

CALCIUM AND IRON INTAKE OF A GROUP OF
PREGNANT AND NON PREGNANT GIRLS IN
TWO COUNTIES OF OKLAHOMA

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CHAPTER I

INTRODUCTION

Many girls become pregnant during adolescence when nutritional requirements are high for physical growth. Nutritional inadequacies are often encountered which are more pronounced when the teenager is also from a low income background. The stress that pregnancy imposes on the body with the added stress of the adolescent's physical growth leads to increased nutritional needs. The nutritional status of a girl when she becomes pregnant is an important factor not only in the outcome of her pregnancy, but also in adequate physical development for her future health maintenance needs.

Eating patterns of teens are often influenced by peers, images of "beautiful thin" bodies, as well as by poor examples set in the family environment. Food acceptance or non acceptance as determined by food likes and dislikes may also influence the type and amounts of nutrient intakes by teenagers.

Iron and calcium, two of many nutrients essential for adequate growth and development during adolescence and for growth of the fetus, are especially critical during pregnancy. Further, these two minerals have been identified in national surveys as deficient in the diets of many teenagers (1,2,3). These findings have been substantiated in several studies including one multi-state study conducted on Southern adolescent girls (4). Additional findings in this study included

identification of food sources of nutrients in the girls' diets (5).

Calcium is an essential nutrient for adolescent growth and pregnancy. Approximately 30 gms of calcium is accumulated in the mother's body during pregnancy, and nearly all of this amount is needed for fetal skeletal growth. Although most of the accumulated amount of calcium is needed in the last trimester for the period of accelerated growth of the fetus, an increase of 400 mg of calcium intake is recommended daily through the entire prenatal period (6). Calcium is stored in the mother's body and is used as needed for fetal development. Diets deficient in calcium can result in decreased bone density in the infant, and a diet less than the recommended 1200 mg for an adult pregnant woman can cause calcium loss from the mother's bones (7).

During adolescence, the bones increase in length and diameter, and calcium retention may be as high as 300 mg per day (8). To help cover the added needs of the accelerated growth period, daily calcium intake recommendations are increased from 800 mg to 1200 mg for ages 11 through 18 (6). Calcium is an important nutrient for every adolescent, but with the added burden of pregnancy with the adolescent girl's still developing body, the recommendation for calcium increases by 400 mg to a total of 1600 mg per day. Because of the limited food sources of calcium, special attention to food selection is necessary for the pregnant adolescent in order to meet this recommended level of intake.

A mother's iron needs during pregnancy include sufficient amounts to cover her basal losses which may include losses through skin and gastrointestinal tract (about 240 mg), the increase in her red cell mass (about 500 mg), and the requirement of the fetus and placenta (about

300 mg). Thus the total iron requirement for pregnancy can be estimated at about 1000 mg. The distribution of needs for iron during the term of pregnancy vary, although increased needs develop chiefly in the last half of pregnancy because of the rapid growth of the fetus. In determining daily needs for iron during pregnancy, a basis of 3.5 mg of iron per day for net absorption is recommended, which would indicate an increase of approximately 30 mg of iron per day over the non pregnant recommended amount (6). The RDA recommendation for pregnancy is for 30 to 60 mg of iron in addition to the daily intake of 18 mg for non pregnant females (6). The habitual American diet provides an average intake of 6 mg per 1000 calories, making it extremely difficult to obtain this amount of iron by diet and requiring supplements.

Teenagers' diets which are traditionally high in fast foods and snack items which appear to provide a substantial contribution to caloric, fat, sugar and sodium content of the daily diet but provide little toward iron needs. Beginning at age 11, the RDA for iron is increased from 10 mg to 18 mg to aid in meeting the increased blood volume and other requirements during their accelerated growth period, as well as covering blood losses due to menstrual periods. The foods which are good sources of iron and food combinations enhancing iron absorption are often overlooked by teenagers and need to be emphasized in nutrition education not only for the pregnant teenage girl, but also the non pregnant teenage girl.

The teenage pregnancy rate in Oklahoma is high. According to Oklahoma Department of Health Statistics the 1984 birth rate for mothers between ages 15 and 19 was 75.1 births per 1000 population (9). This rate is 42% higher than the latest (1982) U. S. rate, which was

52.9 births per 1000 population, and it is estimated that one Oklahoma girl out of eight will have a live birth or a fetal death before her 18th birthday (9). Concern for the nutritional status of pregnant teenagers must be extended to those presently not pregnant, as there is no reason to believe that Oklahoma teenagers' diets differ from others in other areas of the United States in demonstrating nutritional deficiencies.

In this study dietary intakes among a group of pregnant and non pregnant teenage girls from two rural areas of Oklahoma will be compared for adequacy of calcium and iron. Factors possibly influencing their food intakes will also be noted. The present study was undertaken in order to gain knowledge concerning food intakes of teenage girls in two counties of Oklahoma where teenage pregnancy rates are high and to make recommendations for nutritional education programs directed to their needs.

Purpose and Objectives

The purpose of this study was to determine the adequacy of calcium and iron in the diets of a group of pregnant and non pregnant teenagers living in two rural communities in Oklahoma.

The following objectives were developed for this study:

1. To determine if there are inadequacies of calcium and iron in the diets of a group of pregnant teenagers living in two rural communities of Oklahoma, and compare intakes to the 1980 Recommended Dietary Allowances.
2. Compare the calcium and iron intakes of the pregnant teens with calcium and iron intake of non pregnant teens.

3. Relate the adequacy of calcium and iron intakes in the diet to:
 - a. foods not liked
 - b. age differences
4. Make recommendations for nutrition education programs based on study findings.

Hypotheses

1. There will be no differences in calcium and iron intake between pregnant and non pregnant teenagers.
2. There will be no positive correlation between other variables, related to foods not liked and age differences, and adequacy of calcium and iron intakes.

Assumptions and Limitations

It is assumed that respondents will provide information fully and truthfully.

The following limitations were recognized:

1. The data sampled cannot be generalized to the entire teenage population, because the selection of subjects and area studied did not constitute a random sample.
2. The time to complete the questionnaire and 24 hour recall was limited due to clinic schedules.
3. The nutritional status for this study indicates only the proximity of the nutrient intake to the RDA, and involves no laboratory or anthropometric measurements.

Definitions

Adequate Dietary Intake - Consumption of three-fourths to one hundred percent of the 1980 Recommended Dietary Allowances for any nutrient.

Family Planning Program - Services provided primarily through local health departments in conjunction with the State Department of Health and the Community Action Agencies, and are concerned with the regulation and detection of conception and provide medical examination diagnosis or treatment by a clinic physician, medical or laboratory tests under the supervision of a physician. Counseling or consultation is also provided, and includes nutrition counseling.

Pregnant Teenagers - Girls between the ages of 14 and 19 who are between one and nine months pregnant.

WIC - U. S. Department of Agriculture's special Supplemental Food Program for Women, Infants, and Children, administered by its Food and Nutrition service. The objective is to improve the health of pregnant and lactating women, infants, and preschool children considered to be at special nutritional risk.

CHAPTER II

REVIEW OF LITERATURE

A review of literature was conducted to gain information on nutrition and physical growth needs of teenagers, on calcium and iron intakes and on other nutritional status studies pertaining to adolescents.

Nutrition and Physical Growth

Adolescence is a period of accelerated physical growth in which maximum acceleration is observed just before sexual maturation. For girls the average adolescent growth spurt begins at age 10 or 11, reaches its peak at 12, and is completed at about 15. Prominent growth changes are noted in lean and non lean body mass, height, weight and development of secondary sexual characteristic.

Socioeconomic status is thought to play an important role in the growth of the adolescent. Osofsky et al. (10) found that children from low income families frequently are shorter than those of higher income families and they concluded that limited intakes of food may be compromising their growth potential. Daniel (11) stated that the body size of children from different socioeconomic levels but of the same chronologic age, differed in maturation level. He found that those of higher income groups were more advanced in maturation than their lower income counterparts. He also stated that in addition to nutritional differences some other possible factors influencing body size might be

variations related to ethnic and cultural customs, intelligence levels of parents (as shown in securing health care for their children), and the "typical patterns" of child rearing among low and high socioeconomic family groups. Physical differences found in populations are the result of both environmental and genetic interactions. Genetic factors may predispose an individual or group toward greater sensitivity to environmental factors that may not affect other children in the same manner. Thus during a period of famine, the growth of all children may be retarded, but all will not be affected to the same degree because of genetic differences.

Optimal nutrition for female teenagers is of particular importance for developmental and physical maturation as well as for meeting physical stress when pregnancies occur in this age group. With inadequate nutrients, teenagers not only have suboptimal allowances for their own body growth, but are not equipped with sufficient nutritional reserves for their future infants. Repeated pregnancies are frequent in the lower income families. Polit and Kahn (12) found in their studies more than half of disadvantaged teenagers who had babies were pregnant again within two years. According to Oklahoma statistics (9), an estimated 38% of teenagers in Oklahoma who have babies will give birth to another child before their 20th birthday.

Calcium

Calcium is the most abundant mineral in the body. Ninety-nine percent of the total calcium in the body is found in the skeleton and teeth, and the remaining one percent is present in blood, other body fluids, and various soft tissues where it serves a number of regulatory

functions (6). Calcium in bones serves as a reserve for maintaining constant blood levels. Thus when intake is not sufficient or absorption not efficient, or at times of special demands on the body (such as stress), calcium may be lost from bones in an effort to meet other body demands. Everson (13) states that calcium storage may be affected during periods of great emotional stress. Balance studies done on three unwed pregnant teenage girls receiving generous intakes of calcium, noted that the two subjects who were very disturbed by their condition were in negative calcium balance part or most of the time whereas the one girl who appeared to be emotionally secure stored calcium in a normal manner.

Approximately 10% to 30% of dietary calcium is absorbed in the acid environment of the proximal duodenum of the small intestine by an active transport system. Normally 70% to 90% of the calcium consumed in the diet is excreted in the feces. Urinary calcium excretion varies among individuals, and dietary intake has little effect on the quantity (6).

Several factors influence absorption of calcium from the intestinal tract. An acid environment, the presence of lactose, ascorbic acids and vitamin D all promote absorption. On the other hand, oxalic acid, phytic acid and an alkaline medium tend to decrease the absorption of calcium (6). Phosphorus may enhance calcium retention by reducing urinary calcium while having little, if any, effect on the absorption of calcium (14). Calcium absorption and retention becomes more efficient as the body's needs are increased.

Calcium Needs for Growth

During the girl's growth spurt between ages 11 and 15, approximately 20% of linear height and 50% of the ideal body weight are gained (15). Linear skeletal growth is most obvious during adolescence, and calcium and phosphorus, the main constituents for normal skeletal development, must be adequately provided. Calcium retention may be as high as 300 mg per day with a yearly increase as high as 90 gms (8). Low calcium intakes during the growth spurt may decrease peak bone mass, which is not normally reached until the third decade of life (15,16). Calcium intake of adolescents tends to decline with increasing age (17,18).

