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Graduate School

THE EFFECT OF NUTRITION EDUCATION ON
THE DIET OF PREGNANT TEENAGERS

by

Dorothy Whiteside

A Thesis in Partial Fulfillment
of the Requirements for the Degree of
Master of Science in the Field of Nursing

June 1974

192278

Each person whose signature appears below certifies that this thesis in his opinion is adequate, in scope and quality, as a thesis for the degree Master of Science.

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TABLE OF CONTENTS

	Page
LIST OF TABLES	vii
Chapter	
1. NEED FOR THE STUDY	1
2. REVIEW OF LITERATURE	5
MULTIPLE PROBLEMS OF TEENAGE PREGNANCY	5
GROWTH AND DEVELOPMENT OF ADOLESCENCE	7
MEDICAL COMPLICATIONS OF TEENAGE PREGNANCY	13
NUTRITION IN PREGNANCY	19
TEENAGE EATING HABITS	27
NUTRITION EDUCATION	32
3. PURPOSE, TYPE, AND SCOPE OF THE STUDY ASSUMPTIONS AND LIMITATIONS	43
PURPOSE OF THE STUDY	43
TYPE OF STUDY	43
SCOPE OF THE STUDY	44
LIMITATIONS	46
ASSUMPTIONS	47
4. METHODOLOGY	48
STUDY SETTING	48

	Page
SELECTION OF THE STUDY GROUP	50
PERSONAL INTERVIEWS.	50
PRE-TESTS AND POST-TESTS USED	52
NUTRITION CLASSES	57
EVALUATION	58
5. CASE STUDY FINDINGS	59
SUMMARY OF RESEARCH DESIGN AND PURPOSE	59
SUBJECT NUMBER 1	60
SUBJECT NUMBER 2	63
SUBJECT NUMBER 3	67
SUBJECT NUMBER 4	70
SUBJECT NUMBER 5	72
SUBJECT NUMBER 6	75
SUBJECT NUMBER 7	78
SUBJECT NUMBER 8	82
SUBJECT NUMBER 9	85
6. ANALYSIS AND DISCUSSION OF RESULTS.	89
ANALYSIS OF FINDINGS FOR THE FOOD GROUPS	89
FOOD DISLIKES OF STUDY SUBJECTS.	93
SNACK PREFERENCES	93
SACK LUNCH DAYS VERSUS FOOD TRUCK DAYS.	94

REACTIONS OF STUDENTS TO NUTRITION CLASSES	96
7. SUMMARY, CONCLUSIONS, RECOMMENDATIONS	98
SUMMARY	98
CONCLUSIONS	100
RECOMMENDATIONS	102
BIBLIOGRAPHY	103
APPENDIXES	
A. TOOLS FOR DATA COLLECTION	112
B. OUTLINE OF NUTRITION CLASSES	119
C. PARENT CONSENT FORM.	129
D. LETTERS	131

LIST OF TABLES

Table	Page
1. Study Subjects	51
2. Subject Number 1	61
3. Subject Number 2	65
4. Subject Number 3	68
5. Subject Number 4	71
6. Subject Number 5	74
7. Subject Number 6	77
8. Subject Number 7	80
9. Subject Number 8	83
10. Subject Number 9	86
11. Sack Lunch Days Versus Food Truck Days	96

Chapter 1

NEED FOR THE STUDY

In 1970, there were approximately 15 million females between the ages thirteen and twenty (U. S. Census, 1971). Teenage pregnancy is on the rise in the United States, with the rate of births to teenage mothers being one out of every six deliveries (McGanity et al., 1969, p. 785). Approximately 2 percent of teenage pregnancies occur prior to the mother's fifteenth birthday, 31 percent are during the fifteenth and sixteenth years, and 66 percent during the seventeenth, eighteenth, and nineteenth years (McGanity et al., 1969, p. 785). Pregnant teenagers, and their infants, are considered at risk due to the obstetrical complications seen among this group, such as anemia, toxemia, prematurity, low birth weight, and high neonatal deaths. Both obstetricians and pediatricians are concerned with pregnancy which occurs during the mother's growth period. One evidence of this is the number of articles on this topic appearing in medical literature in the last twenty years.

It is necessary to define when the growth of the adolescent girl occurs. About two to three years before the first menstrual flow, there is a sudden spurt of growth. In the United States the average age at the time of the first menstrual flow (menarche) is

twelve and one-half to thirteen years (National Research Council, 1970, p. 140). After the onset of menarche, linear growth continues for approximately four years, during which time 8 percent of the total physical growth takes place (McGanity et al., 1969, p. 785). The physical growth rate of puberty is second only to that of the infant (Daly, 1966, p. 711). Pregnancy after the completion of growth, which is usually after seventeen years of age, is not considered hazardous, as the body has biologically matured. The statistical outcome of pregnancies supports the fact that pregnancies of girls seventeen to twenty years of age resemble those of young mature women twenty to twenty-four years of age (National Research Council, 1970, p. 140).

Since adolescence is a time of growth and maturation, certain essential nutrients are needed in large quantities in order to meet the nutritional needs during the growing period. Studies of the dietary intakes of children and adolescents have shown that teenagers tend to have the poorest diets of any family member, with teenage girls having poorer diets than teenage boys (Spindler, 1963; Peckos and Heald, 1964). The typical teenage girl's diet is usually lacking in sufficient amounts of calcium, ascorbic acid, and iron. The faulty diet, so typical of the average teenager, is not sufficient to meet all the nutritional needs of the body. With the additional nutritional demands of pregnancy, the pregnant teenager's diet is usually very

deficient in the essential nutrients for both the growth of the mother, and the development of the fetus.

Ideally, good nutritional habits should begin in early childhood, because eating habits are formed early in life, and are difficult to change in adult life.

This study is concerned with trying to bring about dietary changes of pregnant teenagers by a series of planned classes. Some health authorities feel that the nutritional history of the mother prior to conception is more important to the outcome of pregnancy than is the diet during the pregnancy itself. The researcher is in agreement with this theory, and the design of this study is not intended to suggest that good nutrition during pregnancy, per se, is the most important factor in the outcome. However, good nutrition during pregnancy is a causative factor in the healthy development of the fetus, as shown by Burke, who studied the nutritional histories of women during consecutive pregnancies. She found that improving the diet of the mother during subsequent pregnancies brought an improvement in the condition of the infant at birth. The reverse also occurred when the diets during the second pregnancy were poorer than during the first pregnancy (Burke, 1949, p. 458).

Better nutrition might be brought about by nutrition education in the schools from childhood through adolescence. Nationally, nutrition education is receiving increased emphasis in the elementary

schools. Nutrition education to teenagers is difficult in that they tend to rebel against authority. This rebellion is often expressed in their eating habits. Many nutrition authorities are trying to discover ways of "turning on" the teenager to better eating habits. Nutrition projects, cooking classes, and nutrition games have been used with some success. Other approaches might be: improving family diets in general, improving the nutritional values of popular food products, and emphasizing nutritional snack foods. Television could be used as an appeal to youth to adopt better nutritional habits.

Chapter 2

REVIEW OF LITERATURE

MULTIPLE PROBLEMS OF TEENAGE PREGNANCY

The teenage years are characterized by emotional stresses and adjustments. Erickson classifies adolescence as a developmental stage of crisis (Erickson, 1963). According to Shank, when pregnancy occurs during adolescence, the psychological impact is perhaps more detrimental to her lifetime well-being and that of her child than are the effects of physical immaturity (Shank, 1970, p. 8). The pregnant adolescent must work through a multiplicity of conflicts: normal developmental crisis of adolescence, psychological and physiological problems associated with pregnancy, and moral dilemmas converging to create a crisis situation of the most complex nature (Davis and Grace, 1971, p. 585). Pregnant girls need plenty of understanding and support, but society tends to have a punitive attitude toward early pregnancy, especially if it is out-of-wedlock (Shank, 1970, p. 8). Although society formerly withheld support from these girls, there is now an improvement in attitudes and more services are available to them. Her problems are a challenge for those who counsel and give service.

The teenage pregnant girl is considered at risk, not only from the physiological and psychological aspects, but also from the sociological, educational, and vocational aspects. Many are not married. Even if they are, the divorce rate of teenagers is three to four times higher than among those married at a later age (Wallace, 1965, p. 1125). The highest divorce rate is found among couples who married between fifteen and nineteen years of age (Howard, 1971, p. 473). Wallace found that girls who give birth around fourteen to fifteen years of age are very likely to have an almost immediate repetition of pregnancy (Wallace, 1965, p. 1126). Their potential of adding to the population is high since they have many years of fertility ahead of them.

Pregnant teenagers often drop out of school, and many do not return to finish their education. One study found pregnancy to be the most frequent single cause for adolescents to drop out of school (Stine et al., 1964). These girls usually are unemployable and are eventually added to the welfare roles in the community. Howard states that girls under sixteen who deliver have a greater prospect of low birth weight and premature babies, are less likely to finish school, are less likely to marry, and tend to have repeat pregnancies out-of-wedlock (Howard, 1971, p. 480).

