
Self and Other	1	1.7	2	3.5	5	8.7
Self and Mother	3	5.2	-	-	7	12.2
Total	57	99.3*	57	99.7*	57	99.6*

*Do not equal 100% due to rounding

Meal Omissions

As shown in Table IX, breakfast was the meal most often omitted by the participants in the study. Twenty-six respondents (45%) missed breakfast at least once a week. However, 31 subjects (54%) reported eating breakfast every morning, and none of the respondents reported never eating breakfast.

Thirty-six respondents (63%) reported eating lunch every day, while only four indicated they always skipped lunch. Of the 23 subjects still in school, 12 (21%) ate the lunch provided at school five days per week. Eight subjects (14%) reported never eating the lunch provided at school.

TABLE IX

FREQUENCY AND PERCENTAGE OF MEALS EATEN PER WEEK BY SUBJECTS

Number of Meals Eaten Per Week	Breakfast		Lunch		Dinner	
	N	%	N	%	N	%
0	-	-	4	7.0	-	-
1	2	3.5	-	-	-	-
2	3	5.2	2	3.5	-	-
3	5	8.7	5	8.7	1	1.7
4	8	14.0	2	3.5	1	1.7
5	6	10.5	7	12.2	2	3.5
6	2	3.5	1	1.7	2	3.5
7	31	54.3	36	63.1	51	89.4
Total	57	99.7*	57	99.7*	57	99.9*

*Do not equal 100% due to rounding

Dinner was the least frequently missed meal of the subjects interviewed, with 51 participants (89%) eating dinner every evening. The remaining six reported eating an evening meal from three to six times per week.

Food Dislikes

Thirty-nine participants (68%) reported disliking a particular food or foods. Foods most often reported to be disliked by the subjects in rank order were:

Spinach	28.0%
Liver	22.8%
Dairy Products	14.0%
Peas	10.5%
Broccoli	8.7%

According to the responses, the foods most often disliked by the participants were spinach and liver. The dairy products disliked included milk and cottage cheese.

Milk Consumption

Due to the high incidence of lactose intolerance among American Indians (45), the subjects were asked if they consumed milk. The number of subjects in rank order who reported drinking milk and the amounts consumed were:

1-2 glasses per week	10.5%
½-1 glass daily	14.0%
2 glasses daily	26.3%
3 glasses daily	12.2%
4 glasses daily	19.2%
5 glasses daily	7.0%
Total	89.4%

According to the responses, 51 of the 57 participants reported drinking milk at least occasionally. Of the six subjects (10%) who did not drink milk at all, five did not because they did not like it. Only one subject did not consume milk because it made her ill, a possible indication of lactose intolerance.

Beverages Usually Consumed By Subjects When Thirsty

The subjects were asked to name the beverage or beverages they usually drank when thirsty. Many participants listed more than one beverage, so the percentages added to more than 100. Responses in rank

order were:

Water	73.6%
Fruit or vegetable juice	28.0%
Carbonated beverages	24.5%
Coffee or tea	19.2%
Milk	10.5%
Other	10.5%

From the responses, the subjects indicated they usually drank water when thirsty. Only 14 participants (24%) indicated they usually drank carbonated beverages. However, 43 subjects (75%) reported the consumption of carbonated beverages, sweetened iced tea, and KoolAide in their 24-hour recall.

Prescription and Non-Prescription Drugs

The participants were asked what drugs, if any, they were taking or had taken at some time during their pregnancy. Responses in rank order were:

Vitamin and mineral supplements	82.4%
Iron supplements	75.4%
Pills not prescribed by a doctor	14.0%
Birth control pills	3.5%
Pills to lose weight	0%
Pills to lose body water	0%

According to the responses, almost all of the participants were taking or had taken vitamin and mineral supplements and iron supplements during their pregnancy. None of the participants reported taking drugs to lose body water or lose weight while pregnant.

Nutrition Knowledge Related to Pregnancy

Foods Subjects Felt Should Be Consumed During Pregnancy

The subjects were asked to respond to an open-ended question

concerning what foods, if any, they believed should be consumed during pregnancy. Many participants listed more than one food, so the percentages totaled to more than 100. The responses most often identified by the participants in rank order were:

Foods from the Basic Four Food Groups	35.0%
Fruits and Vegetables	26.3%
Dairy Products	19.2%
Meat	12.2%
Liver	5.2%

A total of 41 subjects felt certain foods should be consumed during pregnancy. However, only 20 participants (35%) believed that foods from all of the Basic Four Food Groups should be consumed during pregnancy. Of the total group of 57, 16 subjects (28%) did not believe any particular foods should be consumed during pregnancy.

Foods Subjects Felt Should Not Be Consumed During Pregnancy

The participants were also asked what foods, if any, should not be consumed during pregnancy. The foods most oten listed by the participants in rank order were:

"Junk" food	49.1%
Fried or fatty foods	22.8%
Salty foods	10.5%
Alcohol	3.5%

Of the total population, 39 subjects (68%) believed certain foods should not be consumed during pregnancy. "Junk" food was the most common food listed, followed by fried or fatty foods, salty foods, and alcohol. It is ironic to note that while fried foods and "junk" food were often listed as foods to be avoided during pregnancy, 50 subjects (88%) reported consuming fried meats or potatoes, carbonated beverages, cookies, candy, potato chips, or Kool-Aide in their 24-hour recall.

Weight Gain During Pregnancy

The subjects were asked how much weight they felt they should gain during pregnancy. Their responses in rank order of weight gain were:

0-5 pounds	1.7%
6-10 pounds	7.0%
11-15 pounds	3.5%
16-20 pounds	19.2%
21-25 pounds	57.8%
Don't know	10.5%

Thirty-three subjects (58%) believed they should gain between 21 and 25 pounds during pregnancy. Only one subject (1.7%) reported that zero to five pounds was a sufficient weight gain.

Attempted Weight Loss During Pregnancy

Of the total group, only five subjects (8.7%) indicated that they were on a diet to lose weight. Two of these subjects were aged 15, two were 16, and one was 18. All were in the second or third trimester of pregnancy, and only one subject indicated she was gaining too much weight while pregnant. Since peer pressure was often shown to be greatest in the early teen years, and young girls strived to be thin, this might have been an indication as to why the majority of the subjects who were concerned about their weight were under 17 years of age.