Calcium Needs During Pregnancy

During pregnancy, the accumulation of calcium is approximately 30 gms, nearly all of which is needed for fetal skeletal growth. The rapid increase of skeletal mass of the fetus during the last trimester of term demands an accelerated withdrawal from the mother's calcium stores. Her stores of calcium have been accumulated throughout her pregnancy and any reserve is in the bones.

Allen (19) states that an increased efficiency of calcium absorption has been demonstrated in pregnant animals, but little work has been done on calcium metabolism in pregnant and lactating humans. A later study by Allen (15), indicates absorption efficiency may be doubled by mid pregnancy. Whitney, Cataldo and Rolfes (7) state that later in pregnancy when the fetal bones begin to calcify and calcium stores from the mother's bones are drawn upon, if the mother has had an intake of less than 1200 mg of calcium daily, she will probably be losing more calcium from her bones than is stored.

RDA for Calcium

The RDA for calcium increases from 800 mg for girls at age 10 to 1200 mg for girls aged 11 to 19. This increase is due to the added needs for calcium during the accelerated growth period of adolescence. An additional 400 mg is needed for pregnancy, thus increasing the recommended amount to 1600 mg for a pregnant teenager.

Many intake studies show low calcium intake during adolescence (4,10,17,20). Pregnancy appears to have an effect on the amount of dietary calcium consumed when compared to intakes after pregnancy in a study conducted by King et al. (21). There appears to be an attempt to improve the quality of adolescents' diets during pregnancy. However the average calcium intake for the pregnant girls in their study was 800 mg, and although below the RDA for pregnant adolescents it was above the 400 mg of the average non pregnant teenage girl. It was also noted that vitamin and mineral supplements were not consistently taken by the pregnant teenagers.

Age appears to be an important factor in calcium intake. Milk and milk products appear to be more acceptable to younger teens than to the older teens (18,22,23). National surveys also indicate that lower intakes of calcium are noted as age increases in the teenage years (1,2,3).

Iron

Iron is a metallic ion whose central role in the body is to transport oxygen and electrons. Iron forms a functional part of hemoglobin, cytochromes, iron-sulfur protein, and many enzymes (7). Only about 10% to 30% of the iron ingested is absorbed, however the amount of iron

absorbed depends on 1) the body's need for iron, 2) amount and chemical nature of the iron in ingested foods, and 3) enhancing and inhibiting factors.

Dietary iron is present as heme and non heme iron. Heme iron, found in meat, is the most easily absorbed. The proportion of heme iron in animal tissue varies, but an average of 40% of the total iron in all tissue is used for calculating heme iron intake. Non heme iron is present in the remaining 60% of iron in animal tissue, and in eggs, dairy products and plant foods such as vegetables and grain and is not as easily absorbed by the body. Non heme iron absorption can be enhanced when ascorbic acid and animal tissue are consumed in the same meal. Absorption of non heme iron may be inhibited by consumption of tea, egg yolk, phytates, calcium and phosphate salts, EDTA, and ant-acids during a meal containing the non heme iron (24). Layrisse et al. (25) noted that iron absorption may be between one and eight percent from vegetable foods and between six and twenty percent from animal foods. This study also indicated that a certain proportion of animal food should be included in the diet to enhance the iron absorption from vegetable foods. Thus they concluded that the total iron content of the diet is a relatively poor indicator of the adequacy of the diet with regard to the amount of iron actually absorbed. The composition of the meal consumed and the nature of the iron have been identified as important factors in determining the availability of iron for absorption (24,25,26,27). To determine the availability of the iron in a meal, calculations of the amount of heme and non heme iron ingested must be done separately, the amount of ascorbic acid and the quantity of animal

tissue is calculated, and thus the iron in the meal can be classified as having high, medium, or low availability (24).

Absorption occurs mainly in the acidic environment of the duodenum. The absorption of iron is regulated by the intestinal mucosa according to the body's need for iron (8). Withdrawal of iron to meet internal metabolic needs from iron-transferrin pool brings about an increase in the amount of iron that is absorbed from the intestine (8). The percentage absorption of heme iron will be influenced by iron status in an inverse logarithmic function. This can be illustrated thus: in subjects with 0, 250, 500 and 1000 mg of iron stores, absorption from heme iron is estimated to be 35, 28, 23 and 15 percent respectively from the iron present in meat, poultry and fish in a meal (24).

Iron deficiency produces a variety of organ and tissue changes in addition to hematologic abnormalities. Anemia may be responsible for epithelial changes, disturbances in energy metabolism, alteration in gastrointestinal morphology and function, impairment of leukocyte function and even inhibition of growth (28). The cause of iron deficiency is usually nutrition related through inadequate intake of iron, ignorance of what foods to choose, high concentrations of wrong foods or lack of food (7).

Anemia can be described as being present when hemoglobin concentration is depressed by the presence of common abnormalities such as iron deficiency or inflammatory disease (29). The hemoglobin level is reduced in a subject with typical iron deficiency anemia. While hemoglobin level is probably the most frequently used laboratory method for determining anemia, it is one of the least sensitive and last affected parameters in iron deficiency. More specific and sensitive

laboratory measures of iron hemoglobin status include serum iron, iron binding capacity, transferrin saturation, free erythrocyte protoporphyrin, mean corpuscular volume and serum ferritin (28).

Iron Needs for Growth

Rapid growth, a characteristic of adolescence, is associated with an increased need for iron. Adolescents need to retain iron not only to maintain hemoglobin concentrations but also to increase their total iron mass during the growth period when there is an increase in cell number and size. Replacement of losses must be made and sufficient iron must be absorbed from food and/or supplements to meet body needs. Losses occur normally through the gastrointestinal tract, through skin and through menstruation.

Requirements for absorbed iron for growth are calculated on the assumption that 74 mg iron are deposited in each kg of fat-free body mass of the adult. Non menstrual losses (gastrointestinal tract and dermal) amount to approximately 0.86 mg per day in adults. Considering non-menstrual plus menstrual losses, the average iron loss is approximately 1.3 mg per day (30).

The RDA for iron increases from the 10 mg needed by the pre-adolescent to 18 mg in the adolescent for greater amounts needed for this period of rapid growth and the menstrual iron losses (6).

Iron Needs During Pregnancy

Increased needs for iron during pregnancy are significant. It is estimated that the total iron requirement for pregnancy is 1000 mg (14). The mother's basal losses through skin and gastrointestinal tract may

amount to 240 mg, increased cell mass about 500 mg, and the requirement of the fetus and placenta may be about 300 mg (8). Shortly before term, an increase in blood volume occurs which is 30% above normal non pregnant volume level (30). This increase occurs mainly during the latter half of pregnancy. The hematocrit decreases because of dilution of the blood, however, toward the end of pregnancy the bone marrow becomes increasingly active and the concentration of red blood cells returns almost to normal. A mother's stores are drawn upon at this time, not only for iron but other nutrients stored during the entire term of pregnancy. Ordinarily the mother does not absorb sufficient protein, calcium, phosphates and iron from the gastrointestinal tract during the last months of pregnancy to supply the fetus, thus stores of these nutrients are essential. A daily need of 3.5 mg of iron for net absorption is recommended, which would indicate an increase of approximately 30 mg per day over the non pregnant recommendation. The increased requirements cannot be met by the usual diets in the United States, nor by the existing iron stores of most women. Thus supplements of 30 mg to 60 mg are recommended in addition to the 18 mg recommended for this age group in the 1980 RDA (6).

Intake Studies

Low iron status has been identified in many studies of adolescent girls (21,29,31). In testing adolescents for iron status, Bailey et al. (29) found the transferrin saturation low in 12% of adolescent females and further, the levels declined as age increased. Daniel et al. (32) noted an increase in transferrin saturation as maturation progressed. White adolescents had a slightly greater percent of transferrin

saturation than their black counterparts, but no significant difference in percentages between girls from upper income families and lower income families were shown. It was also noted in this study that adolescents, both boys and girls, have increasing intakes of iron as they mature during adolescence.

The age of onset of adolescent growth and development, the velocity of change, and the age at which growth is completed is not the same for all boys or girls (11). The presence or absence of anemia, as well as the degree, should be related to hematocrit value appropriate for the level of maturity of the individual adolescent, and not solely to age. Daniel (11) noted that iron intake increased as maturation progressed, however he found no significant correlation between dietary iron intakes and the percent of transferrin saturation.

King et al. (21), state that nutritional status at the time of conception is a culmination of a girl's lifelong nutritional experience, and is an important determinant of reproductive efficiency. During adolescence, nutritional inadequacies are typical and are often pronounced when a teenager is from a low income background.

Using data from the second National Health and Nutrition Examination Survey (HANES II, 1976, 1980), Dallman, Yip, and Johnson (31), estimated the prevalence of anemia in the United States and found teenage girls had the highest incidence. Osofsky et al. (10) noted almost all of the teenage girls in an intake study had marked nutritional deficiencies in intake. These included inadequate iron intake among 95.4% of the teenagers and calcium among 93.3% of the girls. King et al. (21) found the intake of nutrients generally higher in pregnant teenage girls when compared with non pregnant teenage girls. Even though they

had higher intakes of nutrients generally, they still did not meet recommended allowances.

Age may have some effect on the amount of nutrients consumed. Wharton (17) noted a difference in intake of calcium and also of iron as ages increased in a study done on adolescent nutritive intake. Forty-six percent of the younger adolescent girls and 60% of the older group consumed less than 50% of the recommendation for calcium. It was noted that the older girls had an iron intake higher than the younger girls. The girls in this study were divided into two groups of 13- to 15-year-olds and 16- to 18-year-olds. McCoy et al. (33) calculated nutrient intakes of 12-, 14- and 16-year-old girls, and found the percentages of diets failing to provide at least two-thirds of the RDAs were always greater for the older girls than for the younger girls. In noting the calcium intake differences between the age groups, the findings were consistent with other studies (2,3,34,35) in showing a decrease in intake with increasing age. The iron mean intakes were 12.7 mg for age 12, 15.9 mg for age 14, and 12.2 mg for age 16.

Eating Patterns

Skinner et al. (36) studied the eating habits and nutrient intakes of a group of Appalachian adolescents and observed that eating patterns reflected the amounts of nutrients obtained. Meals and type of snacks eaten were studied to determine adequacy of daily intakes. Quantitative and qualitative differences were observed in daily intake between those who ate breakfast and those who did not eat breakfast. For instance, those who skipped breakfast had lower mean intakes of energy and the

ten other nutrients noted in the study for the total day than those who ate breakfast. One-third of the adolescents in this study reported that their families did not have a regularly scheduled evening meal, which may be related to the nutrient quality of the food consumed. Twenty-three percent of the subjects prepared their own evening meals, and these meals were significantly lower in iron and thiamin than meals prepared by mothers. Huenemann et al. (22) also noted that teenagers tend to omit meals and that one-third of the white subjects and 90% of the black teenagers had highly irregular eating practices. Meal regularity tended to increase with rise in socio-economic classification. Generally those adolescents in their study who ate regular meals usually augmented by snacks tended to have better nutrient intakes. The most neglected nutrients in this sample were also calcium and iron.

In surveying the nutritional pattern of teenagers, Edwards et al. (18) noted that as students progressed from the seventh to the twelfth grade, the percentage of meals missed increased from 10 to 24. Hinton et al. (37) also noted a high correlation between meals missed and poor diet.