The infant of the pregnant adolescent is also at high risk, for the incidence of developmental abnormalities and neurological

complications are increased, related in part to prematurity, complications of pregnancy, and the sociological milieu of this group (Osofsky, 1968, p. 869). Prematurity, fetal mortality, and neonatal mortality occur with far greater frequency than among the population at large (Osofsky, 1968, p. 869; Shank, 1970, p. 8).

In 1960, for infants born to white mothers under fifteen years of age, the neonatal mortality rate was 32.1/1,000 live births, compared with a rate of 15.9/1,000 for those whose mothers were twenty to twenty-four years of age. Among non-white mothers, the neonatal mortality rate for the very young was 46.5/1,000, compared with 25.3/1,000 for those twenty to twenty-four years of age. (National Research Council, 1970, p. 144). From a developmental point of view, infants born to poor and non-white teenage mothers have prognoses worse than those of any other group (Osofsky, 1968, p. 869).

GROWTH AND DEVELOPMENT OF ADOLESCENCE

Adolescence is a transitional period from childhood to maturity which may last from six to eight years. During adolescence there are physical, sexual, emotional, and social changes which are so intricately woven together that one can not fully understand one aspect out of context from the others.

There are several stages of adolescence in the female which need to be defined:

puberty- the time during early adolescence when secondary sexual characteristics appear. This is sometimes called the adrenarche.

adrenarche- the stage during puberty controlled by the adrenal androgens. The adrenarche occurs two to three years prior to the first menstrual period, about nine or ten years of age. In the female this involves the initial breast budding, changes in the bony pelvis, axillary and pubic hair, acne, and long bone growth (Lundy, 1966, pp. 769, 775).

menarche- the onset of the first menstrual flow. The average age of the first menses in the United States is twelve and one-half to thirteen years (National Research Council, 1970, p. 140), with a normal range from ten to sixteen and one-fourth years (Daly, 1966, p. 714).

maturity- this stage is reached when there is cyclic ovulatory menstruation and complete maturation of the secondary sex characteristics (Lundy, 1966, p. 759).

Endogenous Factors

Underlying the many changes of adolescence is the endocrine system. Influenced by the hypothalamus, the endocrine system stimulates the growth process itself, which secondarily controls reproduction. The hypothalamus, programmed by endogenous and

exogenous factors, initiates the growth spurt by stimulating the anterior pituitary (adenohypophysis), the latter secreting at least seven tropic hormones: growth or somatotropic hormone (STH), thyrotropin or thyroid stimulating hormone (TSH), adrenocorticotrophic hormone (ACTH), melanocyte stimulating hormone (MSH), and the gonadotropic hormones--follicle stimulating hormone (FSH), luteinizing hormone (LH), and prolactin or luteotropic hormone (LTH).

Thyroid stimulating hormone (TSH) from the anterior pituitary acts on the thyroid gland to increase its size and vascularity. It causes an increased release of thyroid hormone from the functional unit of the thyroid, the follicle (Lundy, 1966, p. 764). Thyroid hormone is an important factor in growth and development, for there is an interrelationship between thyroid hormone, and the growth hormone from the anterior pituitary. It is during early adolescence that the thyroid gland undergoes its most marked increase in size and weight (Lundy, 1966, p. 765).

Hypothyroidism may delay or prevent the normal process of maturation in adolescence, depending upon the degree of hypothyroidism, and its time of occurrence. The occurrence of late developing hypothyroidism may bring about delayed growth, and arrest maturation, poor bone development, and delayed menarche. If occurring later still, there may be anovulatory menstrual cycles, possibly due to failure of the pituitary to produce LH (Lundy, 1966, p. 765).

The growth hormone, or somatotropin (STH), is released as menarche approaches. This causes a sudden increase in the rate of body growth. STH causes an increase in body length by acceleration of the growth of epiphyseal cartilage, without hastening ossification of cartilage or epiphyseal fusion (unlike testosterone and estrogen) (Lundy, 1966, pp. 762-763). This maximal growth, which usually occurs between ten and eleven years of age, not only produces body length, but also weight, chest width, iliac diameter, and the development of ossification centers. Girls who have an early menarche tend to be short in stature, while girls who have a late menarche tend to be tall (Daly, 1966, p. 711). Body growth is usually complete within three to four years after menarche, and most girls have achieved gynecologic maturity by seventeen years of age (Daly, 1966, p. 711; National Research Council, 1970, p. 140).

The hypothalamus especially controls the gonadotropins, as shown by direct stimulation of the hypothalamus, which shows centers for follicle stimulating hormone (FSH) and luteinizing hormone (LH) releasing factors (Lundy, 1966, p. 761). These centers are responsive to the presence of estrogen and progesterone hormones. Primary follicles are present in the ovaries at birth and throughout childhood, but they do not secrete estrogen. FSH and LH are not found in the pituitary until early adolescence. It can only be speculated at this time what factors initially stimulate the releasing factors from the

hypothalamus to produce FSH and LH from the anterior pituitary in the adolescent (Lundy, 1966, p. 761).

When FSH and LH are secreted at puberty, the ovaries and follicles within them begin to grow. The follicles secrete large quantities of estrogen. As estrogen levels increase, FSH is depressed, and LH production is stimulated. The first meiotic division of the ovum occurs under the stimulus of LH, which is followed by rupture of the follicle, and ovulation (Guyton, 1971, p. 673).

The early menstrual cycles differ from those of the adult in that they are usually shorter, the time interval between periods is usually greater, and they are usually anovulatory (Daly, 1966, p. 714).

Estrogen production by the follicles effects body changes. About ten or eleven years of age, the ducts and fatty deposits of the breasts develop, plus the buttocks form fatty deposits. The hormone increases the amount of pubic hair, and the size of the vulvae and uterus. About eleven or twelve years of age, estrogen causes the walls of the vagina to thicken, and the vaginal pH to become more acidic (Lundy, 1966, p. 771).

Progesterone does not affect the body changes of adolescence significantly, and is primarily a hormone related to pregnancy and the gravid uterus (Lundy, 1966, p. 772).

Exogenous Factors

The exogenous factors, within the genetic potential of the individual, may change the pattern of growth and development. Such factors are nutrition, health, climate, socioeconomic status, and emotional milieu (Lundy, 1966, p. 773; Daly, 1966, p. 712).

Psychological Factors

There can be psychological problems arising from the physical changes of the adolescent. The prepubertal girl may develop conflicts when she compares her shape with that of mature women, leading to disillusionment, feelings of deficiency and shame about her body (Smith, 1971, p. 210). She may react to these feelings by withdrawing from social contacts. As the result of her weakened ego, the early adolescent girl may show hurt feelings frequently, have an inadequate self-esteem, and retreat into a dreamworld periodically (Daly, 1966, p. 712).

According to Daly, complete sexuality usually takes place after biological maturation is complete. There are many phases of sexuality which the girl experiences before she is ready for complete heterosexual involvement. When a girl enters puberty, she forms close relations outside her home for two reasons: the first is that mother love is a threat to her independence, and the second is that her love for her father infringes on the incestual taboo (Daly, 1966,

p. 717). Usually her first close relationship outside the family is with other girls, which have certain homosexual characteristics such as tenderness, exclusiveness, and related jealousies. As her ego strengthens, the adolescent girl will establish positive heterosexual relationships.

Daly says that the adolescent girl is much happier with fantasies of fulfillment than direct sexual expressions. By late adolescence love becomes the center of her being, and this love is quite different than that which develops in the normal male. A young woman's love runs much deeper and has more narcissistic and passive qualities (Daly, 1966, p. 719). Pregnancy in the adolescent female usually is a symptom of emotional unrest which usually involves rebellion against the parents, and usually is not the result of an overwhelming need for fulfillment (Daly, 1966, p. 720).

MEDICAL COMPLICATIONS OF TEENAGE PREGNANCY

Teenage pregnancies prior to the completion of biological maturity have high incidences of certain major health problems which place both the mother and the infant at high risk. The complications most frequently seen among adolescent mothers are toxemia of pregnancy, anemia, precipitous and prolonged labor, and feto-pelvic disproportion. The infant born to the young teenage girl has a high

incidence of prematurity, low birth weight, and high neonatal death rate.