Plans for Feeding Newborn

Twenty-nine subjects (51%) planned to bottle-feed their infants, and 17 subjects (30%) planned to breast-feed. The remainder of the subjects had not yet decided how they would feed the newborn.

Non-Dietary Practices

Pica

Although pica was often reported in other studies to be prevalent among the American Indian population (24, 28) only four subjects (7%) reported practicing pica. Three (5%) reported eating refrigerator frost, and one subject (1%) reported eating dust scraped from an automobile.

Alcohol Consumption

Alcohol consumption appeared to be low among the adolescents sampled. Only two subjects (3%) reported drinking alcohol. Both of these subjects drank only beer, and usually drank less than once per week. One other subject reported consuming alcohol before she became pregnant, but had stopped upon learning of her pregnancy.

Cigarette Smoking

Of the total sample of 57, 14 subjects (24%) smoked cigarettes during their pregnancy. Twelve (21%) smoked less than one pack per day, and two (3%) smoked from one to two packs per day.

Sources of Nutrition Information

The subjects were asked to list their sources of nutritional information. Many subjects listed more than one source, so the percentages do not equal 100. Responses in rank order were:

Parents	52.6%
Nutritionist	49.1%
Television	43.8%

School	42.1%
Magazines	38.5%
Friends	36.8%
Nurse	36.8%
Doctor	33.3%
Dietitian	33.3%
Grandparents	21.0%
Newspapers	14.0%

The majority of the 57 respondents (30) (52%) indicated that their parents were a source of information regarding nutrition. Twenty-eight subjects (49%) indicated a nutritionist had given them nutrition information, and 19 (33%) identified a dietitian as a source of information. Television and magazines were also named as sources by 25 (43%) and 22 (38%) of the subjects, respectively, demonstrating the influence of the media on adolescents.

Physical Ailments

Table X identified some common physical ailments reported by the subjects during pregnancy. The most common ailments reported included nausea, reported by 26 subjects (45%), and headaches, reported by 25 subjects (43%). Thirteen subjects (22%) reported experiencing indigestion or vomiting at some time during their pregnancy. The incidence of edema was also indicated, with 16 subjects (28%) reporting swollen feet, and 13 (22%) reporting swollen hands.

Nutrient Intake

The mean nutrient intake of the sample population was shown in Table XI. Following the 1980 Recommended Dietary Allowances (Chapter II, page 10) for these age groups during pregnancy, the mean caloric intake required for the subjects was calculated to be 2467 per day, and the mean protein intake required was calculated to be 81 grams per day.

TABLE X

FREQUENCY AND PERCENTAGE OF SUBJECTS REPORTING PHYSICAL AILMENTS DURING PREGNANCY

Ailment	N	%
Nausea	26	45.6
Headaches	25	43.8
Heartburn	17	30.0
Swollen feet	16	28.0
Vomiting	13	22.8
Indigestion	13	22.8
Swollen hands	13	22.8
Constipation	11	19.3
Sore gums	7	12.3
Toothache	7	12.3
Headaches with black spots before eyes	6	10.5
Swollen face	6	10.5
Diarrhea	3	5.3
Mouth Sores	3	5.3

It was shown in Table X that the mean intake of calories was slightly below the RDA for the subjects aged 15 to 18, and the mean protein intake was slightly below the RDA for all subjects. The mean intake of calcium was 36.1 percent of the RDA for the 14 year old subject, and 56.8 percent of the RDA for the 15 to 18 year old subjects. Both were

TABLE XI

MEAN NUTRIENT INTAKE, MEAN PERCENTAGE NUTRIENT INTAKE OF RDA, AND RANGE OF NUTRIENT INTAKE OF SUBJECTS

Nutrient (Age)	Mean Intake	% Intake of RDA* (14)	Mean % Intake (15-18)	Range of Intake
Calories	2191.64	128.1	88.8	778-4002
Protein (g)	80.07	89.9	98.7	21-172 g
Calcium (mg)	908.92	36.1	56.8	143-3029 mg
Iron (mg)	12.92	81.1	71.6	4.4-26.1 mg
Vitamin A (RE)	1295.44	151.6	129.5	121-6741 RE
Thiamin (mg)	1.43	87.3	93.3	0.43-3.44 mg
Riboflavin (mg)	1.86	75.6	116.2	0.41-4.45 mg
Niacin (mg)	16.47	81.7	102.9	4.90-35.5 mg
Vitamin C (mg)	118.49	525.7	148.0	0-630 mg

*Data for the subject age 14

well below the 1600 milligrams (mg) recommended. The mean intake of iron was 81.1 percent of the RDA for the 14 year old subject, and 71.6 percent of the RDA for the 15 to 18 year old subjects. The mean intake for thiamin was 87.3 percent of the RDA for the 14 year old subject, and 93.3 percent of the RDA for the 15 to 18 year old subjects. The mean intake of vitamin A was 151.6 percent of the RDA for the 14 year old subject, and 129.5 percent of the RDA for the 15 to 18 year old subjects. The mean intake of riboflavin was below the RDA (75.6%) for the 14 year old subject, but was 116.2 percent of the RDA for the 15 to 18 year old subjects. Niacin was also below the RDA (81.7%) for the 14 year old subject, but was 102.9 percent of the RDA for the 15 to 18 year old subjects. The mean intake of ascorbic acid was well above the RDA for all subjects, with the 14 year old subject consuming 525.7 percent of the RDA, and the 15 to 18 year old subjects consuming a mean intake of

148.0 percent of the RDA.

To evaluate the subjects' diets in this study, the amount of calories and the intake of nutrients was categorized as 100 percent of the RDA, 75 to 99 percent of the RDA, 50 to 74 percent of the RDA, and below 50 percent of the RDA. Table XII showed the number and percentage of subjects in each of these groups.

Energy

Twenty-four subjects (42%) met 100 percent or more of the RDA for calories, and 13 subjects (23%) met between 75 and 99 percent of the RDA. Only eight subjects were below 50 percent of the RDA for calories. This contradicts other studies of pregnant adolescents which found a greater number to be low in energy intake (21, 27).