Poor nutrient intake has often been linked with weight loss diets. In a study conducted by Macdonald, Wearing and Moase (38), girls with the poorest diets favored skipping meals as a method of weight reduction. Huenemann et al. (22) found girls' self-perception in ninth, tenth and twelfth grades as being fat, and in the ninth grade 65% of the girls said they were trying to do something about their weight. The fact that diet outranked physical activity as the preferred means of weight reduction could indicate why meals were skipped or foods not accepted. Dwyer, Feldman and Mayer (39), in identifying adolescent

dieters ages 14 and 15, noted that 61% reported they had dieted to lose weight, and 31% were on a diet the day of the survey. In this study, only 15% of the girls surveyed were found to be actually obese. Many of the girls did not list weight reduction for health reasons, instead they wanted to reduce for body appearance. A survey of college students indicated 70% of the women students were dissatisfied with their weight (41). In a Canadian study identifying factors affecting dietary intake quality among adolescent girls, Macdonald et al. (38) noted that important relationships do exist between body appearance and quality of food intake. Girls with the poorest diets were heavier and had more total body fat, and physical activity or inactivity was found to be a powerful indicator of dietary quality.

In a study to determine if relationships existed between knowledge, attitudes and dietary practices of female athletes, Perron and Endres (40), obtained 24 hour recalls and information concerning nutrition knowledge and attitudes toward eating and self-image. The information was collected from 31 female high school athletes who were members of the volleyball team and were between the ages of 13 and 17. The results showed no significant difference between calcium, iron and vitamin C intake and the values from individuals surveyed in the HANES II studies (1976, 1980). Milk was consumed daily by 68% of the subjects, compared with 80% in HANES II. Iron intake was less than two-thirds of the RDA. Eighty-one percent of the subjects indicated they were unhappy with their present weight and 73% wanted to lose weight. Through analysis of the data, there was a positive and significant correlation between nutrition knowledge and attitudes, indicating the more nutritional knowledge the subjects had, the more positive the attitude toward

nutrition. However, nutrition related attitudes were not good predictors of dietary practices, and neither nutrition knowledge nor attitudes greatly influenced the food practices of the subjects.

Eating behavior may also be influenced by emotional problems commonly found during adolescence. Hinton et al. (37) scored dietary intakes of girls 12 to 14 years of age and noted that girls who scored best in emotional stability, conformity, adjustment to reality, and family relationships missed fewer meals, were familiar with a larger variety of foods, and had generally better diets. Girls who mature early or late frequently have poorer eating habits than those girls maturing at normal rates. Schorr, Sanjur and Erickson (4) reported that the complexity of an adolescent's diet increased significantly with the extent of his/her social participation. Lifestyle complexity indicators included: age, sex, family size, social participation, employment status, nutrition information channels, father's occupation, mother's occupation and mother's education level. The father's and mother's occupational level, the mother's educational level, and the extent of social participation significantly increased the teenager's diet complexity. Teens interviewed by Spindler and Acker (23), concerning their eating habits were critical of other adolescent's eating habits, but admitted their own habits could improve. They listed reasons for not eating as: "in a hurry," "not time to eat," and "activities interfere with eating."

A teenager's food habits are greatly influenced by peers and current fads. Fast foods are often the major portion of a teenager's intake, and soft drinks often are selected in preference to other beverages. Low calcium intake has been linked with increased consumption

of soft drinks (34 35). Soft drink intake has increased in the general U. S. population over the past 15 years. The intake increases with age up to the age of 24 (34). In a study concerning U. S. teenagers intakes, Guenther (35) correlated the soft drink intake with calcium in the diet of girls aged 13 to 18. The non-users of soft drinks had dietary intakes that provided 75% of the RDA for calcium, low users' diets provided 66%, and high users' diets provided 59%. In this study "low users" were considered subjects who consumed the median amount or less, and the "high users" were those who consumed more than the median for their age-sex group. In noting beverage intake by regions, Southerners drank less milk and juice, and more soft drinks and tea than those in the Midwest, Northeast or West. It was also noted in this study that the mean intakes of milk, juice and fruit drink per individual generally increased with income. Huenemann et al. (22) also noted that boys and girls with calcium intakes below two-thirds of the recommended allowance (RDA) generally tended to substitute soft drinks for milk at meal time. Wharton (17) compared intakes of protein to calcium and noted a higher intake of protein from food other than dairy products.

Although calcium and iron are important nutrients for adolescent growth and are especially needed during teenage pregnancy, low intakes of these nutrients have been noted in many studies (4,10,14,17,20,21, 29,31). Although nutrients consumed by teenage girls during pregnancy may increase, they still may not reach recommended amounts. Many factors may influence calcium and iron intakes for both pregnant and non pregnant teenagers.

CHAPTER III

RESEARCH PROCEDURES

Methods used in selecting subjects and developing material for this study are discussed in this chapter. The research design is described, and also the procedures used for collecting and compiling information.

Research Design

This study was descriptive research, concerned with hypothesis formulation and testing, relationships between nonmanipulated variables, and the development of generalizations (42). The adequacy of calcium and iron intake through foods for a group of pregnant teenage girls compared to a group of non pregnant girls was determined.

Subjects and Population

The subjects in this study were pregnant girls between the ages of 14 and 19. The control group was selected from non pregnant girls of the same ages. The subjects in both groups were selected from the participants in the WIC Programs and the Family Planning Programs in Hughes County and Pottawatomie County health departments. Approval was obtained from the Nursing Directors of the two county health departments selected for this study before the collection of any data. Random sampling was not utilized due to the small number of participants available who were pregnant and/or within the age groups required for this

study. None of the girls in this study had any diagnosed chronic or acute illness that would interfere with eating or completing the questionnaire.

Before a decision was made on the location for data collection, a pilot survey was conducted to determine the population available for this study in four county health departments. The distribution of age and race of possible subjects and control group in each county was considered. The availability of health personnel to aid in data collection was also an important factor. The high percent of live births to teenage mothers in Hughes and Pottawatomie counties was a primary factor influencing the selection of these two counties for this study. The numbers and percentages of resident live births to teenage mothers in these two counties and the state totals are shown in Table I. The accessibility of information and subjects, as well as the health personnel's interest, time availability and skill in communicating with this particular age group provided the basis for the final decision.

The two counties selected for this study are generally in the central section of Oklahoma. Holdenville, the county seat of Hughes County, is located 74 miles southeast of Oklahoma City, and 89 miles southwest of Tulsa. The county health department is in Holdenville, and the girls selected in this county all live close to or in Holdenville. Holdenville is generally considered an agricultural community, and the population is estimated to be 5400. Shawnee is the county seat for Pottawatomie county, and is located 37 miles southeast of Oklahoma City. With a population of approximately 26,000 it has a variety of small diversified industries, and is also an agricultural county. The county health department for Pottawatomie county is located in

TABLE I
RESIDENT LIVE BIRTHS TO TEENAGE MOTHERS BY AGE OF MOTHERS
IN HUGHES COUNTY, POTTAWATOMIE COUNTY
AND STATE TOTALS*

County and State	Total Resident Live Births	Births to Mothers Under Age of 20	Percent of Births of Mothers Under Age of 20	Age of Mothers					
				14	15	16	17	18	19
Hughes County	165	50	30.3	0	2	10	11	16	11
Pottawatomie County	759	172	22.6	1	9	19	37	46	60
State	45,449	9,740	21.4	127	453	1,226	1,987	2,662	3,264

*From selected demographic information of each county in Oklahoma, Oklahoma State Department of Health (1976).

Shawnee, and the girls for this study from Pottowatomie county live in or close to Shawnee.

An effort was made to obtain subjects for this study within the same general ethnic distribution as the overall female population of each county. An attempt was also made to match age distribution of subjects in each of the counties with the age distribution of live births to teenage mothers occurring in 1977 in those counties.

Procedures

As visits to the clinics in the two health departments were scheduled, prospective participants for this study were identified. As these girls arrived for their appointments they were given a description of the study, a questionnaire, an explanation of the questions, and a consent form. The explanation was usually given by the researcher or member of the nursing staff, however when neither were available the clinic clerk gave instructions and explanations.

As the participant waited to be seen in the clinic, she filled out the questionnaire. Most of the girls could complete the forms in 10 to 15 minutes, however some took longer due to interruptions or difficulty in reading. The usual waiting time to be seen in the clinics ranged from 5 to 20 minutes. Most of the girls were interested in completing the questions, and if they could not finish the forms before clinic visit, they would stay a few minutes after the clinic visit in order to complete the information. There were no girls beginning the questionnaire and 24 hour recall who did not attempt to complete the forms, however two forms were unusable because of incomplete information.

A questionnaire was designed to obtain information on factors that might influence food selection or acceptance and dietary intake. Questions were both factual and opinionnaire and both open and closed form type questions were used. The questionnaire consisted of two parts: general questions concerning physical information and food habits and a 24-hour recall dietary intake sheet. Seasonal variations in intakes were not a factor in this study as the data was collected from January to November.

Pretesting of the instrument was performed by two pregnant and two non pregnant girls. For further aid in identifying ambiguous questions and clarity of wording, the questionnaires were reviewed by two staff nurses in Hughes county and Pottawatomie county. Necessary revisions were made and again reviewed by nursing staff. Two questionnaires were designed, one for pregnant teens and a second for non pregnant teenage girls. Both forms contained questions concerning the same type of data, except for obvious differences. Each subject signed a consent form which advised her of the nature and confidentiality of the information. Examples of the consent forms are shown in Appendix A; Questionnaire examples are found in Appendix B.

Analysis of Data

Dietary Intake Measurement

A 24-hour recall intake sheet was completed by each participant. (Sample copy is shown in Appendix C.) If help was needed in determining serving sizes, spoons, cups, glasses and bowls were provided as aids. When completed, the forms were reviewed by the researcher or by other health personnel.

Foods were categorized into the Four Food Groups from each 24-hour dietary recall. The calcium and iron content was then calculated for each food, and the total for these minerals was listed in each food group for each participant. From these totals each participant's daily intake of the two minerals was determined. Using the Four Food Groups, an indication of the type of food source of each of the minerals could be determined. An example of this work sheet is found in Appendix C. Comparisons were made for each girl's intake with the 1980 RDA, and these were shown in percentage of RDA that her intake represented. In this study, the consumption of less than two-thirds of the RDA of any nutrient was considered to be an inadequate intake.

General Data

General information from each participant was compiled on a form for pregnant teens and one for non pregnant participants. Foods listed as "disliked" were listed and each participant's response was recorded on a form devised by the researcher (Appendix C).

Information was also compiled from opinion questions. These questions concerned the girl's description of her appetite (hearty, moderate or poor), whether her appetite changed since her pregnancy or whether the non pregnant girls have had any changes in their appetite in the last six months, and how they generally feel (good, tired, sick).

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this study was to determine if there were any significant differences in calcium and iron intakes between pregnant and non pregnant teenage girls living in two counties of Oklahoma. Factors such as age, foods disliked, adults living in the house, participation in meal preparation, and the amount of milk consumed were also reported.