Toxemia

Toxemia of pregnancy, one of the major obstetrical complications of teenage pregnancy, is observed most frequently in girls fifteen years of age and under (Aznar and Bennett, 1961; Poliafoff, 1958; Utian, 1967; Coates, 1970 and 1971; Mussio, 1962; Bataglia et al., 1963; Bochner, 1962; Osofsky, 1970; Hassan and Falls, 1964). Marchetti and Menaker found that the younger the mother, the higher the incidence of toxemias (1950, p. 1014). The National Research Council came to the same conclusion, with parity and race held constant, that the incidence of toxemia rises sharply with each year under twenty (National Research Council, 1970, p. 149). Some reasons given for this problem are the lack of development and balance of the endocrine system, emotional stress of early pregnancy, poor diets, and inadequate prenatal care (National Research Council, 1970, p. 149; Israel and Woutersz, 1963, p. 662; Semmens and McGlamory, 1960, p. 37). When parity is examined for incidence of toxemia, Beck and Rosenthal state that 70 percent of maternal admissions with complications of eclampsia are primigravida (Beck and Rosenthal, 1955). Several studies show that the incidence of toxemia in primiparas parallel the incidence of weight gain in excess of forty pounds

(Semmens and McGlamory, 1960, p. 35; Peckos and Heald, 1964, p. 27). Several authors have correlated the incidence of toxemia with the type of diet, with toxemia occurring more frequently in women who eat a "poor" to "very poor" diet (Kaltreider, 1970; Burke, 1943). The rate of toxemia among these women was found to be 44 percent by Burke. Clough found from a study of 175 young primiparas, both black and white, that the incidence of pre-eclampsia is higher among young white girls than black (1958, p. 381).

Anemia

Iron-deficiency anemia is the reduction in the concentration of hemoglobin per 100 ml. of blood (hemoglobin concentration), the number of erythrocytes per cubic millimeter of blood (erythrocyte count), and/or the volume of packed red cells per 100 ml. of blood (hematocrit). The hemoglobin concentration, a common measure of use, should be no less than 11 gm. in pregnancy (Shank, 1970, p. 9). The function of hemoglobin is to carry oxygen to the cells of the body.

Iron-deficiency anemia is frequently observed in the teenager, and is a particular problem for the pregnant adolescent (National Research Council, 1970, p. 148; Mussio, 1962; Shank, 1970; Israel and Woutersz, 1963; Osofsky, 1968). Clough states that it is particularly prevalent among young pregnant blacks (1958, p. 381). It is of particular concern during pregnancy, as it could prevent adequate

oxygenation of the body cells of both the mother and the developing fetus. Anemia during pregnancy has been associated with premature labor (Josey, 1954, p. 303; California State Department of Public Health, 1960, p. 23).

Hemoglobin is a complex molecule comprised of protein and iron, and its production by the body needs an ample supply of many nutrients: protein to furnish the essential amino acids, sufficient calories to protect the protein from being utilized for energy, iron and other minerals, plus several vitamins which serve as cofactors in the synthesis of heme and globin (Shank, 1970, p. 8). Therefore, the diet is an important factor in the normal production of hemoglobin. Nearly 6 mg. of absorbed iron is needed by the pregnant woman daily to meet her own needs, and those of the fetus. Only about 10-20 percent of food iron is likely to be absorbed and utilized, as some is lost through the intestine, the urinary tract, and the integument (Shank, 1970, p. 9). The maternal iron stores are seldom large enough to meet the requirements of pregnancy. Therefore, ferrous iron supplements during pregnancy are recommended by the National Research Council, with the addition of 30-60 mg. of iron to the daily diet (Shank, 1970, p. 9).

Precipitous, and Prolonged Labor

Precipitous labor has been mentioned in the literature by

Semmens as a complication of young teenage pregnancy. The highest frequency of precipitous delivery among primiparas were thirteen to fourteen years of age (Semmens and McGlamory, 1960; Semmens, 1965).

Prolonged labor is mentioned by many authors as a complication of adolescent pregnancy. The rate among teenagers may be four to six times the normal rate of young women. (Semmens and McGlamory, 1960; Mussio, 1962; Hassan and Falls, 1964; Aznar and Bennett, 1961; Bochner, 1962; Semmens, 1965; National Research Council, 1970, p. 148).

Excessive Weight Gain

Shank states that 10-12 percent of the adolescents entering pregnancy are obese (1970, p. 8). According to Semmens, 30 percent of the pregnant adolescents gained in excess of twenty-five pounds (1965, p. 83). Excessive weight gain is also stated as a problem in adolescent pregnancies by Howard (1971, p. 473). Clough found that twice the number of white young primipara gained excess amount of weight as blacks (1958, p. 375).

Feto-pelvic Disproportion

Feto-pelvic disproportion, or contracted pelvis, is quoted by many as being a significant problem among young pregnant adolescents (National Research Council, 1970, p. 148; Howard, 1971;

Hassan and Falls, 1964; Battaglia et al., 1963; Bochner, 1962).

Mussio, however, states that there is no increased incidence of fetopelvic disproportion because of pelvic immaturity (1962, p. 444).

Aznar and Bennett (1961) found that there was only a slight increase in the C-section rate, whereas Mussio found no increase in that rate (1962).

Low Birth Weight

One of the complications of young teenage pregnancy is the low birth weight infant (National Research Council, 1970, p. 148; Howard, 1971; Semmens and McGlamory, 1960; Gold and Stone, 1968). These infants are defined as weighing less than 2500 gm. at birth, being either premature, or full-term. These infants have a mortality rate forty times that of normal weight full-term infants (Fitzpatrick et al., 1971, p. 403). Preventing the occurrence of the low birth weight infant is currently one of the targets for lowering the neonatal death rate in the United States. Hulka and Schaaf state that the adolescent primipara does not differ in complications from the older primipara, but that their infants "tend to be delivered earlier, weigh less, and therefore have a poorer chance of survival: (1964, p. 685).

Prematurity

Prematurity (the birth prior to the thirty-seventh week of gestation) occurs more frequently in teenage pregnancies (Semmens

and McGlamory, 1960; Aznar and Bennett, 1961; Howard, 1971; Battaglia et al., 1963; Osofsky, 1968; Hassan and Falls, 1964; National Research Council, 1970, p. 148). Semmens and McGlamory estimate that two-thirds of the premature infants of adolescent mothers are due to the incomplete maturation of the reproductive organs (1960, p. 37).

High Neonatal Death Rate

The neonatal death rate (occurring during the first twenty-eight days of life) of infants born to adolescents is high, due partly to the high incidence of premature and low birth weight infant (Howard, 1971; Osofsky, 1968; National Research Council, 1970, p. 148).

NUTRITION IN PREGNANCY

History

At the turn of the century, an obstetrician in Germany by the name of Ludwig Prochownick contended that semistarvation of the mother was a blessing in disguise. He observed that when a woman was kept on a diet low in carbohydrates, with fluids restricted, the delivery of the resulting small, light-weight baby would make for an easier, more comfortable delivery for the woman. The experience of women in Germany during World War I who gave birth to viable, healthy infants despite strict food rationing, seemed to support the

belief that the fetus will receive all the nourishment it needs regardless of the mother's nutritional status (Shank, 1970, p. 4). With the advancements in the field of nutrition, it is becoming more evident that maternal nutrition is an important factor in the outcome of a healthy infant. Some feel that the infant is parasitic to a small extent, but that the mother with dietary deficiencies is more likely to have an unhealthy infant (Seifrit, 1961, p. 459).

The dietary history of the mother over a long period of time is important to the health of her developing infant, as observed during World War II. Smith reported on the effects of wartime starvation in Holland. Prior to the war, the women had fair nutrition. In October, 1944, the food situation in Holland became critical for a period that lasted at least five months but not more than eight months. During the early part of 1945 the pregnant women had less than 1,000 calories, and from 30 to 40 gm. protein daily.

The infants conceived before, and born during the hunger period, were shorter and weighed less than those born before this period. There were reduced numbers of births; prematurity and congenital malformations were slightly increased but not significantly. There was no effect on the incidence of stillbirths, neonatal deaths, or lactation (Smith, 1947, pp. 599-605). During the hunger period, amenorrhea was common, and too few babies were conceived for

data on stillbirths, prematurity, and neonatal death rate to be statistically reliable (Stearns, 1958, p. 1656).

Of great interest to the medical profession, was the fact that toxemia was not increased (Smith, 1947, p. 601). Because table salt was scarce during that period of time, interest was directed to the role which salt plays in the incidence of toxemia of pregnancy. Perhaps of greater importance is the fact that the women of Holland had a history of good to fair nutrition prior to the hunger period, and also the types of foods they ate during the hunger period. The effects of the hunger period in Holland suggest that short periods of restricted intake after several years of fair nutrition do not produce extreme problems of pregnancy.

Compared to this was a study done by Antonov on the effects of the Seige of Leningrad. The seige lasted from August, 1941 to January, 1943. The women of Leningrad did not have an adequate diet during the years prior to the seige. During the seige, their diet was both insufficient and inferior, with the staple food being bread made from defective rye flour, with cellulose bran and malt used as fillers. In 1942, the birth rate fell, and the stillbirth rate doubled during the first half of 1942. Prematurity increased to 41.2 percent of the total live births. Nine percent of the full-term infants and 31 percent of the premature infants died during the neonatal period. During the second half of 1942, few babies were born. This report

suggests that poor nutrition prior to conception, plus poor nutrition during pregnancy produced an extremely poor pregnancy outcome (Antonov, 1947, pp. 250-251).