Protein

Of the total sample, 26 subjects (46%) had protein intakes meeting or exceeding 100 percent of the RDA. Thirteen subjects (22%) had intakes of protein between 75 and 99 percent of the RDA. Six subjects (10%) were below 50 percent of the RDA. Meat and eggs were the main source of quality protein for most subjects. Pork chops, ground beef, sausage, and bologna were the types of meat most often reported in the dietary recalls of the subjects. Meats were commonly fried, and were often served with fried potatoes and gravy.

Calcium

The nutrient found to be most lacking in the subjects' diets was calcium, which supports past research of this age group (21, 24, 27,

TABLE XII

FREQUENCY AND PERCENTAGE OF NUTRIENT INTAKE OF SUBJECTS ACCORDING TO % OF RDA

	Calories	Protein (g)	Calcium (mg)	Iron (mg)	Vitamin A (RE)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin C (mg)
% and Number of Subjects Meeting 100% or More of the RDA	24 42.1%	26 45.6%	6 10.5%	9 15.7%	26 45.6%	22 38.5%	32 56.1%	25 43.8%	27 47.3%
% and Number of Subjects Meeting Between 75 and 99% of the RDA	13 22.8%	13 22.8%	10 7.5%	17 29.8%	14 24.5%	17 29.8%	7 12.2%	12 21.0%	7 12.2%
% and Number of Subjects Meeting Between 50 and 75% of the RDA	12 21.0%	12 21.0%	12 21.0%	18 31.5%	9 15.9%	13 22.8%	10 17.5%	10 17.5%	8 14.0%
% and Number of Subjects Below 50% of the RDA	8 14.0%	6 10.5%	29 50.8%	13 22.8%	8 14.0%	5 8.7%	8 14.0%	10 17.5%	15 26.3%

30). Approximately 50 percent of the adolescents (29) had calcium intakes below 50 percent of the RDA, and only 16 subjects (28%) had intakes over 74 percent. Twelve subjects (21%) had intakes between 50 and 74 percent. Even though the subjects drank milk, they did not consume enough to meet the high amount recommended for this nutrient.

Iron

Iron intake for this group was somewhat higher than was reported in other studies of adolescent girls (21, 24, 27, 30). A total of 17 subjects (29%) had iron intakes between 75 and 99 percent of the RDA, and nine subjects met or exceeded 100 percent of the RDA. Eighteen subjects (32%) had iron intakes between 50 and 75 percent of the RDA, and 13 subjects (23%) were below 50 percent of the RDA. However, as reported earlier, 47 (82%) were taking a multiple vitamin and mineral supplement containing iron, and 43 (75%) were taking iron supplements containing 324 mg of ferrous sulfate, both of which would help offset the low dietary intake of the iron.

Vitamin A

Twenty-six subjects (45%) had vitamin A intakes of 100 percent or more of the RDA, and 14 (24%) were between 75 and 99 percent of the RDA. This finding did not support past studies of pregnant adolescents, which found inadequate intakes of this vitamin to be quite common (21, 24, 27, 29, 30). For the participants in the present study, the most common sources of vitamin A in the diet were eggs and fortified cereals rather than fresh fruits and vegetables.

Thiamin

Twenty-two subjects (38%) had intakes of thiamin which met or exceeded 100 percent of the RDA, and 17 subjects (29%) were between 75 and 99 percent. Only five subjects (8%) had intakes below 50 percent of the RDA. The most common sources of thiamin for the participants in the study were pork and enriched breads and cereals.

Riboflavin

Thirty-two subjects (56%) in the study had intakes of riboflavin which met or exceeded 100 percent of the RDA. Only eight subjects had intakes below 50 percent of the RDA. It appeared that for most subjects, dietary sources of riboflavin were from a variety of foods, since milk was generally not consumed in large enough amounts to account for the high percentage of participants meeting or exceeding 100 percent of the RDA.

Niacin

Twenty-five subjects (43%) met or exceeded 100 percent of the RDA for niacin. Ten subjects (17%) met between 50 and 74 percent of the RDA, and ten (17%) were below 50 percent of the RDA. However, only preformed niacin found in foods was measured in the dietary recall. Since tryptophan is also converted to niacin in the body, those subjects with adequate protein intakes should have an adequate intake of niacin as well.

Vitamin C

Twenty-seven subjects (47%) had intakes of vitamin C which met or

exceeded 100 percent of the RDA. This was higher than expected, since many past studies of adolescent girls found the majority to be low in vitamin C intake (21, 26). However, 15 subjects (26%) were below 50 percent of the RDA.

Hemoglobin and Hematocrit Levels

When compared to the reference levels established by the Interdepartmental Committee on Nutrition for National Defense (see Chapter II, Table I, page 9) 17 subjects (30%) had hematocrit values below acceptable levels. Three of the subjects (18%) were in the first trimester of pregnancy, 11 (64%) were in the second trimester, and three (18%) were in the third trimester.

Of the 17 subjects with low hematocrit values, only one subject (6%) had a corresponding hemoglobin value below acceptable levels. Three other subjects had borderline low hemoglobin values when compared to the reference levels. It was found in previous studies that hemoglobin levels did not drop as low as hematocrit levels during pregnancy, since the increase in red cell production was not as great as the increase in plasma volume (11). Therefore, according to the reference levels, only four subjects from the total sample were clinically anemic. The other subjects with low hematocrit values were suspect for anemia, and should be monitored closely through the remainder of pregnancy.

Utilizing the Pearson-Product Moment correlation coefficient, no correlation was found to exist between the subjects' hemoglobin and hematocrit values and their one-day iron intakes. The correlation coefficient for hemoglobin levels and iron intake equaled 0.01, and for

hematocrit values and iron intake equaled 0.02. A list of hemoglobin and hematocrit values and iron intake for all subjects can be found in Appendix D.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

A study was undertaken to identify the nutrient intake and food patterns of pregnant American Indian adolescents in Oklahoma. Fifty-seven subjects aged 14 to 18 who were identified to be at least one-quarter American Indian and who were receiving prenatal care from Indian Health Service clinics in Oklahoma were interviewed. Most were between 16 and 18 years of age and were primigravidas in the second or third trimester.