In our present mobile society many people do not live in one location for long periods of time. This factor may be important in describing a population in a specific area as being representative of that particular area. It also may be important in planning education programs. Of the 58 girls participating in this study, 58.6% indicated they had lived in the county over five years, 32.6% lived in the county one to five years and 8.6% said they had lived in their county less than one year (Table XV, Appendix D).

Subjects

The 29 pregnant girls in this study were selected from the WIC program participants in each of the two counties. The non pregnant girls were selected from participants in the Family Planning programs in the health departments in each of the two counties. These girls were selected because of their ages and because they were also sexually

active. Ages of the pregnant girls and the month of their pregnancy are shown in Table XVI, Appendix D.

Race was not a significant factor in this study, due to the larger white population in these two counties. Although no data was compared for racial differences in this study, an attempt to have a representative percentage of each of the three (White, Indian, and Black) racial groups was made. The ethnic distribution for the overall female population in these two counties, and the distribution for this study are shown in Table II.

Ages

The ages of the pregnant girls ranged from 14.8 years to 19.7 years. The non pregnant girls' ages ranged from 14.9 years to 19.7 years. Both the pregnant and non pregnant girls were divided into smaller age groups in order to represent life styles that may change from the young teenage years to the older teenage years. These age groups are shown in Table III. Young teens are generally considered to be the age of 9th or 10th graders, usually beginning high school, more likely to be living at home with parents, and still in the growth spurt years. In this study two out of the seven pregnant young teens were still in school, compared to five out of the seven non pregnant young teens. One pregnant girl was working full time, and one was working part time while going to school. None of the young non pregnant girls was working full time and one indicated she was working part time while going to school. Four of the young pregnant girls indicated at least one parent (or adult relative) lived in their household, compared to five of the non pregnant teens.

TABLE II
RACE DISTRIBUTION OF FEMALE POPULATION
AND SUBJECTS IN STUDY

County	Total	White	Black	Indian
<u>Hughes:</u>				
All females*	6999	5914	268	802
Percent		84.4	3.7	11.5
Pregnant subjects	13	10	1	2
Percent		76.9	7.6	15.3
Non pregnant subjects	16	12	1	3
Percent		75.0	3.4	10.3
<u>Pottawatomie:</u>				
All females*	22580	20818	626	1068
Percent		92.1	2.7	4.7
Pregnant subjects	16	14	1	1
Percent		87.5	6.2	6.2
Non pregnant subjects	13	11	1	1
Percent		84.8	7.6	7.6

*1970 Census from General Population Characteristics, Oklahoma. U. S. Department of Commerce, Bureau of the Census. 1971.

TABLE III
CHARACTERISTICS OF SUBJECTS

	Pregnant (N=29)			Non Pregnant (N=29)		
	Young Teens N=7	Mid Teens N=15	Older Teens N=7	Young Teens N=7	Mid Teens N=15	Older Teens N=7
Age Range (Years)	14.8 - 16.3	16.6 - 17.9	18.0 - 19.7	14.9 - 16.3	16.5 - 18.1	18.2 - 19.7
Occupation:						
In school (n)	2	5	0	5	7	0
Work (F.T.) (n)	1	2	1	0	3	0
Homemaker (F.T.) (n)	3	8	6	0	2	7
Work (P.T.)/School (n)	1	0	0	2	3	0
Household Occupants:						
Self and Husband (n)	2	4	5	0	2	2
Parents (n)	4	10	2	7	10	4
Others (n)	1	1	0	0	1	0
Alone (n)	0	0	0	0	2	1
Meal Preparer:						
Self (n)	3	5	5	1	5	4
Mother (n)	2	6	0	4	4	1
Self and others (n)	1	3	1	1	6	2
Others (n)	1	1	1	1	0	0

The mid teens, (pregnant ages 16.6 to 17.9 years, and non pregnant ages 16.5 to 18.1) represent the ages of high school students enjoying a wider variety of freedom than the younger teens might have. These teens are old enough to have a drivers license, may be out of school (graduated or dropped out), may have a full time or part time job. In this study only 33.3% of the pregnant teens were in school, and 53.3% indicated they were full time homemakers. Of the non pregnant girls in the mid teen age group, the largest percentage (46.6%) said they were in school full time, and the smallest percentage, 13.3% indicated they were full time homemakers. The largest percentages in both groups indicated they lived with parent and/or other family members. Two of the non pregnant girls lived alone. Twenty-six percent (4) of the pregnant girls lived with their husbands alone, while only 13% of the non pregnant girls did. Two non pregnant girls said they lived alone.

The older teens (pregnant age range from 18.0 years to 19.7 years, non pregnant ages ranged from 18.2 years to 19.7 years), represent teens out of school, and none of the girls in this age group indicated they were attending school. The greatest percentages (85.5% of the pregnant and 100% of the non pregnant girls) were full time homemakers. Seventy-one percent of the pregnant girls in this age group live with their husbands alone, and 13.3% live with parents and/or other adult family members. In the non pregnant group, 57% lived with parents and/or family members, and only 28.5% live with husband alone. The number and percentages of girls in each age group in school, working, homemakers, school/work and adults living in the household are shown in Table III. Raw data for age distribution into groups is shown in Table XVII, Appendix D.

The ages of the girls may not indicate the maturity, knowledge or ability to select foods wisely. The teenager living with parents and/or adult relatives, may not have influence on food selected or prepared for the family, and may not take part in food preparation. Although all of the young non pregnant teens lived with parents, only two said they were the meal preparer or helped with meal preparations. Of the pregnant young teens, three indicated they were the meal preparer (two of whom lived only with their husbands), and two said they helped with meals. As ages increased participation in meal preparation rose, and in the older pregnant teen group, none said their mother alone prepared the meals (Table III).

Opinion Questions

When asked whether they generally feel "good," "tired" or "sick," 71% of the young pregnant girls replied "good," the remaining 28% were equally divided between "tired" and "sick." All of the young non pregnant girls answered that they generally felt "good." The frequency of "generally feel good" reply diminished in both the pregnant and the non pregnant girls as ages increased. These figures are shown in Table IV.

In regard to a question about appetite, a greater percentage in each group replied they had "moderate" appetites. The largest group describing themselves as having a "poor" appetite were the mid teen pregnant girls. No answers were recorded for 13.3% of the mid teen pregnant girls. These percentages are shown in Table IV.

Any changes in appetite during pregnancy were to be noted by each subject. None of the girls replied that they eat more, one said she

TABLE IV
PHYSICAL FEELING AND APPETITE OF PREGNANT
AND NON PREGNANT TEENAGERS

	Young Teens		Mid Teens		Older Teens	
	P	NP	P	NP	P	NP
Physical Feeling:						
Feel "Good" (n)	5	7	10	13	4	5
Feel "Tired" (n)	1	0	4	2	3	1
Feel "Sick" (n)	1	0	1	0	0	1
Appetite:						
Hearty (n)	2	1	1	4	2	2
Moderate (n)	4	6	8	9	5	5
Poor (n)	1	0	4	2	0	0
NA (n)	0	0	2	0	0	0

eats "more and better." Five said there was no change. Other descriptions included: "eat less," "eat better," "more hungry." Descriptions of any changes in appetites noted in the last six months was requested from the non pregnant girls. Twelve said there has been no change, eight eat less, and four eat more. Two of these girls replied that they are eating more junk foods now than they did six months ago.

Nutrient Intakes

The nutrients to be studied were calculated from foods listed on a 24-hour recall form completed by each participant. The foods were listed in one of the Four Food groups for calculation of calcium and iron, and also to provide a method of identifying the foods providing these minerals. An example of the 24-hour recall form and the nutrient calculation sheet are shown in Appendix C.

Calcium Intake

The calcium intake was determined from the foods categorized under the milk, vegetable, and bread and cereal groups. The total intake of calcium from the 24-hour recall was recorded for each participant and the percentage of the RDA represented by the intake was calculated. The RDA of 1600 mg for pregnant teenagers and 1200 mg for non pregnant teenagers was used as the reference. At the age of 19 the RDA changes to 800 mg for the non pregnant girl, and 1200 for the pregnant girl. However, calcium for the six 19-year-olds in this study was not calculated separately; four of the six were a few months over the age of 19, but it is assumed their calcium needs remained essentially the same and therefore a separate calculation was not necessary.

Calcium intake for the pregnant and non pregnant girls was generally low. There was a significant difference ($p=0.0253$) in mean calcium intake between the pregnant and non pregnant girls, however statistical differences in mean calcium intake between the age groups within the pregnant and non pregnant groups was not noted.

Calcium intake for the pregnant subjects ranged from 5.5% to 140.8% of the 1600 mg RDA for pregnancy during teenage years. Only one girl in each age group had an intake over two-thirds of the RDA, resulting in 89.7% of the subjects reporting an intake below two-thirds of the RDA during pregnancy. One girl in the non pregnant group had an intake over two-thirds of RDA (1200 mg), but none of the other non pregnant girls reached two-thirds of the RDA. These percentages are shown in Table V.

Although the older pregnant teen group had the largest mean calcium intake in this study, these girls did not have individually high calcium intakes. Generally the calcium intake of the pregnant girls was higher than the non pregnant girls, and when comparing the percentages of RDA for each group, the young and older teens of the pregnant group were higher than their corresponding age group in the non pregnant group. Raw data concerning calcium intake is shown in Table XVIII, Appendix D.

Iron Intake

Foods were listed according to the Four Food groups, and iron intake was calculated from the meat, vegetable, bread and cereal groups. Total iron was determined from the sum of the iron in all of the foods in these three food groups.

TABLE V
CALCIUM INTAKE BY RANGES OF PERCENTAGES OF RDA

Subjects	%	RDA Mg	%	Mean Mg
Pregnant: (RDA 1800 mg)				
Young teens	9.0 - 71.8	144 - 1148	34.7	554
Mid teens	7.5 - 84.6	120 - 1353	32.6	522
Older teens	5.5 - 140.8	88 - 2252	44.6	714
Non Pregnant: (RDA 1200 mg)				
Young teens	14.0 - 58.3	168 - 699	30.5	336
Mid teens	3.6 - 83.3	43 - 1000	35.7	428
Older teens	1.0 - 43.1	12 - 517	15.9	190

Due to the greatly increased level of iron recommended during pregnancy (30-60 mg per day), it was not expected that this amount would be obtained through diet alone. The RDA for iron from food sources is 18 mg, and this amount was used for pregnant and non pregnant girls in this study.

Iron intake for the pregnant and non pregnant girls was generally low. A significant difference ($p=0.0004$) was noted in mean iron intake between the pregnant girls and the non pregnant girls. In using analysis of variance procedure it was noted that there was no significant differences in iron intake between the age groups within the pregnant and non pregnant groups.

The overall intake of iron for the pregnant girls was higher than for the non pregnant girls. Twenty percent of the pregnant girls consumed over 75% of the RDA, but this same level of intake was attained by only 3.4% of the non pregnant girls. Consumption of iron at 50-74% of the RDA was attained by 41.4% of the pregnant girls and only 6.9% of the non pregnant girls. The majority of the non pregnant girls (79.3%) consumed between 25% and 49% of the RDA, compared to 37.9% of the pregnant girls. None of the pregnant girls consumed less than 24% of the RDA while 10.3% of the non pregnant girls reported this small intake. (See Figure 1.)