During the 1940's, studies indicated that maternal nutrition had an effect upon the pregnancy outcome. However, in the 1950's, there were reports negating the earlier claims (Shank, 1970, p. 4). The result was disillusionment and disinterest in maternal nutrition. Now, in recent years, there has been a renewed interest in maternal nutrition. The science of nutrition is rapidly expanding, with new knowledge about the role of nutrition in pregnancy and disease. There is increasing evidence that maternal nutrition is critically important to both the mother and the developing fetus (Shank, 1970; National Research Council, 1970; Brewer, 1967; Jacobson, 1971; Taylor, 1971; Theobald, 1966; Wilson et al., 1966; Winick, 1971).

Nutritional Needs During Adolescence

The Ten-State Nutrition Survey in the United States, 1968-70, which studied different age and cultural groups, found that adolescents between the ages of ten and sixteen had the highest prevalence of an unsatisfactory nutritional status. ("Highlights from Ten-State Nutrition Survey," 1972, p. 7).

Because of the growth spurt during adolescence, the body requires certain additional nutrients to meet the body's functions,

such as protein, calories, calcium, iron, and certain vitamins. Teenagers' diets are most likely to fall short of calcium and iron (Leverton, 1968, p. 14; Hampton et al., 1967, p. 395; Everson, 1960, p. 17; McGanity et al., 1969, p. 786); ascorbic acid (Leverton; Everson); and to a lesser extent Vitamin A (Everson), and niacin (McGanity et al.).

Calories

12 to 14 years of age- 2,300*

14 to 16 years of age- 2,400*

16 to 18 years of age- 2,300*

* +200 calories for pregnancy

Recommended Daily Dietary Allowance, National Research Council, 1968.

Prior to menarche, caloric intake increases, reaching an average maximum of 2,500 to 2,600 between the twelfth and thirteenth years, coinciding with the surge of growth at that time. After this peak caloric intake, there is a rapid decline until adulthood is reached. Girls who mature earlier have an increased caloric intake earlier than the late maturing girls. Caloric requirements correlate with the physiological growth, and therefore when estimating an individual's caloric needs during adolescence, the needs must be based on the physiological development rather than on chronological age (National

Research Council, 1970, pp. 150-151). Growth during adolescence requires caloric intake, deprivation during the growing period is not well tolerated by the adolescent.

Protein

12 to 18 years of age- 50-55 gm.*

* +10 gm. for pregnancy

Recommended Daily Dietary Allowances, National Research Council, 1968.

The requirements for protein are related to the maturing process of the body. Proteins are essential for enzyme and hormone synthesis. The accelerated growth period prior to menarche requires adequate protein. In pregnancy, from two to eight weeks after conception, amino acids are needed especially during major organogenesis of the fetus (Brandt, 1963, pp. 604-606). After puberty, there is a deceleration of growth and therefore a decrease in protein needs (National Research Council, 1970, p. 152). The results of several studies of adolescents indicate that the average protein intakes are higher than the recommended levels in the 1968 revision of the Recommended Dietary Allowances (National Research Council, 1970, p. 152). Beyond twelve years of age, the mean protein intakes were found to remain about 75 gm. daily (Eppright et al., 1954, p. 381).

Calcium

12 to 18 years of age- 1.3 gm.*

* +0.4 gm. for pregnancy

Recommended Daily Dietary Allowances, National Research Council, 1968.

Prior to menarche, girls ingest between 0.8 and 1.2 gm. of calcium daily (National Research Council, 1970, p. 153). After twelve years of age, the intake levels of calcium decline, until adulthood is reached, where between 0.4 and 0.8 gm. of calcium per day is ingested (as compared to the recommended intake of 1.0 to 1.6 gm. calcium per day for the adolescent) (National Research Council, 1970, p. 153).

The retention and efficiency of calcium does not depend only upon the intake; a gradual increase in the intake does result in a gradual increase in retention, but an increase beyond a certain level has little effect on the retention. Calcium absorption and retention increase during the growth spurt and premenarchal period (National Research Council, 1970, p. 153). Stress decreases calcium retention, regardless of previous diet or nutrition. In a study of pregnant girls and young women, each emotional disturbance was found to decrease calcium retention (Stearns, 1958, p. 1658). Also, after menses begins, there is a decline in the calcium retention, perhaps

due to a depressive effect of sex hormones and a decrease in the growth rate (National Research Council, 1970, p. 153).

Since calcium retention needs are higher during the period of rapid growth during adolescence, for adequate mineralization of the bones, a mean retention level of 400 mg. of calcium per day must be maintained for several years during this period. In order to retain this level of calcium per day, the adolescent must ingest between 1.0 to 1.6 gm. of calcium per day (National Research Council, 1970, p. 153). Calcium absorption can not take place without the presence of Vitamin D in the body, which should be about 400 IU per day.

Iron

12 to 18 years of age- 18 mg.*

* same amount for pregnancy

Recommended Daily Dietary Allowances, National Research Council, 1968.

The daily diet is usually deficient in the amount of iron required. However, the body is evidently capable of becoming more efficient in its ability to absorb iron during periods of low iron intake. Even with the increased iron absorption, there are indications that the diets of adolescent girls do not provide an iron intake adequate to provide the requirements for pregnancy (National Research Council, 1970, pp. 153-154).

Ascorbic Acid

12 to 18 years of age- 50 mg.*

* +10 mg. for pregnancy

Recommended Daily Dietary Allowances, National Research Council, 1968.

Counseling the Pregnant Adolescent

The diet regimens commonly used in prenatal clinics are not suitable for adolescents, as they are generally restrictive in calories (National Research Council, 1970, p. 159). To sustain and complete her own growth, she requires a diet rich in calories, protein, and calcium. In addition, the general prenatal diet regimens are not geared to the eating habits of the adolescent, and the foods listed are too expensive for low-income families to purchase.

TEENAGE EATING HABITS

Teenagers in the United States have been found to have the poorest diets of any family member. Teenage girls have a poorer diet than teenage boys, with six out of ten eating a poor diet (Peckos and Heald, 1964, p. 28; Wyman, 1972, p. 3). The sixteen-year-old girl was found to be the most deficient in all essential nutrients (Eppright et al., 1954). Clinical examinations and nutrition surveys indicate that 30 percent to 35 percent of teenagers in the United

States are overweight, and 19 percent are underweight (Peckos and Heald, 1964, p. 28). Ten to twelve percent of the adolescents entering pregnancy are overweight, and a smaller proportion are underweight (Shank, 1970, p. 8).

Teenagers frequently adopt bizarre eating patterns regardless of being underweight, overweight, or normal weight. Spindler explains the poor eating habits among adolescents:

1. Teenagers take part in many activities that keep them away from home at meal time.
2. Their habits begin to be influenced more by conformity to peer groups than by their home.
3. Their desire to assert independence often influences them to abandon formerly good eating habits.
4. They skip breakfast because they do not allow enough time for it.
5. In selecting snacks, they pick foods having calories derived from fats, sugars, and starches.
6. Many teenagers, particularly girls, fear the word "fat" whether they are overweight or not.
7. They no longer drink milk or they don't drink a sufficient amount of milk.

(Spindler, 1963, p. 29)

Girls are figure conscious, and are apt to skimp or skip on nourishing foods. One study revealed that 60 percent of high school girls had been on reducing diets by the time they were seniors (Dwyer et al., 1967). Teenage girls become alarmed over their body changes, and notice the fatty deposits their bodies form during the development of secondary sex characteristics, stimulated by increased hormonal secretions. They often go on "crash" diets to lose the "fat."

Psychologist Dr. Joyce Brothers states:

Young people stuff themselves to make themselves happier and tend to overeat in spurts, generally at times when they are alone and feeling sorry for themselves. They tend at times to eat the handiest foods, the ones that don't require preparation, such as potato chips. Then they realize they are overweight, and go on a crash diet which makes them so unhappy and hungry that they start to overeat once again. It's circular. (Wyman, 1972, p. 3)

She states that teenagers use food as a means of rebelling against their parents--they eat what the group wants them to eat, not what parents advise.

Meal Patterns

Teenage eating habits appear to be irregular, often skipping meals throughout the day. McGanity et al. found that only five out of eight adolescent pregnant girls ate breakfast regularly (McGinity et al., 1969, p. 778). Among the nonpregnant teenagers, a study by Hinton et al., disclosed that about 44 percent of the girls in their

study indicated they were not hungry at breakfast time; 7 percent said they were not hungry at lunch; and 8 percent said they were not hungry at dinner time (Hinton et al., 1962, p. 843). A study done by Huene-mann et al. found that the lunch is the meal most frequently omitted by teenagers during summer vacations. During the school year, though, the lunch and breakfast were equally omitted (Huenemann et al., 1968).