The objectives of the study were: (1) to assess the adequacy of intake of selected nutrients by the subjects as compared to the 1980 Recommended Dietary Allowances for these age groups during pregnancy; (2) to compare the caloric intake of the subjects with that recommended for these age grous during pregnancy; (3) to compare the hemoglobin and hematocrit values of the subjects with standard levels recommended for the stages of pregnancy; (4) to identify background information, food patterns, nutrition knowledge related to pregnancy, non-dietary practices, sources of nutrition information, and physical ailments of the subjects; and (5) to make suggestions and recommendations for nutrition education in prenatal services for pregnant American Indian adolescents in Oklahoma.

A 24-hour dietary recall and a questionnaire were administered and clinical data from medical records were collected. The frequency and percentage of nutrient intake of the subjects was categorized as 100 percent or more of the RDA, 75 to 99 percent of the RDA, 50 to 74 percent of the RDA, and below 50 percent of the RDA. The mean nutrient intake of the group was also calculated. Data from the questionnaire were analyzed for frequency and percentage of subjects' responses. Hemoglobin and hematocrit data was compared to reference standards established for the stages of pregnancy.

The nutrient found to be consumed in the highest amount by the subjects was riboflavin, with 32 subjects (56%) meeting or exceeding 100 percent of the RDA. Intakes of vitamin C, protein, vitamin A, and niacin were also high for the group. Although other studies of adolescent girls found the majority to be low in iron intake, only 13 of the participants in the study (23%) were below 50 percent of the RDA for iron. The nutrient found to be most lacking was calcium, with 29 subjects (51%) below 50 percent of the RDA. A comparison of the mean nutrient intake of the group to the RDA for ages 15 to 18 identified mean intakes over 100 percent of the RDA for vitamin C, vitamin A, riboflavin, and niacin. The nutrient with the lowest mean intake was calcium. Twenty-four subjects (42%) met or exceeded 100 percent of the RDA for calories, based on their pre-pregnancy weights and trimester of pregnancy. Only eight subjects (14%) were below 50 percent of the RDA for calories.

For a majority of the subjects, meals were planned by themselves or by their mother or grandmother. Breakfast was the meal most often missed, with almost half of the participants missing the meal at least

once a week. The foods most often reported to be disliked were spinach and liver. Although almost all of the participants reported drinking milk, reported intake in the 24-hour recalls was low. The majority of subjects reported taking both a multi-vitamin and mineral supplement and an iron supplement at some time during their pregnancy. The physical ailments reported most often were nausea and headaches. Some evidence of edema was also seen.

Few subjects appeared to have an understnading of the role of nutrition in affecting the outcome of pregnancy. Half of the subjects indicated that "junk" foods were foods which should be avoided during pregnancy, but only 35 percent of the subjects named foods from all of the Basic Four food groups as foods which should be consumed.

Only four subjects practiced pica, with refrigerator frost and dirt reported to be the substances consumed. Alcohol consumption appeared to be minimal. Cigarette smoking was reported by one-fourth of the subjects. The major sources of nutrition information reported were parents nutritionists. Television, magazines, and school were also primary sources named. Most of the subjects indicated they planned to bottle-feed rather than breast-feed their babies.

Conclusions

The researcher made the following recommendations for nutrition education for prenatal services for pregnant American Indian adolescents in Oklahoma:

1. A complete and detailed 24-hour dietary recall, using food models, should be administered on the first visit to identify nutrients in the diet which are missing or consumed in low

amounts. The recall should be repeated on successive visits if possible.

2. A nutrition education program should be implemented to assist pregnant adolescents in adapting their dietary habits to include foods which are excellent sources of calcium.
3. Information regarding nutrition and its relationship to the outcome of pregnancy, utilizing a variety of media, should be provided for pregnant adolescents and their families.
4. The lactose intolerance test should be performed whenever an adolescent reports discomfort or illness upon consumption of milk or milk products.
5. The Indian Health Service should continue to provide opportunities for health professionals to attend in-service training in nutrition and nutrition education.

The researcher made the following recommendations for further research:

1. A comprehensive nutritional status study of pregnant American Indian adolescents utilizing biochemical, dietary, anthropometric, and clinical data would prove to be useful in further developing prenatal services for this population.
2. A comparison of the nutritional status of reservation pregnant American Indian adolescents and non-reservation pregnant American Indian adolescents would provide additional information regarding the dietary habits of this population.

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APPENDIXES

APPENDIX A

AGREEMENT WITH INDIAN HEALTH SERVICE

AGREEMENT BETWEEN

OKLAHOMA STATE UNIVERSITY

DEPARTMENT OF FOOD, NUTRITION

AND INSTITUTION ADMINISTRATION

AND

INDIAN HEALTH SERVICE

FOR A STUDY TO DETERMINE

DIETARY INTAKE AND FOOD PATTERNS

OF PREGNANT AMERICAN INDIAN

ADOLESCENTS IN OKLAHOMA

This agreement made and entered into this 23rd day of February, 1981, between Oklahoma State University, College of Home Economics, Food, Nutrition and Institution Administration (FNIA) Department, and Indian Health Service (IHS), Oklahoma City, is for the purpose of identifying the parameters of a study to determine the dietary intake and food patterns of pregnant American Indian adolescents in Oklahoma.

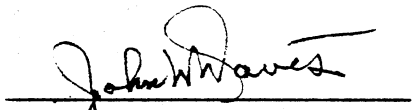
The FNIA Department will work cooperatively with the IHS at each stage of the research study, and will direct and advise one M.S. graduate student throughout the study. The objectives of the study are as follows:

1. To assess the adequacy of selected nutrients of pregnant American Indian adolescents in Oklahoma as compared to the Recommended Dietary Allowances.
2. To compare the caloric intake of pregnant American Indian adolescents in Oklahoma with that recommended for pregnancy in this age group.
3. To compare the hemoglobin and hematocrit levels of pregnant American Indian adolescents in Oklahoma with those recommended for this age group during pregnancy.
4. To identify the correlation of food patterns and dietary intake of pregnant American Indian adolescents in Oklahoma.
5. To make suggestions and recommendations for developing future nutrition education programs for pregnant American Indian adolescents in Oklahoma.