When means for each age group were calculated, the pregnant groups had mean percentage intakes of iron above 53% of RDA. The non pregnant girls reported a mean percent of RDA between 34.3% and 41.5%. The smallest amount of iron recorded for the pregnant girls was 4.8 mg and was consumed by a girl in the mid teen group while the largest amount recorded was 17.7 mg consumed by an older pregnant teen. The non

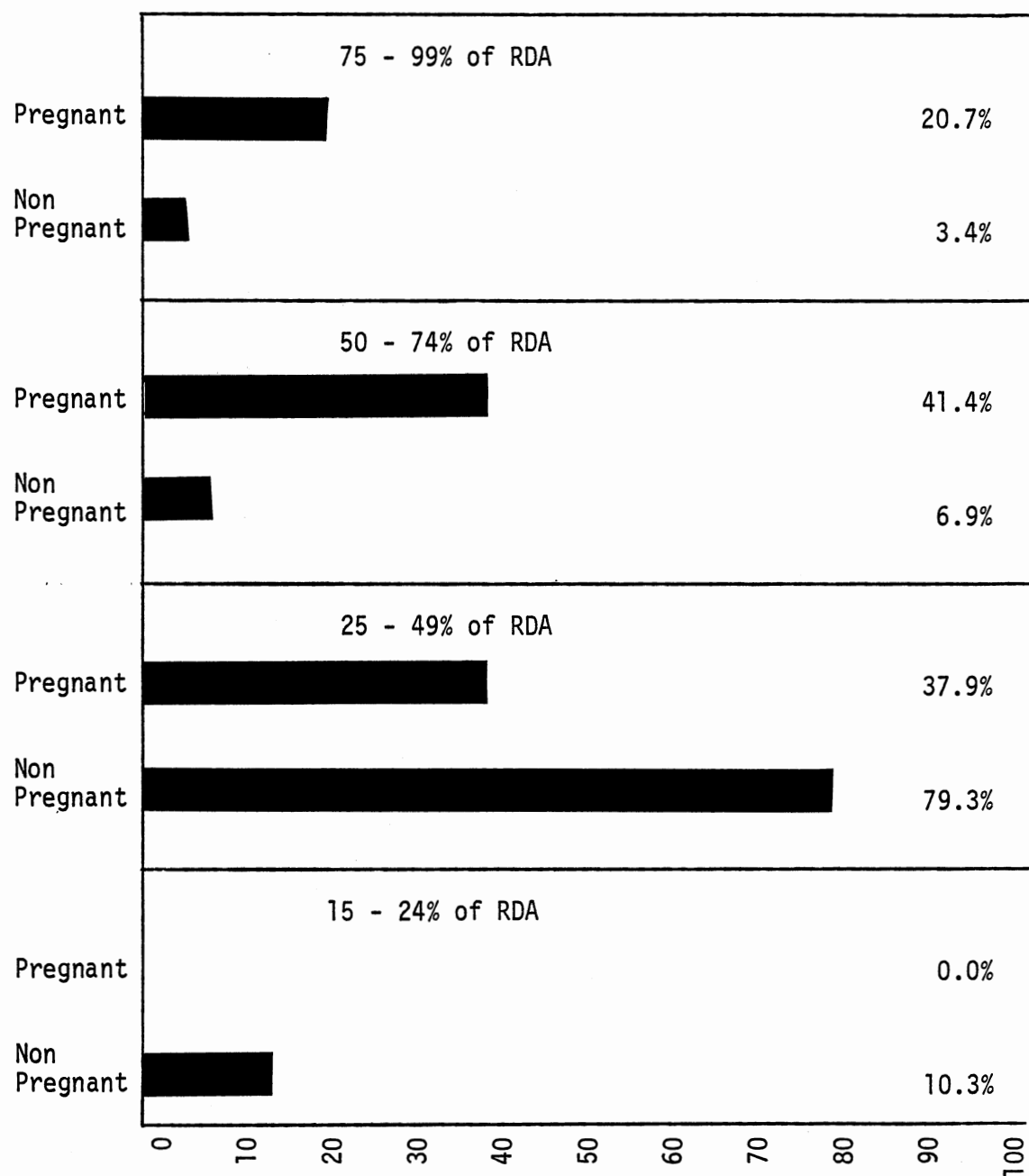


Figure 1. Iron Intake Percent of RDA

pregnant girls had consistently lower intakes in each age group than the corresponding age group for pregnant subjects. The lowest amount of iron consumed among both pregnant and non pregnant girls was 2.7 mg which was calculated from a younger non pregnant girl's intake (Table VI).

Because of the inconsistency of data recorded about meal patterns it was not possible in this study to calculate available iron from intakes. However heme and non heme iron was determined from food sources. Forty percent of iron from the meat group was designated heme iron, and the remaining 60% of meat iron plus iron from vegetables, bread and cereal was considered non heme iron. Using the Four Food groups as a guideline for daily servings of meat, the recommendation for pregnancy and non pregnancy is two two-ounce servings per day. From four ounces of meat (i.e. roast beef or hamburger) we assume that 1.5 mg of heme iron is present in the 3.8 mg of total iron in the meat. The mean heme iron intake for the girls in this study for all age groups was 1.5 mg and above. These heme iron and non heme amounts are shown in Table VII. Raw data concerning iron intakes may be found in Table XIX, Appendix D.

Caloric Intake

Total caloric intake was estimated for each girl using the Food Exchange values for energy nutrients. Generally caloric intake of the pregnant girls was higher (mean intake of 1219 Kcal), when compared to non pregnant girls (mean intake of 1033 Kcal). This data is shown in Tables XX and XXI, Appendix D.

TABLE VI
IRON INTAKE BY RANGES OF PERCENTAGES OF RDA

Subjects	%	RDA Mg	Mean %	Mg
Pregnant: (RDA 18 mg)				
Young teens (N=7)	37.0 - 74.4	6.7 - 13.4	53.2	9.6
Mid teens (N=15)	26.6 - 94.4	4.8 - 17.0	58.5	10.5
Older teens (N=7)	27.9 - 98.5	5.0 - 17.7	55.3	9.9
Non Pregnant: (RDA 18 mg)				
Young teens (N=7)	15.0 - 48.9	2.7 - 8.8	35.2	6.3
Mid teens (N=15)	24.4 - 76.1	4.4 - 13.7	41.5	7.5
Older teens (N=7)	21.1 - 47.6	3.8 - 8.6	34.3	6.2

TABLE VII
MEAN INTAKE OF HEME AND NON HEME IRON IN AGE GROUPS FOR
PREGNANT AND NON PREGNANT TEENAGE GIRLS

	Meat (Mg)	Heme Iron Iron (Mg) 40% Total Meat FE	Non Heme Iron Meat (Mg) 60% Total Meat FE	Vegetables, Bread and Cereal (Mg)	Total Non Heme Iron (Mg)
Pregnant					
Young teens (N=7)	5.1	2.0	3.0	4.5	7.5
Mid teens (N=15)	4.8	1.9	2.9	5.7	8.6
Older teens (N=7)	3.9	1.6	2.3	5.9	8.2
Non Pregnant					
Young teens (N=7)	3.8	1.5	2.3	2.6	4.8
Mid teens (N=15)	4.4	1.8	2.7	3.1	5.8
Older teens (N=7)	4.0	1.6	2.4	2.2	4.6

Food Intake

Food Acceptance

Food acceptance and intake generally varied among the girls. The girls participating in this study were asked to list the foods disliked. Liver was the most frequently disliked food but a wide variety of vegetables were also listed. The girls in this study did not eat a wide variety of vegetables on the day of this survey. Potatoes were the most frequently listed vegetable. Seven of the pregnant girls and eight of the non pregnant girls listed potatoes as the only vegetable eaten on the day of the survey. Hamburgers and chicken were the meat items most often listed on the intake records.

Iron Sources

Meat, bread and cereal were the two groups of foods contributing the largest amounts of iron among both pregnant and non pregnant groups of girls. Meat intake declined with each age group for the pregnant girls, and iron from the bread and cereal group increased. Very little iron was obtained from vegetables, and it was noted that only one girl in the seven young pregnant teens consumed a vegetable containing any iron. Only seven of the 15 mid teen pregnant girls listed vegetables containing iron, and four out of the seven older pregnant teens listed iron containing vegetables. Generally intake of iron containing vegetables remained constant through age differences in the non pregnant group of girls. Only two of the girls in each age group had no iron contribution from vegetables, and no increase in iron containing bread and cereal was noted as ages increased (Table VIII).

TABLE VIII
IRON INTAKE FROM FOOD GROUPS

	Pregnant			Age Group	Non Pregnant		
	Meat	F/V*	B/C*		Meat	F/V*	B/C*
Young Teens Pregnant N=7 Non Pregnant N=7							
Total (mg)	35.4	2.2	29.2		26.3	4.1	14.0
Mean (mg)	5.1	.3	4.2		3.8	.6	2.0
Percent	53.0	3.3	43.7		59.2	9.2	31.5
Mid Teens Pregnant N=15 Non Pregnant N=15							
Total (mg)	72.6	11.0	78.5		62.4	15.7	31.2
Mean (mg)	4.8	.7	5.2		4.2	1.0	2.1
Percent	44.8	6.8	48.4		57.1	14.4	28.5
Older Teens Pregnant N=7 Non Pregnant N=7							
Total (mg)	27.3	7.8	34.7		24.1	5.7	9.6
Mean (mg)	3.9	1.1	5.0		3.4	.8	1.4
Percent	39.1	11.2	49.7		61.1	14.5	24.4

*Fruits and vegetables, bread and cereal

Calcium Sources

Although calcium was calculated from vegetable, bread and cereal groups, the largest amount of calcium was derived from the milk group. Calcium intake from food groups is shown in Table IX.

Milk intake in both pregnant and non pregnant varied from 0% to 100% of the Four Food groups recommendation. The recommended amount for non pregnant girls is two eight-ounce glasses per day, and for pregnant girls the amount is increased to four eight-ounce servings per day. Milk intake for non pregnant girls decreased as age increased. Average intake for young teens 7.4 oz, for mid teens 4.5 oz and for older teens the mean intake was 2.3 oz. Soft drink intake increased for mid teens when compared to young teens, and decreased to less than that of younger teens as age progressed in the older teen group. The average soft drink intake was more than double the average of milk intake for mid and older teens.

Milk intake surpassed the soft drink intake in all three age groups of the pregnant girls. The average milk intake for young girls was 11 oz, for mid teens 9.7 oz, and although the older group average was 12 oz, one girl's consumption of 44 oz raised the average. The percentages of recommended milk intake consumed by the girls in this study are shown in Table X. Six of the pregnant girls consumed no milk compared to 12 of the non pregnant girls. Compilation of milk and soft drink amounts may be found in Table XXII, Appendix D.