According to several authors, the dairy products contributed the most calories per day of any food group (Huenemann et al., 1968, p. 24; Hampton et al., 1967, p. 395). This does not seem to correlate with another study showing that 43.5 percent of total calories of teenagers' diets comes from fat, and that their consumption of sugar is high (Hodges and Krehl, 1965, p. 203).

Snacks

Snacks are an important aspect of the teenagers' diet, as they usually eat more than three times a day (Huenemann et al., 1968, p. 17). Snacks are generally consumed in the afternoon and evening. McGanity et al. found that the pregnant adolescent ate an average of 4.5 feedings per day during her pregnancy (McGanity et al., 1969, p. 778). Those who eat frequently tend to have an overall good diet (Hampton et al., 1967, p. 395; Leverton, 1968, p. 15). Snacks are now considered as food by some nutritionists, and the wise use of

snacks could be incorporated into nutritional health education for the teenager.

Snacks have been found to provide more than 20 percent of the total calories in 35 percent of the nonpregnant teenage girls studied by Wharton. In one study, snacks found to be used in descending frequency were: candy, soft drinks, potato chips, and cookies, according to Hinton et al. (1962, p. 843). Since these are not nutritious foods, it is surprising that Wharton states that snacks were found to provide 20 to 30 percent of total intakes of all nutrients except Vitamin A, thiamin, and ascorbic acid (Wharton, 1963, p. 308). Even more surprising is that Huenemann et al. found that obese girls ate less frequently, had fewer snacks, and that breakfast skippers were often obese teenagers (Huenemann et al., 1968, p. 17).

In comparing the responsibilities such as meal planning to girls' eating habits, Hinton et al. found that girls who planned meals consumed fewer snacks each day than did the girls who did not plan meals. When the girls prepared their own meals, they consumed smaller number of snacks, fewer servings of food per day, and tended to have poorer diets than the others. The purchase of food, the preparation of some food, or setting the table did not appear to be related to eating behavior or dietary adequacy (Hinton et al., 1962, p. 845).

Hinton et al. state that youth with the poorest diets tended to come from the lowest social-status class. (Hinton et al., 1962, p. 845)

Negro teenagers and those in the lower socioeconomic groups tended to have lower intakes of nutrients than the other boys and girls (Hampton et al., 1967, p. 395), and Negro teenagers showed the greatest tendency to omit meals (Huenemann et al., 1968, p. 18). Hampton et al. suggest that the Negro teenager and lower socioeconomic group may be the most in need of nutrition education.

NUTRITION EDUCATION

Meaning of Food

Foods can be used for many reasons, including relief of hunger, cementing friendships, celebrating, honoring someone, punishing, and attracting attention such as "hunger strikes" (Lamb, 1969, p. 20).

Children learn food habits from parents and others, learning what is considered edible and even when to eat it (Mead, 1957, p. 90).

Traditions within cultures, also, designate which foods are to be eaten, the ways of preparing them, and even the manner of eating them (Niehoff, 1969, p. 10). Therefore, people's eating habits are deeply embedded from childhood, through parental teachings, and cultural influences. The learning of these habits is basically on the unconscious level. Some food biases are maintained simply because it is easier than learning new habits.

Unfamiliarity with foods is one of the most frequent problems affecting acceptance of new foods, no matter how beneficial. Fear of

unknown foods causes rejection (Lamb, 1969, p. 21; Niehoff, 1969, p. 10). The cost of food may also be a barrier to acquiring new eating habits.

Need for Understanding Cultural and Social Factors

The understanding of cultural and social factors are important in trying to motivate changes (Eppright, 1957, p. 291). Foods have different meanings to different cultures, subcultures, and ethnic groups. For an effective nutrition program, knowledge is needed as to why people eat what they eat (Maynard, 1951, p. 355). Emphasizing the foods most often neglected, without concern for the reasons why they have been neglected, will not lead to permanent change in food habits. The nutrition educator should avoid being "culture bound," believing that his own set of beliefs, attitudes, and practices are the only correct ones. He must avoid thinking that because a group of people do not share his concepts of nutrition that they have no ideas whatever concerning nutrition (Eppright, 1957). Eating habits of groups are often studied by nutritionists, psychologists, sociologists, and anthropologists. The nutrition educator should incorporate his findings in teaching approaches in order to be effective.

Changing Food Habits

Change is threatening. For a group to change, its members need to have a strong sense of belonging (Cartwright, 1951, p. 381).

Bohlen and Beal, during the 1930's, 1940's, and 1950's, investigated within the agriculture field how people accept new ideas. From their studies, they discovered that people go through a series of steps in accepting new ideas. These steps became known as the adoption or diffusion process. Briefly, they are:

1. Awareness--people know of the existence.
2. Interest--it may intrigue his interest.
3. Evaluation--the person compares the new idea with what he is presently doing, and weighs the alternatives.
4. Trial--final stage is complete acceptance and use of the idea or product (Bohlen and Beal, 1955).

People do not go through all stages with new ideas, and different people go through the adoption process at different rates (Craig, 1971).

Food habits are hard to change, and is a slow process (Todhunter, 1965). People must be convinced that a problem in nutrition exists before their interest will be aroused. They must see a need for a change, which if not brought about, would bring serious consequences to them. They should also see that there are some possible solutions to the problem (Rosenstock, 1960, p. 295). Any changes in eating habits should be attractive to them, meeting their own desired goals. Often, nutrition education is geared to appeal to such goals as health, strength, growth, or having healthy children. To some groups, though, these goals have little appeal. Their goals may

consist of such things as personal appearances, popularity, or athletic prowess (Eppright, 1957), p. 290).

Bringing about a change in food habits in the United States has been tried through different methods of health education. Yet, in spite of increased efforts to impart sound nutrition information, the United States Department of Agriculture Report of 1968 indicated there is a worsening of United States food habits (Sipple, 1971, 1. 18; "Does Nutrition Education Reach Teenagers?" 1968, p. 59). The quality of diets has declined in the United States in recent years, and Parrish describes some of the causes for the declines between 1955-56, and 1965-66 (1971, p. 140). McKenzie and Mumford, in reviewing nutrition education attempts to improve or alter food habits in the United States, conclude that the work up until 1964 indicates that the success or failure of an education program depends on the methods used, the personalities involved, and the circumstances prevailing in the area at that time (1964). Nutrition education efforts need to be increased, for it is ignorance and indifference, not inadequate food resources, which usually causes the poor dietary levels in the United States today ("Does Nutrition Education Reach Teenagers?" 1968, p. 60; "Nutrition Education for Youth," 1972, p. 34). Research in nutrition education effecting change in food habits needs to be increased, for it is scanty (Todhunter, 1965, p. 37; Briggs, 1969, p. 7; Bell and Lamb, 1973, p. 199).

Methods of Nutrition Education

Innovative methods of nutrition education are greatly needed. Nutrition as a science is often taught in a "conventional, subject-matter-centered approach" due to the fact that nutrition lends itself naturally to classification. Eppright (1957, p. 289) is concerned with this approach for the public, for even though it succeeds within higher education, it is not very effective in influencing people's use of food.

Teaching is more than telling. Several authors warn that food practices do not change just because people have accurate and meaningful facts (Mills, 1972; McKenzie and Mumford, 1964). Learning experiences are more valuable as teaching techniques than are presentation of facts. Nutrition education needs to be behavior-centered, according to Whitehead (1963). Nutrition education should have elements of discovery, interest, and meaning (Poolton, 1972). Some authors feel that nutrition educators should not be satisfied with anything less than changes in eating habits.

Wilson and Knox presented an annotated bibliography of methods and kinds of nutrition education from 1961 to 1972 (1973). A review of the progress in nutrition education since the country's beginning is given by Stiebeling (1967).

Learning Process

Nutrition education, to be effective, needs to incorporate the dynamics of the learning process. Studies by a vacuum company suggest how people learn suggested that they learn:

85 percent through the eyes;

10 percent through the ears;

5 percent through the tongue, skin, and nose (Craig, 1971, p. 23).

Retention of learning was found to be:

10 percent of what they read;

20 percent of what they hear;

30 percent of what they see;

50 percent of what they see and hear;

70 percent of what they say as they talk;

90 percent of what they say as they do a thing (Craig, 1971, p. 23).

Food Groups

Generally speaking, people understand foods better than they can nutrients, according to Eppright (1957, p. 290). To facilitate clarification of good nutrition, and to facilitate learning, foods are often grouped according to their similarity of nutrient content, or some other criteria. The implication in teaching food groups is that

a balanced and adequate diet is probable if two or more items from each group are consumed daily (Eppright, 1957, p. 290).