To determine nutrient and caloric intake, a 24-hour dietary recall will be administered to each pregnant adolescent and analyzed for total calories, protein, calcium, iron, vitamin A, thiamin, riboflavin, niacin, and vitamin C content. Each diet will be evaluated according to the nutrient levels recommended for pregnant adolescents.

A modification of the prenatal nutrition questionnaire currently used by IHS will also be administered. Information obtained will be used to identify the correlation of food patterns and dietary intake of this group. The chief nutritionist, IHS, will make the initial contacts to the public health nutritionists and dietitians in Oklahoma, who will administer the 24-hour recall and the questionnaire. In those areas which have no dietitian or nutritionist to collect the data, the researcher will collect the data. Data will be collected during the spring of 1981. A copy of the research findings shall be submitted to the IHS and the researcher shall have IHS approval prior to any publication in a professional journal. Only information or data from the group as a whole will be used. No individual reporting will be done on any particular tribe or person. The subjects will be at no risk.

Esther Winterfeldt, Ph.D., R.D.
Head, FNIA Department
Oklahoma State University
Stillwater, OK 74078



John W. Davis, Area Director
Okla. City Area Indian Health Service

APPENDIX B

QUESTIONNAIRES

Chart Number _____ Today's Date: _____

PRENATAL NUTRITION QUESTIONNAIRE

INSTRUCTIONS

Record the client's chart number at the top of the questionnaire in the left-hand corner. Ignore the first two items, subject number and card number. Begin with numbers 5-7, and record the hemoglobin value from the patient's chart and the date the value was originally taken. Record the hematocrit value and the date taken for numbers 8-9. In the next two lines, record age and tribe. Beginning with number 12, circle the correct response in the left-hand column.

For questions 33-37, 51-55, 70-75, and 76-80, please fill in the response and then categorize it by food groups. For example, for question 33-37, if the client responds milk, write in milk in the blank provided and circle number 1 in the left-hand column to correspond to the Milk Group.

1-3. Subject Number

4. Card Number

Start Here 5-7. Hemoglobin _____ Date Taken _____

8-9. Hematocrit _____ Date Taken _____

10-11. Age ____

Tribe _____

1 2 3 4 5 12. Marital status: Single=1 Married=2 Divorced=3 Widowed=4 Separated=5

1 2 3 4 5 6 7 8 9 13. Months now pregnant

1 0 14. Is this your first pregnancy? Yes=1 No=2

Before this pregnancy, what was your usual weight? Pounds _____ Don't know ____

0 1 2 3 15. Have you ever had trouble with your weight during pregnancy? No=0
If yes, what kind? Overweight=1 Underweight=2 Other=3

1 2 3 4 5 16. How much weight do you think you should gain during pregnancy? 0-5 pounds=1 6-10 pounds=2 11-15 pounds=3 16-20 pounds=4 21-25 pounds=5

1 2	17.	How would you describe your eating habits? Regular=1 Irregular=2
1 2 3	18.	How would you describe your appetite? Hearty=1 Regular=2 Irregular=3
0 1 2 3 4 5 6 7	19.	How many days do you eat breakfast each week?
0 1 2 3 4 5 6 7	20.	How many days do you eat lunch each week?
0 1 2 3 4 5 6 7	21.	How many days do you eat dinner (supper) each week?
0 1 2 3 4 5 6 7 8 9	22.	Are you presently in school? No=0 If yes, what is your present grade level? 5th=1 6th=2 7th=3 8th=4 9th=5 10th=6 11th=7 12th=8 Other=9
0 1 2 3 4 5	23.	If you are presently in school, do you eat the lunch provided there? No=0 If yes, how many days each week?
1 2 3 4 5 6 7 8	24.	If you are not in school, what was the last grade you completed? 6th=1 7th=2 8th=3 9th=4 10th=5 11th=6 12th=7 Other=8
0 1 2	25.	If you are not in school, do you plan to return at a later date? Yes=1 No=0 Haven't decided=2
1 0	26.	Are you now on a diet to lose weight? Yes=1 No=0
0 1 2 3 4 5	27.	Are you on a special diet? No=0 If yes, what kind? Diabetic=1 Gallbladder=2 Low Salt=3 Low Calorie=4 Other=5
0 1 2 3 4 5	28-32.	Were you ever on a special diet? No=0 If yes, what kind? Diabetic=1 Gallbladder=2 Low Salt=3 Low Calorie=4 Other=5
0 1 2 3 4 5	33-37.	Is there any kind of food you cannot eat or drink because it makes you sick or uncomfortable? No=0 If yes, what food(s)? _____ Milk Group=1 Fruit & Vegetable Group=2 Protein Group=3 Bread & Cereal Group=4 Other=5
1 2 3 4 5 6	38-43.	What happens when you eat this food? Stomach ache=1 Gas=2 Heartburn=3 Vomiting=4 Headache=5 Other=6
0 1 2 3 4 5	44.	When you eat fried or fatty foods, do you get a pain in your stomach or between your shoulder blades? No=0 If yes, how often? Very frequently=1 Frequently=2 Often=3 Seldom=4 Never=5
1 2 3 4 5 6 7 8	45.	Do you drink milk? If yes, how many glasses a day? ½-1 glass=1 2 glasses=2 3 glasses=3 4 glasses=4 5 or more glasses=5 If not, why not? Makes you ill=6 Don't like it=7 Other=8

If not, do you eat other dairy products, such as:

1 0 46. Cheese Yes=1 No=0
1 0 47. Cottage Cheese Yes=1 No=0
1 0 48. Sweet Acidophilous Yes=1 No=0
1 0 49. Yogurt Yes=1 No=0
1 0 50. Ice cream/sherbet/ice milk Yes=1 No=0

0 1 2 3 4 5 51-55. What food (s) do you dislike? _____
None=0 Milk Group=1 Fruit & Vegetable Group=2
Protein Group=3 Bread & Cereal Group=4 Other=5