Supplements

Vitamin and mineral supplements may supply nutrients missing in daily food intake and are recommended during pregnancy. The National

TABLE IX
CALCIUM INTAKE FROM FOOD GROUPS

	Pregnant			Age Group	Non Pregnant		
	F/V*	B/C*	Milk		F/V*	B/C*	Milk
Young Teens Pregnant N=7 Non Pregnant N=7							
Total (mg)	41.0	505.1	3335.0		59.0	554.0	1949.0
Mean (mg)	5.9	72.1	476.4		8.4	79.1	278.4
Percent	1.0	13.0	85.9		2.3	21.6	76.1
Mid Teens Pregnant N=15 Non Pregnant N=15							
Total (mg)	246.0	1410.0	6280.0		423.0	1442.0	4563.0
Mean (mg)	16.4	94.0	418.7		28.2	96.1	304.2
Percent	3.0	17.8	79.1		6.6	22.4	71.0
Older Teens Pregnant N=7 Non Pregnant N=7							
Total (mg)	376.0	690.0	3969.0		79.0	420.0	828.0
Mean (mg)	53.7	98.6	567.0		11.3	60.0	118.3
Percent	7.4	13.7	78.8		5.9	31.7	62.4

*Fruit and vegetables, bread and cereal

TABLE X
COMPARISON OF MILK INTAKE TO RECOMMENDED INTAKES

Subjects	n	Recommendation (Basic Four Food Group)		Young Teens	Mid Teens	Older Teens
		%	oz	%	%	%
<hr/>						
Pregnant (Recommended = 32 oz)						
	9	0-24	0-4	28.5	33.3	28.5
	13	25-49	8-12	42.8	40.0	57.1
	4	50-74	16-20	14.2	20.0	0
	2	75-99	24-29	14.2	6.7	0
	1	100+	44	0	0	14.2
Non Pregnant (Recommended = 16 oz)						
	12	0-24	0	14.2	46.6	57.1
	7	25-49	4	28.5	20.0	28.5
	5	50-74	8	28.5	13.3	14.2
	3	75-99	12	14.2	13.3	0
	2	100	16	14.2	6.7	0

Research Council recommends the use of 30-60 mg of supplemental iron during pregnancy (6). Other supplements recommended during pregnancy include vitamin B₆, and folacin. Calcium supplement is also recommended when milk intake is insufficient (8).

Eighty-two percent of the pregnant teens and only 30% of the non pregnant girls said they take any supplement. As the ages of the pregnant girls increased, more girls took supplements, and all seven of the older pregnant girls took supplements (Table XI).

Testing Hypotheses

Summary of Testing Hypothesis One

The researcher rejected the null hypothesis that there was no significant difference in calcium and iron intakes between pregnant and non pregnant teenage girls in this study. The mean intakes of calcium and iron were evaluated using the t test. Significant differences between the pregnant and non pregnant girls was noted for calcium ($p=0.0253$) and for iron ($p=0.0004$) (Table XII).

Summary of Testing Hypothesis Two

Chi square test was used to evaluate the null hypothesis concerning correlation between foods not liked and intake of calcium and iron. The eight foods most frequently listed as "not liked" were used in the test. No statistical significance was established for any of the foods listed and intake of calcium and iron. The null hypothesis can not be rejected (Table XIII).

TABLE XI
INTAKE OF SUPPLEMENTS

	Young Teens		Mid Teens		Older Teens		Total	
	%	n	%	n	%	n	%	n
Pregnant								
Supplement	71.4	(5)	80.0	(12)	100.0	(7)	82.8	(24)
None	28.6	(2)	20.0	(3)	0		17.2	(5)
Non Pregnant								
Supplement	42.9	(3)	26.7	(4)	28.6	(2)	31.0	(9)
None	57.1	(4)	73.3	(11)	71.4	(5)	69.0	(20)

TABLE XII
COMPARISON OF MEAN CALCIUM INTAKE (MG) AND IRON INTAKE (MG) t TEST PROCEDURE

Mineral	Subjects	N	Mean	Standard Deviation	Standard Error	Minimum	Maximum	<u>t</u>	<u>df</u>	<u>p</u>
Calcium										
	Pregnant	29	576.103	451.882	83.912	88.000	2252.000	2.318	42.5	0.0253
	Non Pregnant	29	356.069	238.769	44.338	12.000	1000.000			
Iron										
	Pregnant	29	10.169	3.738	.694	4.800	17.700	3.825	51.5	0.0004
	Non Pregnant	29	6.886	2.718	.547	2.700	13.700			

TABLE XIII
CHI SQUARE TEST FOR FOODS DISLIKED

Food	Subjects	N	Frequency	df	Value	p
Liver	Pregnant	14	(15.0)	1	0.276	0.599
	Non Pregnant	16	(15.0)			
Meat	Pregnant	5	(6.0)	1	0.420	0.517
	Non Pregnant	7	(6.0)			
Broccoli	Pregnant	5	(6.5)	1	0.892	0.345
	Non Pregnant	8	(6.5)			
Cabbage	Pregnant	5	(6.0)	1	0.420	0.517
	Non Pregnant	7	(6.0)			
Greens	Pregnant	13	(12.5)	1	0.070	0.791
	Non Pregnant	12	(12.5)			
Squash	Pregnant	7	(5.5)	1	1.010	0.315
	Non Pregnant	4	(5.5)			
Milk*	Pregnant	3	(2.5)	1	0.219	0.640
	Non Pregnant	2	(2.5)			
Cheese	Pregnant	7	(5.5)	1	1.010	0.315
	Non Pregnant	4	(5.5)			

*Fifty percent of the cells have expected count less than 5, Chi square may not be a valid test.

When analysis of variance was used to determine if there was a significant difference in calcium and iron intake between the age groups within the pregnant and non pregnant groups, no significant statistical difference was evident. The null hypothesis cannot be rejected (Table XIV).

TABLE XIV
ANALYSIS OF VARIANCE SIGNIFICANCE OF CALCIUM AND IRON INTAKE BETWEEN AGE GROUPS

Mineral	Subjects	df	SS	MS	F Value	p
Calcium						
	Pregnant (age group)	2	179753.5468	89876.7734	0.42	0.6602
	Non Pregnant (age group)	2	270521.2716	135260.6358	2.65	0.0895
Iron						
	Pregnant (age group)	2	4.9533071	2.4766535	0.17	0.8474
	Non Pregnant (age group)	2	10.8137209	5.4068604	0.72	0.4975

CHAPTER V

SUMMARY AND RECOMMENDATIONS

Twenty-nine pregnant teenage girls and twenty-nine non pregnant teenage girls were surveyed in this study. Ages ranged from 14 to 19 and the girls were divided into three age groups in order to more adequately describe characteristics. All girls were participants in WIC or Family Planning Programs offered in two county health departments in Oklahoma.

Twenty-four hour recall records were obtained from each girl to determine her intake of calcium and iron for that period of time. The intakes for pregnant and non pregnant girls were compared.

Mean intakes (mg) of calcium and iron were significantly different between the pregnant girls and non pregnant girls. The pregnant girls at all age groups had higher intakes of calcium and iron. When compared to RDA, one pregnant girl in each age group had an intake that reached two-thirds of the RDA for calcium. Only one girl from the non pregnant group reached two-thirds of the RDA for calcium. Iron intake, when compared to the RDA, was significantly higher for the pregnant girls than that of the non pregnant girls. The number of pregnant girls reaching two-thirds of the RDA for iron was almost four times the number of non pregnant girls reaching this amount.

The variety of foods consumed by both groups was limited and, in particular, foods from the fruits and vegetable groups were low. Milk

intake varied among the girls, and higher intakes were noted among the pregnant girls. Milk intake decreased as the non pregnant girls' ages increased, and 12 of the non pregnant girls consumed no milk, compared to six of the pregnant girls who consumed no milk on the day of the study. The soft drink intake was less for the pregnant girls when compared to the non pregnant girls.

Supplements were taken by most of the pregnant girls, and were listed more frequently as ages increased. Caloric intake was higher for the pregnant girls than the non pregnant girls. More pregnant girls recognized that they were eating more and some indicated they were generally hungrier than before pregnancy.

Recommendations

1. Educational programs directed to teenage girls, and evaluations of a variety of teaching methods is recommended. The content of such programs should include:
 - a. Familiarity with foods in the Four Food groups, including methods of preparation that offer a wider variety in nutrient content (i.e. use of milk in creaming vegetables, in puddings).
 - b. Reading labels to obtain information concerning nutritive content of foods.
 - c. Posters and hand-out material concerning food needs during accelerated growth periods, and pregnancy.
 - d. Information and encouragement in planning meals for the family, including new recipes acceptable to life style (i.e. economical meals with uncomplicated preparation techniques).
 - e. Encourage more regular eating patterns.

2. Follow-up studies to determine food patterns in specific area of the state and region, including foods popular with teens for aid in making nutrition education more specific and applicable.

3. Evaluation of dietary education materials, and methods used in the WIC program by further studies that might include laboratory determinations and follow-up studies to determine dietary compliance.

4. Using a larger population group and comparing WIC, non WIC subjects, persons in different age groups or persons at nutritional risk.

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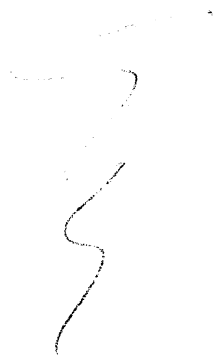
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APPENDIXES



APPENDIX A
CONSENT FORMS

CONSENT STATEMENT

(Pregnant)

To participate in this study you will complete a questionnaire and a 24 hour recall food intake record. Nutrition information will be given to you at all times in order to help you and your baby through a more healthful period of growth and development. Information from your medical record will also be needed to complete your nutritional overview.

This study has been explained to me and I am willing to participate. Information from my medical record may be used, and I understand that all information I give for this study will be regarded as confidential, and the results of this study will not be used in any way which will identify me.

Date

Signature of Participant

Researcher

CONSENT STATEMENT

(Non Pregnant)

To participate in this study, you will complete a questionnaire and a 24 hour recall food intake record. Nutrition information will be given to you as indicated by any high nutritional risk factors. The information given for this study will be regarded as confidential, and the results of this study will not be used in any way which will identify the individuals participating.

This study has been explained to me and I am willing to participate. I understand that all information I give for this study will be regarded as confidential, and the results of this study will not be used in any way which will identify me.

Date

Signature of Participant

Researcher

APPENDIX B

QUESTIONNAIRES

Date _____

P _____

Teenage Food Habits Study
Questionnaire

Please answer the following questions, checking the correct answers or filling in the blanks.
If you give an approximate answer please write "approx." after the answer.

Birth date _____
Your height _____
Your weight (now) _____ Your prepregnancy weight _____
Your birth weight (if you know) _____

Number of pregnancies you have had _____
Number of live births _____ Birth weights _____
Expected date of birth for your new baby _____

Are you presently:

- () Attending school
() Working full time
() Working part time
() Full time homemaker

How long have you lived in this county?

- () Less than a year
() 1 - 5 years
() 6 - 10 years
() Over 10 years

If you moved here from another state
please give the name of the state: _____

Have you spent most of your life living:

- () In a large town (population of 100,000 or more).
() In a smaller town (population of less than 100,000).
() In a farm or country home.