Food groupings were used in the United States as early as World War I. During World War II, when some foods were rationed, the United States Department of Agriculture published a guide to nutrition listing seven food groups. This number of groupings was found to be too many for popular nutrition education, and were changed in 1956 to four food groups. This was done by combining three vegetable groups into one, and fat group omitted altogether. Foods containing protein, iron, calcium, and Vitamins A, B, and C were especially emphasized. Many other countries have their own groupings of foods, ranging from three to twelve groups (Ahlström and Räsänen, 1973). The four groups in the United States consist of the milk group, meat group, vegetable and fruit group, and bread and cereal group. One author feels that using only the four food groups is not the best approach in nutrition education, as it implies this is all there is to know about nutrition (Poolton, 1972).

Nutrition Education for Teenagers

Appealing to teenagers for better nutrition is difficult in that they usually "tune out" when the subject of nutrition is mentioned. In spite of attacks upon teenage malnutrition through the press and home economic classes, there has been no improvement in their eating

habits. As one article states, eleven out of twelve teenage girls take at least one year of home economics, yet they reflect little knowledge and understanding of human nutrition ("Does Nutrition Education Reach Teenagers?" 1968, p. 59). Therefore, nutrition education programs are frequently failing to meet their objectives. The article bases the failure upon negative attitudes of both teachers and students towards the subject. The sermon approach of the "importance of nutrition," or what is "good" for them causes teenagers to resist. They need facts, and up-to-date research findings. They need general understanding and application of principles so they can "select foods intelligently, evaluate advertising claims, and combat diet fads and food fallacies," according to the article stated above. Poolton states that responsible choice-making by the individual, based on adequate knowledge, should be the goal in nutrition teaching (Poolton, 1972, p. 111).

One authority in nutrition education for teenagers is Ruth M. Leverton. She states that to be effective with teenagers, one must relate food, nutrition, and health to the things that teenagers want to do and want to be, and consider highly important (Leverton, 1961, p. 53).

E. B. Spindler relates what some of their needs are: to be sociable, to be liked by their peer group, and to have a good looking appearance. She suggests that to help teenagers, one must understand

them, and involve them in solving their own problems (Spindler, 1963, p. 28). The author suggests in another article that an appeal to vigor and popularity could be used to motivate them to better nutrition (Spindler, 1964, p. 32).

An appeal to teenagers' beauty is emphasized by Earl. Their figures and their skin were the focal topics in nutrition education. Nagging teenagers about nutrition will not work, he says, for the teenager has to be willing to watch himself or herself without critical supervision (1965, p. 50).

M. M. Hill states that food selection should be taught in a positive way to teenagers. Involvement in activities where they need to think and make choices is felt by the author to be most important in nutrition education for the teenagers (Hill, 1963).

Many nutritionists and health educators throughout the United States are trying different methods and appeals to get the teenagers "tuned in" to nutrition. Hazel Taylor Spitze at the University of Illinois, is working on nutrition education games (Spitze, 1972, p. 8; Spitze, 1971, p. 156; Illinois Teacher, 14 (1) (2), 1970; 13 (2) 1969; 13 (5), 1970; 11 (1), 1967). The games described in these articles include such things as card games, flash cards, dominoes, etc. The purpose of the games is to inspire enjoyment in learning nutrition. Several of the games designed by her are now on the market (see appendix), and two were used during this research project.

They were titled "The Nutrition Game," and "The Calorie Game."

Goode, a teacher in high school home economics, describes how her students enjoyed learning about foods by class discussions, individual experiments, independent research, and group discussions. The students were allowed freedom in their studies, and employed self-evaluations (Goode, 1970).

Graham describes how a nutrition newsletter sent to one thousand young people ages ten to sixteen, teaches nutrition to teenagers, using puzzles, quizzes, and nutritious snack recipes (Graham, 1971).

Other innovative programs in nutrition education for teenagers and adults have included such methods as singing quartets of teenagers (Ebling, 1965); use of television for teaching (Pender, 1966; Penner, 1971); a traveling nutrition education bus (Schild, 1970); the use of the press (Stare et al., 1961); tape recordings and accompanying booklets (Stuckey, 1968); candid camera films by teenagers showing poor eating habits (Zirkle, 1972); and animal studies (Hamilton and Brown, 1968); and music and games ("Music and Games Introduce Nutrition," 1968).

Nutrition Education for Children

Today, on the elementary level, nutrition education has tried to come up with approaches which are interesting and fun, to incite interest in children. Carruth and Foree have devised a self-instruction

program using a cartoon approach (1971). Baker has studied the effects of a multimedia approach for fourth and fifth graders (1972). Boysen and Ahrens (1972) describe their approach with second graders to create interest in breakfasts and lunches. They also cite many references for nutrition education in the elementary school. Alford and Tibbets describe a program for school children to increase interests in the consumption of vegetables (1971). Some schools help combat malnutrition by feeding programs, and inventive nutrition education programs in both the schools and the community (Schubert, 1970).

The effects of popular television on the nutritional habits of children has been a concern to many nutritionists throughout the United States. Counternutritional messages in television commercials, directed to children, have been a problem for many years (Gussow, 1972, p. 48). Nutritionists, health professionals, and a few food product companies, are now working towards promoting good nutritional habits through the use of television commercials.

Chapter 3

PURPOSE, TYPE, AND SCOPE OF THE STUDY ASSUMPTIONS AND LIMITATIONS

PURPOSE OF THE STUDY

The purpose of this study was to measure the effect of one type of nutrition health education in changing the eating habits of pregnant teenagers. Nutrition classes were presented to a group of teenage girls, emphasizing the nutritional needs of adolescence, of pregnancy, and the need for continued good nutrition after pregnancy. It was hoped that the nutrition classes would bring about behavioral changes in eating habits. These behavioral changes were measured in two ways:

1. Pre- and post-diet histories on each girl.
2. Pre- and post-recordings of in-between-meal snacks by each girl.

TYPE OF STUDY

This study is descriptive in nature. There was no hypothesis in this research. There was no control group, as each girl was used as her own control, to study if one type of nutrition education classes

would change her eating habits. This type of research design is described by B. S. Phillips as a "before-after" study (1966, pp. 99-100).

SCOPE OF THE STUDY

The population for the study was a group of pregnant high school girls selected from special classes for pregnant girls within the San Bernardino County School System, San Bernardino, California. The selection of subjects for the study was limited to the following criteria:

1. Age--fourteen through nineteen.
2. Parity--primipara only.
3. Gestation--second or third trimester.
4. Knowledge of English language--must understand the spoken English language.

Only primiparas (women pregnant for the first time) were used in the study, because of the likelihood that multiparas might have attended special prenatal classes or clinics, where nutrition during pregnancy was emphasized. A carryover of information and diet change during subsequent pregnancies is negligible, according to Burke (1949, p. 462), but diet change may occur more readily if exposed to nutrition education during each pregnancy.

It was felt that the marital status of each girl was not a factor in the selection, as several researchers have stated that marital status of teenage pregnancies does not alter the outcome of pregnancy, labor, or postpartum period (Howard, 1971, p. 476; Clough, 1958, p. 380).

Race was not a factor in selection, for it was hoped that the nutrition class would be representative of the racial make-up of the school, which is generally about one-third white, one-third Mexican-American, and one-third Negro. In the final study group of nine girls there were four Negroes, three Mexican-Americans, and two Caucasians. The nutrition classes attempted to teach fundamentals of good nutrition which would be applicable to these various ethnic groups.

The subjects for the study had to be able to understand the English language when spoken. The regular teachers of this school were consulted as to the capabilities of each subject to understand the spoken English language.

It was felt that a class of fifteen to twenty girls would be small enough to allow for informal discussions and participation in the class, yet large enough to comprise a study sample. Since the existing health education class was small, with a total enrollment of twenty-one girls, the researcher taught the whole class the nutrition content. The subject content for the classes was chosen and presented by the researcher. The study subjects were selected from the class, using

the above criteria for selection. Some of the subjects were later deleted from the study due to frequent absences from school, leaving a total of nine girls as study subjects. Their ages ranged from fifteen to nineteen years.

LIMITATIONS

1. The total study covered only a six-week period of time. Diet patterns, established early in life, take a long time to change.
2. Diet histories were twenty-four hour recall, and the subject may have forgotten what she ate the day before.
3. The post testing took place one week after the completion of the classes. This may not have allowed enough time for change to take place.
4. The researcher could not control what the subject wanted to learn about nutrition, nor what the subject chose to "tune out."
5. The researcher, being Caucasian, may have been limited in her approach and appeal to members of other racial groups.
6. The participants may have responded to testing in a way to please the instructor.

ASSUMPTIONS

1. The girls were interested in promoting good health through improving nutrition.
2. They accurately reported their food intake.
3. The two pre-diet histories, and the two post-diet histories were indicative of eating habits during this period of pregnancy.