Do you eat things that are not food, such as:

1 0 56. Clay Yes=1 No=0
1 0 57. Cornstarch Yes=1 No=0
1 0 58. Refrigerator frost Yes=1 No=0
1 0 59. Other Yes=1 No=0

1 2 3 4 60. Who usually plans the meals in your household?
Mother and/or Grandmother=1 Sibling=2 Self=3
Other=4

1 2 3 4 61. Who usually buys the food in your household?
Mother and/or Grandmother=1 Sibling=2 Self=3
Other=4

1 2 3 4 62. Who usually prepares the meals in your household?
Mother and/or Grandmother=1 Sibling=2 Self=3
Other=4

1 2 3 4 5 6 7 63. When you are thirsty, what do you usually drink?
Soda pop=1 Beer=2 Water=3 Coffee or tea=4
Milk=5 Fruit or vegetable juice=6 Other=7

0 1 2 3 4 5 6 7 64. Do you drink water? No=0
If yes, how many glasses a day?

What kitchen equipment do you have at home?

1 0 65. Refrigerator Yes=1 No=0
1 0 66. Oven Yes=1 No=0
1 0 67. Hot Plate Yes=1 No=0
1 0 68. Other Yes=1 No=0

1 2 69. What kind of drinking water do you have at home?
City water=1 Well water=2

0 1 2 70. Do you work outside your home? No=0
If yes, full time or part time? Full time=1
Part time=2

What are your working hours? _____

0 1 2 3 4 5 71-76. Do you believe there are some foods you should eat when you are pregnant? No=0
If yes, what food(s)? _____
Milk Group=1 Fruit & Vegetable Group=2
Protein Group=3 Bread & Cereal Group=4 Other=5

0 1 2 3 4 5	77-5.	Do you believe there are some foods pregnant women should not eat? No=0 If yes, what food(s)? _____ Milk Group=1 Fruit & Vegetable Group=2 Protein Group=3 Bread & Cereal Group=4 Other=5
		Are you receiving any of the following?
1 0	6.	Food Stamps Yes=1 No=0
1 0	7.	WIC Vouchers Yes=1 No=0
		Do you now take or have you taken at any time during your pregnancy any of the following:
1 0	8.	Iron Pills Yes=1 No=0 Brand _____
1 0	9.	Vitamins and Minerals Yes=1 No=0 Brand _____
1 0	10.	Birth Control Pills Yes=1 No=0
1 0	11.	Pills not prescribed by a doctor Yes=1 No=0
1 0	12.	Pills to lose weight Yes=1 No=0 Brand _____
1 0	13.	Pills to lose body water Yes=1 No=0 Brand _____
		Do you have any of the following problems:
1 0	14.	Constipation Yes=1 No=0
1 0	15.	Diarrhea Yes=1 No=0
1 0	16.	Heartburn Yes=1 No=0
1 0	17.	Vomiting Yes=1 No=0
1 0	18.	Nausea Yes=1 No=0
1 0	19.	Indigestion Yes=1 No=0
1 0	20.	Headaches Yes=1 No=0
1 0	21.	Headaches with black spots before your eyes Yes=1 No=0
1 0	22.	Swollen feet Yes=1 No=0
1 0	23.	Swollen hands Yes=1 No=0
1 0	24.	Swollen face Yes=1 No=0
0 1 2 3 4	25.	Do you smoke? No=0 If yes, how many cigarettes a day? Less than 1 pack=1 1-2 packs=2 3-4 packs=3 More than 4 packs=4
		Do you have any of the following problems with your mouth:
1 0	26.	Mouth sores Yes=1 No=0
1 0	27.	Sore gums Yes=1 No=0
1 0	28.	Toothache Yes=1 No=0
1 0	29.	Other Yes=1 No=0
0 1 2 3 4 5	30.	Do you drink alcoholic beverages such as beer, wine, and liquor? No=0 If yes, how often? Every day=1 At least once a week, but not every day=2 At least once a month, but less than once a week=3 More than once a year, but less than once a month=4 Once a year or less=5
		If yes, what alcoholic beverages do you drink?
1 0	31.	Beer Yes=1 No=0
1 0	32.	Wine Yes=1 No=0
1 0	33.	Liquor Yes=1 No=0

0 1 2 3 4 5	34.	How much alcohol do you usually drink at one time? Less than 1 can/glass/drink=1 None=0 1-2 cans/glasses/drinks=2 3-4 cans/glasses/drinks=3 5-6 cans/glasses/drinks=4 Over t cans/glasses/drinks=5
0 1 2 3 4	35.	How many children do you have?
1 2 3 4	36-39.	What were the weights of your previous babies? Less than 5 pounds=1 5-6 pounds=2 7-8 pounds=3 9 pounds or more=4
1 2 3 4 5	40.	How do you plan to feed your upcoming baby? Breastfeed=1 Ready Prepared Formula=2 Homogenized Milk=3 Have Not Decided=4 Don't Know=5
0 1 2	41.	Do you believe fat babies are healthy? Yes=1 No=0 Don't know=2
		What is your source(s) of nutrition information?
1 0	42.	Parents Yes=1 No=0
1 0	43.	Grandparents Yes=1 No=0
1 0	44.	Nutritionist Yes=1 No=0
1 0	45.	Dietitian Yes=1 No=0
1 0	46.	Nurse Yes=1 No=0
1 0	47.	Doctor Yes=1 No=0
1 0	48.	School Yes=1 No=0
1 0	49.	Friends Yes=1 No=0
1 0	50.	Television Yes=1 No=0
1 0	51.	Magazines Yes=1 No=0
1 0	52.	Newspapers Yes=1 No=0
1 2 3 4 5 6 7 8	53.	With whom do you live? Parents=1 Grandparents=2 Both parents and grandparents=3 Husband=4 Alone=5 Husband, parents and grandparents=6 Friends=7 Other=8
1 2 3 4 5 6 7 8	54.	With whom do you normally eat most meals? Parents=1 Grandparents=2 Both parents and grandparents=3 Husband=4 Alone=5 Husband, parents, and grandparents=6 Friends=7 Other=8

INSTRUCTIONS FOR THE 24-HOUR DIETARY RECALL

First, ask the patient whether the previous day consisted of a "typical" meal pattern for her. If it did not, then ask her to give you a typical day's menu. If the foods consumed in the previous 24 hours were typical foods, then ask the patient to tell you everything she ate and drank at home and away, such as at school, at work, at a friend's house, etc.