Do you generally feel:

- () Good
() Tired
() Sick

Do you feel

- () Better
() Same
() Worse

than you did before this pregnancy?

How would you describe your appetite this month?

- () Hearty
() Moderate
() Poor

How has your appetite changed during this pregnancy?

Are there any foods that you couldn't eat before this pregnancy that you can eat now?

What foods? _____

Are there any foods that you can't eat now that you could eat before this pregnancy?

What foods? _____

What happens when you eat these foods? _____

If you had nausea or vomiting with this pregnancy, how long did it last? _____

List foods that you eat every day (please include snack items):

Have you ever:

- a. Been overweight? When? _____ How much overweight? _____
- b. Been underweight? When? _____ How much underweight? _____
- c. Been on a weight reduction diet? When? _____ Describe the diet: _____
How long were you on the diet? _____ How much weight did you lose? _____
- d. Taken pills to control your weight? When? _____

Have you lost weight during this pregnancy? How much? _____
How much do you think you should weight now? _____
How much do you think you should gain during this pregnancy? _____

Height and weight of parents (if you aren't sure . . give approximate height and weight).

Mother Height _____ Weight _____
Father Height _____ Weight _____

Have you missed any meals since you have been pregnant. How many? _____
Why did you miss them? _____

Have you had cravings for particular foods during this pregnancy? What foods? _____
Do you usually eat the foods when you crave them? _____

Have you gotten any information or advice about eating or not eating any particular foods during pregnancy? What was this advice? _____

Where did you get this advice . . (doctor, nurse, nutritionist, dietitian, friend, family member, book, T.V., magazine, teacher)? _____
Did you follow this advice? _____

Check the following items that you eat regularly:

<input type="checkbox"/>	Cornstarch (laundry starch)	<input type="checkbox"/>	Seafood
<input type="checkbox"/>	Plaster	<input type="checkbox"/>	Plant leaves or flowers
<input type="checkbox"/>	Dirt or clay	<input type="checkbox"/>	Dog food
<input type="checkbox"/>	Ice	<input type="checkbox"/>	Fresh fruit

Are you on a special diet?
What kind of special diet? _____
Who put you on this diet? _____
When did you start this diet? _____

Is anyone in your household on a special diet? Who _____
What kind of diet? _____
How long have they been on this diet? _____

Do you smoke?
How many cigarettes daily? _____
Do you drink alcoholic beverages (include beer)?
How much and how often? _____

Do you now take: Before pregnancy
did you take:

<input type="checkbox"/>	<input type="checkbox"/>	Diuretic (water) pills - How often _____
<input type="checkbox"/>	<input type="checkbox"/>	Vitamin pills - Kind (brand) _____ How many daily _____
<input type="checkbox"/>	<input type="checkbox"/>	Iron medication - Kind (brand) _____ How many daily _____
<input type="checkbox"/>	<input type="checkbox"/>	Birth control pills - How long did you take them? _____ When did you stop taking them? _____
	<input type="checkbox"/>	Medication for menstrual cramps - What _____ Every month? _____
<input type="checkbox"/>	<input type="checkbox"/>	Other medications - Kinds _____ How much each day? _____ How long have you taken these? _____

How old were you when you began menstruating? _____

Was your menstrual flow:

☐ Regular ☐ Not regular ☐ Heavy ☐ Light ☐ Average

Have you ever been checked for diabetes? _____ When? _____
 Did you have diabetes? _____
 Does anyone in your family have diabetes? _____ Who? _____

Who are the adults living in your household? _____
 (please answer with titles. . . such as mother, brother, husband, etc.)

Ages of the children in your household: _____

In your household, who does the following: (use titles)

Plans the meals _____
 Does the grocery shopping _____
 Prepares the food _____

How many times a week does someone do grocery shopping for your household? _____

List five foods that you DO NOT like:

Food	How Often Do You Eat This Food?
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

List five foods that are your FAVORITE foods:

1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

List five foods that you have NEVER TRIED:

Food	Why Haven't You Tried It?	Would You Be Willing to Try It?
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____

Date _____

NP _____

Teenage Food Habits Study
Questionnaire

Please answer the following questions, checking the correct answers or filling in the blanks.
If you give an approximate answer please write "approx." after the answer.

Birth date _____
Your height _____
Your weight _____
Your birth weight (if you know) _____

Number of pregnancies you have had _____
Number of live births _____ Birth weights _____

Are you presently:

- () Attending school
() Working full time
() Working part time
() Full time homemaker

How long have you lived in this county?

- () Less than a year
() 1 - 5 years
() 6 - 10 years
() Over 10 years

If you moved here from another state, please
give the name of the state: _____

Have you spent most of your life living:

- () In a large town (population of 100,000 or more)
() In a smaller town (population less than 100,000)
() In a farm or country home

Do you generally feel:

- () Good
() Tired
() Sick

Do you feel:

- () Same
() Better
() Worse

than you did 6 months ago?

How would you describe your appetite?

- () Hearty
() Moderate
() Poor

Has your appetite changed in the last 6 months? _____
How? _____

Are there foods that you didn't eat 6 months ago that you eat now? What foods? _____

Why didn't you eat them before? _____

Why don't you eat them now? _____

List foods that you eat every day (please include snack items):

Have you ever:

- a. Been overweight? _____ When? _____ How much overweight? _____
- b. Been underweight? _____ When? _____ How much underweight? _____
- c. Been on a weight reduction diet? _____ When _____
Describe the diet _____
How long were you on the diet? _____
How much weight did you lose? _____
- d. Have you ever taken pills to control your weight? _____ When? _____

How much do you think you should weigh? _____

Height and weight of parents (if you aren't sure . . . give approximate height and weight).

Mother	Height	_____	Weight	_____
Father	Height	_____	Weight	_____

Have you missed any meals within the past 2 weeks? _____

Why did you miss them? _____

Do you crave any particular foods? _____ What foods? _____

Do you usually eat the foods when you crave them? _____

Have you gotten advice about eating or not eating particular foods? What was this advice? _____

Where did you get this advice . . . (nurse, doctor, nutritionist, dietitian, friend, family member, book, T.V., magazine, teacher)? _____

Did you follow this advice? _____

Check the following items that you eat regularly:

- () Cornstarch (laundry starch)
- () Plaster
- () Dirt or clay
- () Ice
- () Seafood
- () Plant leaves or flowers
- () Dog food
- () Fresh fruit

Are you on a special diet? _____

What kind of special diet? _____

Who put you on this diet? _____

When did you start this diet? _____

Is anyone in your household on a special diet? Who _____

What kind of diet? _____

How long have they been on this diet? _____

Do you smoke?

How many cigarettes daily? _____

Do you drink alcoholic beverages (include beer)? _____

How much, and how often? _____

Do you take:

- () Diuretic (water) pills - How often _____
- () Vitamin pills - Brand name _____ How many daily _____
- () Iron medication - Brand name _____ How many daily _____
- () Birth control pills - How long have you taken them _____
- () Medication for menstrual cramps - What brand _____ Every month? _____
- () Other medications - Kind _____
- () How much each day _____ How long have you taken this _____

How old were you when you began menstruating? _____

Is your menstrual flow:

- () Regular
- () Not regular
- () Heavy
- () Light
- () Average

Have you ever been checked for diabetes? _____ When _____
 Did you have diabetes? _____
 Does anyone in your family have diabetes? _____
 Who? _____

Who are the adults living in your household? _____
 (please answer with titles . . . such as mother, brother, husband, etc.)

Ages of the children in your household: _____

In your household, who does the following: (use titles)

Plans the meals _____
 Does the grocery shopping _____
 Prepares the food _____

How many times a week does someone do grocery shopping for your household? _____

List five foods that you DO NOT like:

Food	How Often Do You Eat This Food?
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

List five foods that are your FAVORITE foods:

1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

List five foods that you have NEVER TRIED:

Food	Why Haven't You Tried it?	Would You Be Willing to Try It?
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____

APPENDIX C

FORMS FOR NUTRITION CALCULATION

Date _____

Food Intake Record
(24 Hour Recall)

Time	Place	Food Eaten	Amount
------	-------	------------	--------

Was this a typical day?What was different about this day?

FOOD DISLIKE CHECK SHEET

(PREGNANT SUBJECTS)

FOOD:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Liver																														
Other meat																														
Broccoli																														
Cabbage																														
Greens																														
Squash																														
Milk																														
Cheese																														

(NON PREGNANT SUBJECTS)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Liver																														
Other meat																														
Broccoli																														
Cabbage																														
Greens																														
Squash																														
Milk																														
Cheese																														

APPENDIX D

RAW DATA

TABLE XV
SUBJECTS LIVED IN COUNTY (YEARS)

Subjects	Age Group	<1 Years	1-4 Years	5+	Total N
Pregnant:					
	Young teens	1	2	4	7
	Mid teens	1	6	8	15
	Older teens	1	3	3	7
Non Pregnant:					
	Young teens	0	1	6	7
	Mid teens	1	6	8	15
	Older teens	1	1	5	7
 <1 year = 8.6% (5) 1 - 4 years = 32.8% (19) 5+ years = 58.6% (34)					

TABLE XVI
AGE OF GIRLS AND MONTH OF PREGNANCY

Subject Number	Age of Girl Year	Month	Month of Pregnancy
Young Teens:			
1	14	01	6
2	15	01	3
3	15	02	7
4	15	08	7
5	16	02	4
6	16	03	7
7	16	04	7
Mid Teens:			
8	16	07	7
9	16	07	4
10	16	07	8
11	16	11	4
12	16	11	8
13	16	11	5
14	17	01	5
15	17	01	1
16	17	01	9
17	17	03	3
18	17	06	2
20	17	11	3
27	17	10	8
28	17	10	7
30	17	10	5
Older Teens:			
21	18	00	7
22	18	02	7
23	18	02	6
24	18	02	8
29	18	05	5
25	19	04	7
26	19	08	4

TABLE XVII
AGE DISTRIBUTION INTO GROUPS

Pregnant					Non Pregnant			
Age Year	Month	n	Subject Number		Age Year	Month	n	Subject Number
14	01	1	1		14	11	1	1
15	01	1	2		15	01	1	2
15	02	1	3	Young Teens:	15	03	1	3
15	08	1	4	Pregnant 7	15	09	1	4
16	02	1	5	(Ages 14.10-16.04)	16	02	2	5, 6
16	03	1	6	Non Pregnant 7	16	03	1	7
16	04	1	7	(Ages 14.11-16.03)				
7					7			
16	07	3	8,9,10	Mid Teens:	16	06	2	8,28
16	11	3	11,12,13	Pregnant 15	16	08	1	9
17	01	3	14,15,16	(Ages 16.07-17.11)	16	09	1	10
17	03	1	17	Non Pregnant 15	16	10	2	11,12
17	06	1	18	(Ages 16.06-18.01)	16	11	1	13
17	10	3	27,28,30		17	02	1	15
17	11	1	20		17	03	1	14
15					17	06	3	16,17,18
					17	09	1	19
					18	01	2	20,21
					15			
18	00	1	21	Older Teens:	18	02	1	22
18	02	3	22,23,24	Pregnant 7	18	07	2	23,24
18	05	1	29	(Ages 18.00-19.08)	19	00	1	25
19	04	1	25	Non Pregnant 7	19	01	2	29,30
19	08	1	26	(Ages 18.02-19.08)	19	08	1	26
7					7			
				Total	58			