Chapter 4

METHODOLOGY

STUDY SETTING

San Bernardino County School System conducts special classes for pregnant high school girls. The classes meet in a small building far removed from the high schools. Classes are conducted by certified teachers hired by the school system. The school hours are from 8:30 A.M., to 2:30 P.M., Monday through Friday, nine months out of the year. The girls live at home, and are brought to the school by special school buses. Any girl attending public high school in the county who is pregnant is eligible to attend this special school to the end of the semester in which the baby is born. The identities of the girls are carefully guarded by the school system, and their permanent transcripts show no indication that they attended the school for pregnant girls. They receive full high school credits for the courses they complete while attending this school. After she has completed the semester in which the baby was born, the girl may return to her regular high school.

There are a number of courses in the school which the girls may select as electives. There are also a few required courses,

one of which is Health Education. This course is divided into ten units over a semester. The units consist of subjects on prenatal care, labor and delivery, and infant and child care. The Health Education classes meet daily during two morning class periods; one-half of the girls attend the first class, and the other half attend the second class. Of particular interest to this study is a unit on nutrition which lasts two and one-half weeks. It was during the time the nutrition unit was presented that this study was undertaken.

Eating Facilities

The girls generally eat the morning and evening meals at home. Each morning, there is one fifteen-minute break between classes at which time the girls usually eat a snack. They either bring something from home, or they can purchase certain items supplied by the school. The items which the school supplies at a very reasonable price are milk, cocoa, fruit drinks, instant soups, and crackers.

Lunches are usually brought from home, but there is a catering truck with a variety of hot and cold foods which comes to the school at noon on Tuesdays and Fridays. The high cost of the items on the truck is prohibitive to many girls. A portion of this study was designed to compare what differences there were in the nutritional intake on a day when they bring lunch versus a day the truck comes.

SELECTION OF THE STUDY GROUP

The subjects for this study were selected from among the girls enrolled in the second Health Education period. The subjects were selected by the criteria as stated in Chapter 3. One girl, subject #7, had her baby toward the end of the study, but she was only absent for the final lunch observation and diet history. Since all the other tests were complete, she was not deleted as a subject due to the delivery of her baby. (See table 1)

Consents

Before the pretesting began, each girl returned a consent form signed by her parent or guardian.

PERSONAL INTERVIEWS

The researcher conducted a short personal interview at the time each subject underwent her first twenty-four-hour recall diet history. The interview was recorded on a special form, adapted from Seiler (thesis, 1968). (See appendix A for tool) Information on her eating habits was obtained, plus the subject's birth date and due date. The researcher calculated the trimester of pregnancy. Her marital status, race, and parity were obtained from the school records. Questions which might be embarrassing were avoided, such as her

Table 1

Study Subjects

Subject number	Age	Trimester	Gravida	Race	Year in school	Marital status	Use of food stamps, or food commodities
1	19	Third	1	Mex-Am	Sr.	S	no
2	17	Second	1	N	Sr.	S	no
3	16	Second	1	N	Jr.	S	no
4	17	Second	1	C	Sr.	S	no
5	16	Third	1	N	Jr.	S	no
6	17	Second	1	Mex-Am	Sr.	S	no
7	19	Third	1	N	Sr.	S	yes
8	17	Second	1	C	Sr.	S	no
9	15	Second	1	Mex-Am	Soph.	S	no

economic status. Each subject was merely asked if a county food assistance program was being used in her home.

PRE-TESTS AND POST-TESTS USED

Since this study was concerned with changes in the participants' eating habits, their diets were studied both before and after the stimulus of nutrition education classes. Each participant underwent three dietary pre-tests and three dietary post-tests. Verbal twenty-four-hour recall diet histories were one measurement used for both pre- and post-tests of each participant. Foods eaten between meals recorded by each girl were used as another measure before and after the classes. Direct observations of eating habits at lunchtime while at school was the third pre- and post-test. Except for the first pre-test diet history, the subjects were not told when the other pre- and post-tests were to be taken.

Diet Histories

Two verbal twenty-four-hour recall diet histories were taken on each participant on Tuesday and Wednesday of the week prior to the nutrition education classes. Two weeks after the classes were completed, two more verbal diet histories were taken.

The diet histories consisted of taking an accurate written record of the foods each participant recalled having eaten the previous

day, including an estimated amount of each serving. The tool used for the recording was the "Food Inventory" form supplied by the Dairy Council of California. (See appendix A) To help the girls estimate the sizes of their servings, plastic models of different foods formed in standard serving sizes were provided for them to examine. From their given information, tallies of the number of servings from each food group were computed, and then totaled for each food group.

The guide printed on "The Four Food Groups Serving Sizes Game" (Dairy Council of California) was used for this computation of servings of each food group. (See appendix A) Foods which were high in calories compared to their nutritional values, fatty foods, sugars, and non-nutritive items were tallied under the "other" food category, and totaled.

All of the diet histories were reviewed with a nutritionist and a dietitian, and the totals of each twenty-four-hour diet history confirmed. Each girl's pre-test scores for each food group were then compared with her post-test scores for changes in eating habits. (See Tables 2 to 10) The pre-test scores for each food group were added together, as were the post-test scores, and if the difference between the two scores was one whole number or more, it was counted as a change. If the post-test score was one serving or more over the pre-test score for the same food group, it was counted as an increase in the use of that food group. If it were one serving less,

it was counted as a decrease in the use of that food group. Also, if the score for a particular test item was no more than one-fourth serving short of meeting the recommended requirement for that food group, it was counted as having met the requirement.

Snack Cards

Records of the types of foods eaten between meals were kept by each participant on a special card for four days, Thursday through Sunday, as a pre-test and post-test. (See appendix A for tool) It was felt that snacking would be heaviest over the weekend. The recordings of the pre-test set of cards were kept the weekend before the nutrition classes started. There was a one-week time lapse between the completion of the classes and the post-recording of snacks. The post-test set of cards were kept in the same manner, Thursday through Sunday. It was hoped that the students would decrease their use of the "empty calorie" foods for snacks (synonymous with foods in the "other" category).

The times the foods were eaten were recorded in the squares across from the appropriate type of food. Foods which did not fit under the items listed were identified by the girl under "other," and later placed in appropriate food groups by the researcher.

Items listed on the card were considered in the following food groups:

Food Item	Food Group
Milk, ice cream, shakes	Milk group
Sandwich, hamburger, taco, pizza, nuts	Meat group
Apples, carrots, celery, pickles, olives	Fruit and vegetable group
Bread and butter	Bread and cereal group
Pop, french fries, potato chips, corn chips, cake, cookies, candy	"Other" food group

From the recordings, tally counts were made as to the frequency of use of the four food groups. Serving amounts were disregarded in this test. The difference of one whole number or more was considered a change; if the difference was higher on the post-test, it was considered an increase in use of that food group, and visa versa.

Lunch Observations

Lunch observations were carried out on two consecutive days, Monday and Tuesday, before the classes started, and again after they were completed. In this way, the lunches brought from home on Monday, and the foods bought on the truck on Tuesday were observed. These two days were then compared against each other for the nutritional intakes and types of foods eaten. The observations were done

by two teachers whose job it was to monitor lunch periods. The students did not know that their lunches were to be scrutinized. The teachers walked around among them to observe their lunches. At times, students tried to hide items such as candy and cookies, and the teacher had to ask them what they brought in their sack. The tool used for recording the lunch observations was a checklist adapted from Boysen and Ahrens (1972, p. 173). (See appendix A)

Two weeks time elapsed between the completion of the classes and the post-lunch observations. Absences during the last week of post-testing made it impossible to obtain the fourth lunch observation on three of the subjects.

The lunch observations were used to indicate whether each participant was reporting what she ate. The twenty-four-hour recall diet histories on Tuesdays and Wednesdays were taken the day after the lunch observations were made. Therefore, there were two recordings of the same meal; one done by direct observation one day, and the other by recall the day after. The lunch observations were then compared to the recall diet histories to give an indication of whether or not the participant was accurately reporting what she ate. The lunch observations were repetitious of the material obtained through the diet histories, so they were not used as a measure for changes in diet habits.

NUTRITION CLASSES

The stimulus in this study consisted of ten daily nutrition classes, omitting Thursdays, and the weekend days. The researcher planned the class content and methods of teaching, and presented all the classes. (See appendix B)

The class attendance fluctuated due to absences, but there usually were fifteen to twenty girls each class period. The small class facilitated an informal approach which helped to hold their interest in the class, and encouraged active participation. Since interest in a subject enhances learning, it was hoped that the girls' interest would be aroused by the use of fun and games. The researcher employed various ideas in teaching nutrition, encouraging active participation at all times. After an initial introduction of the nutrients necessary for health, and presentations of the food groups, group activities were employed as much as possible. Group discussions, group games, and skits were some of the approaches used. As many avenues of learning as possible were utilized (as listed on page 37 of this manuscript).