-In the left-hand column on the recall sheet, under Food Item and Description, begin recording each food item consumed and how it was prepared. Be as exact as possible. For example:

Meat, Poultry, and Fish- indicate if it was baked, fried, stewed, etc.

Eggs- indicate if they were boiled, fried, scrambled, or poached

Fruit- indicate if it was fresh or canned

Vegetables- indicate if they were fresh, canned, or frozen, or if they were eaten raw

Milk- indicate if it was whole, 2%, nonfat, or nonfat dry

Cereals- list brand names whenever possible

Cookies and Desserts- indicate if they were homemade or purchased. If purchased, list brand names whenever possible

Coffee and Tea- indicate if sugar, honey, nondairy creamer, or milk was added

Carbonated Beverages- indicate whether regular or diet soda was consumed

Beer- indicate whether regular or "lite" beer was consumed

If any "fast foods" were eaten, list the food item and the name of the fast food establishment where the food was purchased, such as MacDonald's Big Mac hamburger. Be sure to list all sauces and condiments consumed, such as catsup, mayonnaise, salad dressing, margarine, sugar, and gravy.

-In column b, record the time the food was consumed and the location.

-In column c, record the amount eaten. It is very important to record as accurate an amount as possible. Make use of food models, measuring cups and spoons, and anything else you have available to you that might help the patient to estimate a more exact quantity of food eaten. Record quantities in household units, such as teaspoons, tablespoons, ¼ cup, ½ cup, etc. For meats, use either ounces or serving pieces, such as chicken, fried, 1 leg. For snack foods, such as chips, record either the number eaten, such as 10 chips, or the weight consumed, such as 3 ounces. For candy bars, record the size as small, medium, or large, since the weight is not likely to be known.

Chart No. _____

24-HOUR DIETARY RECALL

_____Is this a record of what was eaten all day yesterday?

_____OR Is it a record of what the patient would choose as typical meals and snacks in a day?

Complete columns a through c ONLY — Columns d through f for computer use only

a. Food Item and Description (How Prepared)	b. Time and Where Eaten	c. Amount Eaten	d. Amount in Appendix A	e. Code No. Appendix A	f. Multiple
First Meal:					
Second Meal:					
Third Meal:					
Snacks:					

APPENDIX C

LOCATION OF INDIAN HEALTH SERVICE CLINICS AND NAMES OF IHS EMPLOYEES PARTICIPATING IN THE STUDY

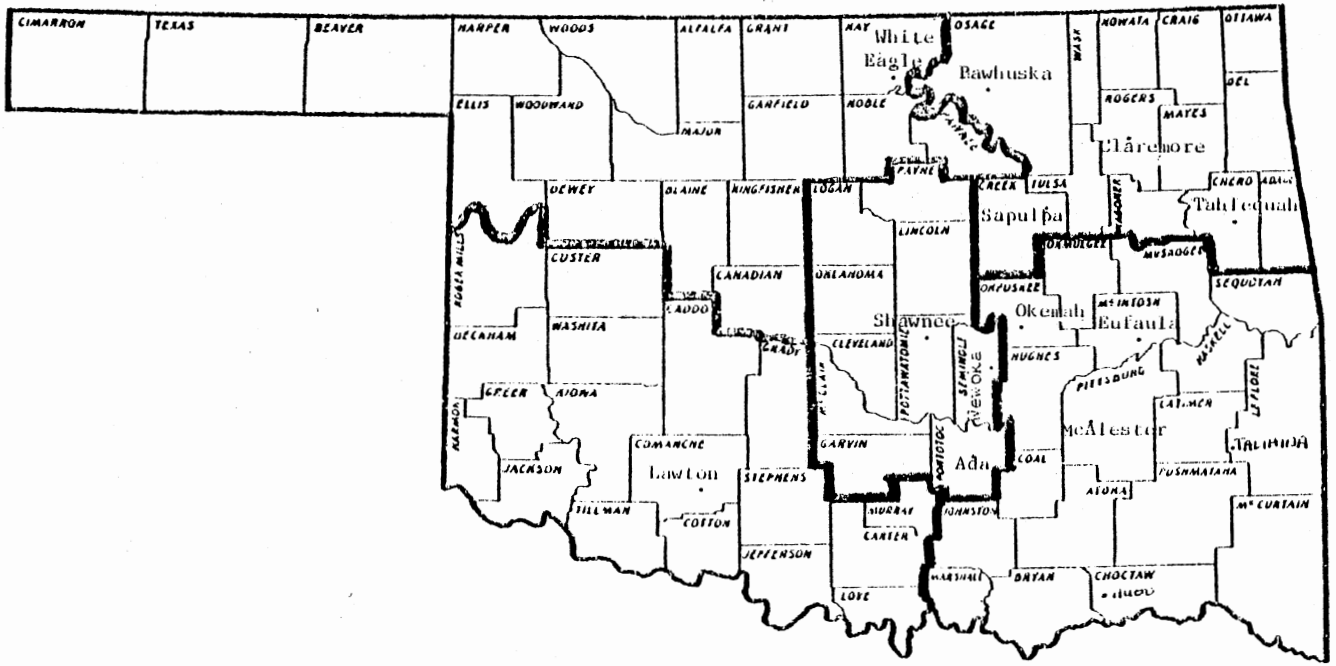


Figure 1. Location of Clinics Sampled in Oklahoma

OKLAHOMA AREA NUTRITION BRANCH
OKLAHOMA INDIAN HEALTH SERVICE

Miss Ruth Hembekides,
R.D., M.S., M.P.H.
Chief, Area Nutrition Branch
Oklahoma City Area, IHS
388 Old Post Office & Courthouse Bldg.
Oklahoma City, OK 73102