TABLE XVIII
CALCIUM INTAKE - FOOD SOURCES AND PERCENT RDA

Pregnant						Non Pregnant					
Subject No.	F/V*	B/C*	Milk mg	Total	RDA %	Subject No.	F/V*	B/C*	Milk mg	Total	RDA %
1.	41	54	1053	1148	71.8	1.	17	60	288	365	30.4
2.	0	30	360	390	24.4	2.	9	84	576	699	58.3
3.	0	196	365	561	35.1	3.	12	61	144	217	18.1
4.	0	60	144	204	12.8	4.	12	84	176	272	22.7
5.	0	0	144	144	9.0	5.	0	162	477	639	53.3
6.	0	165	765	930	58.1	6.	9	15	144	168	14.0
7.	0	0	504	504	31.5	7.	0	88	144	232	19.3
8.	21	90	0	111	6.9	8.	0	75	711	786	65.5
9.	0	180	288	468	29.3	9.	12	150	88	250	20.9
10.	0	120	666	780	48.8	10.	58	185	432	675	56.3
11.	72	90	603	765	47.8	11.	8	116	189	313	26.1
12.	0	120	1233	1353	84.6	12.	9	55	320	384	32.0
13.	26	60	720	806	50.4	13.	0	31	520	551	45.9
14.	31	120	720	871	54.4	14.	13	30	0	43	3.6
15.	0	60	432	492	30.8	15.	48	105	189	342	28.5
16.	0	120	0	120	7.5	16.	27	37	432	496	41.3
17.	31	120	0	151	9.4	17.	97	264	639	1000	83.3
18.	24	120	144	188	11.8	18.	29	64	0	93	7.8
20.	0	90	189	279	17.4	19.	18	114	288	420	35.0
27.	0	90	376	466	29.1	20.	21	174	144	339	28.3
28.	41	30	477	548	34.3	21.	12	30	189	231	19.3
30.	0	0	432	432	27.0	28.	71	12	422	505	42.1
21.	230	60	1962	2252	140.8	22.	12	0	0	12	1.0
22.	0	120	432	522	32.6	23.	0	0	144	144	12.0
23.	0	30	378	408	25.5	24.	9	31	144	184	15.3
24.	47	60	288	395	24.7	25.	21	74	189	284	23.7
25.	41	180	621	833	52.1	26.	0	120	0	120	10.0
26.	58	30	0	88	5.5	29.	46	120	351	517	43.1
29.	0	210	288	498	31.1	30.	0	75	0	75	6.3

*From Four Food Groups . . . (Fruits and vegetables, bread and cereal)

TABLE XIX
IRON INTAKE - FOOD SOURCES AND PERCENT RDA

Pregnant						Non Pregnant					
Subject No	Meat	F/V* mg	B/C*	Total	RDA %	Subject	Meat	F/V* mg	B/C*	Total	RDA %
1.	9.1	2.2	2.1	13.4	74.3	1.	4.8	1.2	1.4	7.4	41.0
2.	8.8	0	.7	9.5	52.7	2.	6.0	.5	1.9	8.4	46.7
3.	2.2	0	5.4	7.6	42.0	3.	5.6	1.1	2.1	8.8	48.9
4.	2.0	0	5.4	7.4	41.1	4.	3.8	.9	2.0	6.7	37.2
5.	5.5	0	6.0	11.5	63.9	5.	2.1	0	3.3	5.4	30.0
6.	7.1	0	3.6	10.9	60.3	6.	1.0	.4	1.3	2.7	15.0
7.	.7	0	6.0	6.7	37.0	7.	3.0	0	2.0	5.0	27.8
8.	2.2	1.1	2.0	5.3	29.3	8.	1.9	0	2.6	4.5	24.4
9.	.7	0	4.1	4.8	26.6	9.	1.3	1.2	2.6	5.1	27.7
10.	6.5	0	4.4	10.9	60.3	10.	8.1	2.1	3.5	13.7	76.1
11.	5.4	2.7	2.0	10.1	56.0	11.	2.9	.5	1.1	4.5	25.0
12.	3.9	0	9.7	13.6	75.7	12.	4.2	.5	1.9	6.6	36.7
13.	4.5	2.0	1.4	7.9	43.8	13.	3.2	0	1.4	4.6	25.6
14.	5.1	.4	9.7	15.2	84.4	14.	4.2	.8	.7	5.7	31.7
15.	9.6	0	7.4	17.0	94.4	15.	4.6	1.4	2.0	8.0	44.4
16.	5.6	0	3.7	9.3	52.0	16.	5.0	1.2	1.2	7.4	35.6
17.	3.8	1.6	3.7	9.1	50.4	17.	0	1.8	3.8	5.6	31.1
18.	1.9	1.0	9.7	12.6	70.2	18.	1.4	1.6	1.7	4.7	26.1
20.	3.3	0	6.0	5.3	29.7	19.	9.5	1.0	2.6	13.1	72.8
27.	4.0	0	8.0	12.0	66.7	20.	8.3	1.4	3.1	12.8	71.1
28.	8.7	2.2	.7	11.6	64.3	21.	7.1	.9	.7	8.7	48.3
30.	7.4	0	6.0	13.4	74.5	28.	4.7	1.3	2.3	8.3	46.1
21.	8.6	1.8	7.4	17.8	98.5	22.	4.9	.9	0	5.8	32.1
22.	3.8	0	3.7	7.5	41.5	23.	6.4	0	.8	7.2	39.5
23.	5.4	0	.7	6.1	33.8	24.	1.9	.5	1.4	3.8	21.1
24.	.7	3.0	1.4	5.0	27.9	25.	1.9	1.4	2.0	5.3	29.1
25.	3.6	2.2	10.1	15.9	88.3	26.	2.1	0	2.7	4.8	26.7
26.	4.2	.8	.7	5.7	31.4	29.	4.2	1.8	1.9	7.9	43.8
29	1.0	0	10.7	11.7	65.5	30.	6.7	1.1	.8	8.6	47.6

*From Four Food Groups . . . (Fruit and Vegetables, bread and cereal groups)

TABLE XX
APPROXIMATE CALORIC INTAKE OF PREGNANT SUBJECTS
FROM FOOD EXCHANGE GROUPS

Subject No.	Milk	Meat	Bread	Fruit	Veg.	Fat	Total
1.	450	525	560	60	25	180	1800
2.	188	600	240	0	0	180	1208
3.	188	150	480	0	0	180	998
4.	113	375	400	0	0	180	1068
5.	75	450	240	0	0	180	945
6.	338	750	480	0	25	180	1773
7.	188	150	80	180	0	180	778
8.	0	150	160	0	25	180	515
9.	150	75	480	0	0	180	885
10.	150	525	400	120	0	180	1375
11.	300	600	320	0	50	180	1450
12.	525	300	480	120	0	180	1605
13.	375	375	320	60	125	180	1255
14.	375	525	480	60	25	180	1645
15.	225	375	400	0	0	180	1180
16.	0	375	400	180	0	180	1135
17.	0	375	560	0	25	180	1140
18.	75	300	400	60	50	180	1065
20.	0	375	320	0	0	180	875
27.	300	375	560	60	0	225	1520
28.	150	375	160	0	25	180	890
30.	225	150	160	0	0	180	715
21.	900	938	720	120	50	180	2908
22.	225	600	480	0	0	180	1485
23.	0	525	320	0	0	180	1025
24.	150	150	160	0	50	180	690
25.	225	450	560	60	25	180	1100
26.	0	525	240	60	50	270	1145
29.	150	225	560	60	0	180	1175

TABLE XXI
APPROXIMATE CALORIC INTAKE OF NON PREGNANT SUBJECTS
FROM FOOD EXCHANGE GROUPS

Subject No.	Milk	Meat	Bread	Fruit	Veg.	Fat	Total
1.	150	150	320	0	0	180	800
2.	300	450	320	60	0	180	1310
3.	225	300	400	120	50	180	1275
4.	0	225	400	0	0	180	805
5.	150	300	480	60	0	180	1170
6.	75	225	320	0	0	180	800
7.	75	225	240	120	0	188	840
8.	600	300	240	0	0	188	1320
9.	0	150	720	0	0	270	1140
10.	225	375	640	60	25	225	1550
11.	0	300	240	60	0	180	780
12.	75	450	400	0	0	180	1105
13.	150	150	160	0	0	180	640
14.	0	263	320	60	0	180	823
15.	0	600	400	120	25	180	1325
16.	225	300	160	160	50	180	975
17.	300	225	480	60	50	180	1295
18.	0	150	240	0	12	180	582
19.	150	638	480	0	0	180	1448
20.	600	375	560	0	0	225	1760
21.	0	413	240	0	0	180	833
28.	0	525	240	0	50	180	995
22.	0	600	160	0	0	180	940
23.	75	450	80	60	0	180	845
24.	0	300	240	0	0	180	720
25.	0	300	480	0	12	180	972
26.	0	413	320	0	0	180	913
29.	150	338	400	0	25	180	1093
30.	75	338	160	120	25	180	898

TABLE XXII
MILK AND SOFT DRINK INTAKE (OZ) AND PERCENT
OF RDA FOR CALCIUM

Pregnant				Non Pregnant			
Subject No.	Milk	Soft Drink	RDA %	Subject No.	Milk	Soft Drink	RDA %
	oz				oz		
1.	24	8	71.8	1.	8	24	30.4
2.	10	30	24.4	2.	16	24	58.3
3.	10	6	35.1	3.	12	0	18.1
4.	4	0	12.8	4.	0	12	22.7
5.	4	12	9.0	5.	8	0	53.3
6.	16	0	58.1	6.	4	0	14.0
7.	10	12	31.5	7.	4	0	19.3
8.	0	12	6.9	8.	4	0	65.5
9.	8	24	29.3	9.	0	0	20.9
10.	8	0	48.8	10.	12	12	56.3
11.	8	0	47.8	11.	0	24	26.1
12.	29	12	84.6	12.	4	24	32.0
13.	20	0	50.4	13.	8	12	45.9
14.	20	12	54.4	14.	0	0	3.6
15.	12	0	30.8	15.	0	24	28.5
16.	0	12	7.5	16.	12	0	41.3
17.	0	12	9.4	17.	16	12	83.3
18.	4	0	11.8	18.	0	0	7.8
20.	0	12	17.4	19.	8	18	35.0
27.	16	8	29.1	20.	4	12	28.3
28.	8	0	34.3	21.	10	12	19.3
30.	12	0	27.0	28.	0	22	42.1
21.	44	0	140.8	22.	0	36	1.0
22.	12	0	32.6	23.	4	0	12.0
23.	0	0	25.5	24.	0	0	15.3
24.	8	0	24.7	25.	0	12	23.7
25.	12	0	52.1	26.	0	0	10.0
26.	0	16	5.5	29.	8	0	43.1
29.	8	0	31.1	30.	4	0	6.3

VITA 2

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Master of Science

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