Miss Juanita L. Bradley, R.D.
Chief, Area Dietetics Branch
Oklahoma City Area, IHS
Oklahoma City 73102

Miss Ruth Ritter, R.D., M.S.
Service Unit Nutritionist
PHS Indian Health Center
P.O.B. 5 - White Eagle
Ponca City, OK 74601

Mr. Don Simone, R.D.
Chief Dietitian
PHS Indian Hospital
Lawton, Oklahoma 73501

Miss Rose Keshishian, R.D., M.S.
Public Health Nutritionist
PHS Indian Health Center
P.O.B. 1475
Wewoka, OK 74884

Mrs. Helen Morgan, R.D., M.S.
Service Unit Nutritionist
PHS Indian Hospital
Claremore, OK 74017

Mrs. Frances Alexander, R.D., M.S.
Public Health Nutritionist
PHS Indian Health Center
P.O.B. 1498
Miami, OK 74345

Miss Janet Marie Taylor
Service Unit Nutritionist/
Dietitian
PHS Indian Hospital
Clinton, OK 73601

Irene Brown
Clinic Nurse
PHS Indian Hospital
Shawnee, OK 74801

LeVoe Maxwell
Public Health Nurse
PHS Indian Hospital
Shawnee, OK 74801

Miss Christine Mathiesen, R.D., M.S.
PH Nutritionist
PHS Indian Health Center
P.O.B. 340
Hugo, OK 74743

Miss Kathryn Willett, R.D., M.S.
Pawhuska Indian Health Center
P.O.B. 297
Pawhuska, OK 74056

Miss Inistore Godfrey, R.D., M.S.
Service Unit Nutritionist
PHS Indian Health Center
901 East Monroe Street
McAlester, OK 74501

Miss Maxine Barnett
Nutrition Technician
PHS Indian Health Center
Eufaula, OK 74432

Mrs. Jan Kelly, R.D.
Chief Dietitian
PHS Indian Hospital
Talihina, OK 74571

Mrs. Nadine Mahaney, R.D.
Chief Dietitian
Tahlequah, OK 74464

Nakita Lawley
Clinic Dietitian
PHS Indian Hospital
Claremore, OK 74017

Diane Sharp
Community Health Nurse
PHS Indian Hospital
Ada, Ok 74820

Helen Coon
PHS Indian Hospital
Okemah, OK 74859

APPENDIX D

HEMOGLOBIN AND HEMATOCRIT VALUES AND IRON INTAKE OF SUBJECTS BY TRIMESTER

TABLE XIII

HEMOGLOBIN AND HEMATOCRIT VALUES
AND IRON INTAKE BY TRIMESTER

FIRST TRIMESTER		
Hemoglobin Value (g/100 ml)	Hematocrit Value (%)	Iron Intake (mg)
-	34.0*	4.8
11.2	35.0*	26.1
11.7	36.0*	12.5
13.0	40.0	18.5
-	40.0	8.1
13.1	-	14.9

SECOND TRIMESTER		
Hemoglobin Value (g/100 ml)	Hematocrit Value (%)	Iron Intake (mg)
10.4*	33.0*	9.8
10.6	33.0*	16.1
11.0	32.2*	17.4
11.0	33.2*	17.8
11.4	33.0*	20.9
11.5	34.6*	14.3
11.5	-	18.6
11.6	34.0*	7.8
11.6	33.1*	10.4

TABLE XIII (Continued)

Hemoglobin Value (g/100 ml)	Hematocrit Value (%)	Iron Intake (mg)
11.9	37.0	4.4
11.9	37.0	11.5
11.9	33.8*	6.5
11.9	32.5*	9.7
12.0	36.5	12.0
12.6	37.8	19.0
12.6	38.0	10.9
12.8	-	18.0
13.1	-	21.9
13.1	39.0	11.4
13.1	38.0	14.6
13.3	38.6	17.4
13.4	39.2	14.9
13.6	-	14.4
13.8	39.0	15.8
14.1	41.4	10.5
-	39.0	13.3
-	36.0	5.9
-	34.0*	14.3
-	36.6	12.8
-	35.5	11.7

TABLE XIII (Continued)

THIRD TRIMESTER		
Hemoglobin Value (g/100 ml)	Hematocrit Value (%)	Iron Intake (mg)
10.8	-	11.9
11.2	27.5*	16.9
11.2	31.8*	4.8
11.4	32.2*	5.6
11.6	33.0	10.4
11.9	34.5	13.6
12.0	36.5	12.0
12.2	36.5	10.5
12.7	36.0	15.8
12.7	36.0	20.3
12.7	39.0	10.6
12.9	-	6.7
13.1	39.0	11.6
13.4	-	15.6
-	33.0	10.9
-	33.0	19.9
-	38.0	16.2
-	35.0	10.8
-	37.0	8.8

*levels are below acceptable standard levels

VITA

Denise Ann Graven

Candidate for the Degree of

Master of Science

Thesis: DIETARY INTAKE AND FOOD PATTERNS OF PREGNANT AMERICAN INDIAN ADOLESCENTS IN OKLAHOMA

Major Field: Food, Nutrition, and Institution Administration

Biographical:

Personal Data: Born in Cushing, Oklahoma, March 13, 1956, the daughter of Clair and Alma Graven.

Education: Graduated from Ponca City High School, Ponca City, Oklahoma, in May, 1974; received Bachelor of Science in Home Economics degree from Oklahoma State University in 1979; studied at Oklahoma State University from 1979 to 1981; completed the requirements for the Master of Science degree at Oklahoma State University in July, 1981.

Professional Experience: Graduate Research Assistant in the Food and Nutrition Department of Cooperative Extension, Oklahoma State University, Stillwater, Oklahoma, 1979-1980; Instructor for the Basic Human Nutrition Correspondence Course, Food Nutrition, and Institution Administration, Oklahoma State University, 1980-1981. Graduate Teaching Assistant in the Department of Food, Nutrition, and Institution Administration Departments, Oklahoma State University, Stillwater, Oklahoma, 1980-1981.

Professional Organizations and Honors: Student member of the American Dietetic Association; recipient of Graduate Fee Waiver Scholarship, 1980-1981.