The four food groups were incorporated into the content in several ways. Much of the materials, visual aids, and resources used in the classes were furnished by the Dairy Council of California, which emphasize the four food groups. Two class sessions were

devoted to teaching the four food groups, and the recommended number of servings of each group. The number of servings recommended for the milk group and the meat group were increased to meet the nutritional needs of the pregnant teenager. The analyses of the diet histories and snack cards were based on the four food groups. Because specific nutrients are often too low in diets among teenagers and pregnant women, these were emphasized: ascorbic acid, calcium, and iron.

EVALUATION

After the classes and testing were complete, the researcher returned to the school to have an individual conference with each participant. At that time, the findings of their diet habits, as shown by their twenty-four-hour recall diet histories and snack cards, were discussed. The participants were each given a written record of their diet history scores, with the recommended number of servings they should have daily.

Chapter 5

CASE STUDY FINDINGS

SUMMARY OF RESEARCH DESIGN AND PURPOSE

Nine pregnant teenagers were studied for possible changes in their eating habits as the result of nutrition education classes. Each girl was used as her own control. Before the classes began, each girl underwent three dietary pre-tests. After the classes were completed, the same three dietary tests were given again. Two twenty-four-hour recall diet histories were given as pre-tests and post-tests. Four-day records (snack cards) of foods eaten between meals were kept by each girl for pre-tests and post-tests. Lunches were observed and recorded by teachers the day before each diet history was taken. This allowed a double-check on the accuracy of the twenty-four-hour recall of each girl. The analyses of the tests were based on the use of the four food groups in each girl's diet. Foods which were high in calories, "empty calorie" foods, and fatty foods were analyzed under the "other" category.

SUBJECT NUMBER 1

Personal Data

This nineteen-year-old Mexican-American primipara, in her third trimester, lived at home with her parents. She usually ate three meals a day, skipping a meal infrequently. If she skipped a meal, it was usually breakfast, which was the meal she fixed for herself. Her mother fixed the other meals at home for her. Her snacking took place in both the mornings and afternoons, according to her. When asked about her appetite, she said that it was "not good." She still experienced some nausea and occasional vomiting. Her food dislikes included liver, spinach, and cottage cheese. She took a multiple vitamin a day.

The absences from school of this girl were a problem in completing a thorough study on her. She missed four out of the eight classes, and was absent the first day of nutrition games. She was also absent for the second post-diet history. Her post-test snack cards were lost, so she had to complete another set of snack cards at a later time. (See table 2)

Summary of Her Diet Histories

Since there was only one post-test diet history done on her, it was difficult to ascertain any changes in eating habits. The milk intake on the three diet histories was too low to meet the needs of teenage

Table 2

Subject Number 1

Food groups (recom- mended no. of servings)	Diet history scores (no. of serv.)				Changes	Snack cards (no. of tallies)		Changes
	Pre-test scores		Post-test scores			Pre-test scores	Post-test scores	
	Day 1	Day 2	Day 1	Day 2		4 days' totals	4 days' totals	
Milk group (5)	3	1 1/2	1 1/2	-	-1 1/2	4	5	+1
		4 1/2		1 1/2				
Meat group (3)	2 1/2	3 1/2	1	-	-2 1/2	5	6	+1
		6		1				
Fruit and vegetable group (4)	5	2	1	-	-4	3	3	0
		7		1				
Bread and cereal group (4)	6 1/2	5	4	-	-2 1/2	12	11	-1
		11 1/2		4				
"Other" group	3	5	1	-	-4	10	9	-1
		8		1				

pregnancy. The meat group consumption in the one available post-diet history was two and one-half to three and one-half times lower than on the pre-diet histories. The fruit and vegetable group was reduced in consumption on the post-test, and was one-fourth the serving requirement for that group. The bread and cereal group met the recommended number of servings, and showed a slight decrease in use throughout the three diet histories. Use of the "other" food group dropped from three and five servings on the pre-tests to only one serving on the post-test. It appears that on the day her post-diet history was taken, her general consumption of food was lower than on the days her pre-diet histories were taken.

The lunch observations which the teachers made, and her twenty-four-hour recall pre-test diet histories correlated well. Her absences made it impossible to obtain correlation data for the post-diet history. She was absent when the post-lunch observations were scheduled, but she was observed and recorded for her lunch eating habits later in the week. On the post lunch observations, she drank milk both days for lunch, which she had not chosen as a drink on either of the pre-test observation days.

Conclusions from Her Diet Histories

There was a general lowering of consumption of all foods on

the day the post-diet history was taken, which makes it impossible to state there were any changes in eating habits.

Summary of Her Snack Cards

Her two sets of snack cards show that there was an increase in the use of milk for snacks, and an increase in use of the meat group. Decreases were found in the bread and cereal group, and in the use of the "other" food group.

Conclusion from Her Snack Cards

There were increases in the use of the milk and meat groups, a decrease in the use of the bread and cereal group, and a decrease in the "other" food group after the nutrition classes.

SUBJECT NUMBER 2

Personal Data

Subject number 2 was a tall seventeen-year-old Negro primipara who was in her second trimester. She usually fixed her own meals where she lived, and liked to eat four meals a day. If she ever skipped a meal, it was usually breakfast. Snacking of foods occurred both in the morning and afternoon for her. She reported her appetite as being "good," and had no nausea and vomiting. Her dislikes of foods included carrots, apples, liver, and lima beans. She took one multiple vitamin daily.

This girl had an almost perfect attendance during the nutrition classes and data collection. She was absent only once, for the first lunch observation. (See table 3)

Summary of Her Diet Histories

The analysis of her twenty-four-hour recall diet histories showed that she had an erratic eating pattern, with few trends of an established pattern of food consumption. The milk group was consistently too low for good health. The meat group consumption was high in all four diet histories. The use of fruits and vegetables were too low throughout all the diet histories, but did show an increase on the post-tests. The bread and cereal group met the recommended number of servings, and there was an increase shown in the use of this group. There was a lowering of the use of foods in the "other" group.

Lunch observations done by the teachers and what she reported she ate did not correlate very closely. On her diet histories, she reported having eaten one-half sandwich, cookies, a cupcake, some candy, and one orange over the four days her lunches were observed, but these items were not observed by the teachers. Therefore, it seems that it was impossible for the teacher to have observed everything eaten. The teachers observed her eating a grapefruit and some soup, which she did not report. It may be difficult for her to remember everything eaten the previous day. Since she reported items in

Table 3

Subject Number 2

Food groups (recom- mended no. of servings)	Diet history scores (no. of serv.)					Changes	Snack cards (no. of tallies)		Change	
	Pre-test scores		Post-test scores				Pre-test scores 4 days' totals	Post-test scores 4 days' totals		
	Day 1	Day 2	Total	Day 1	Day 2					Total
Milk group (5)	7	1 1/2	8 1/2	2 1/2	1 1/4	3 3/4	-4 3/4	5 1/2	5	0
Meat group (3)	3	2 3/4	5 3/4	3	3	6	0	3	3 1/2	0
Fruit and vegetable group (4)	1 1/2	0	1/2	3	1	4	+3 1/2	4	0	-4
Bread and cereal group (4)	7	5	12	8	9	17	+5	13	12	-1
"Other" group	1	9 1/3	10 1/3	3	5	8	-2 1/3	8	7	-1

the "other" category which do not correlate with the lunch observations, she was apparently not trying to falsify her reports to please the researcher. Even though there were these discrepancies, it does not seem to indicate that she was being dishonest about her eating habits.

Conclusions from Her Diet Histories

There was an increase in the use of the bread and cereal group, and the fruits and vegetable group. There were decreases in the milk group, and the "other" food group after the nutrition classes.

Summary of Her Snack Cards

Her two sets of snack cards showed more of a consistent pattern of use of the food groups than did the diet histories. These patterns changed little between the pre-tests and the post-tests, but there was a decrease in the use of fruits and vegetables, breads and cereals, and the foods in the "other" category on the post-tests.

Conclusion from Her Snack Cards

There were no increases in the use of the four food groups after the classes. The decreases were in the fruit and vegetable, bread and cereal, and "other" food groups.

SUBJECT NUMBER 3

Personal Data

This sixteen-year-old Negro primipara, in her second trimester, stated that she fixed her own meals. Usually she ate two to three meals per day. She preferred to snack in the afternoon. The meal she usually skipped was breakfast, and sometimes she skipped dinner. She described her appetite as "pretty good," and was not troubled with nausea and vomiting. Allergies to foods consisted of strawberries. She disliked most cooked vegetables, liver, spinach, apples, and pears. Her diet was supplemented with one multiple vitamin tablet, and two iron tablets daily.

Her school attendance was very good throughout the study, with there being only one absence on the day of the last lunch observation. She turned in only three pre-test snack cards, instead of the required four. (See table 4).

Summary of Her Diet Histories

The analysis of her diet histories showed that the use of the milk group increased slightly, but remained too low for health during pregnancy. The meat group remained too low throughout the diet histories, and did not change. The consumption of fruits and vegetables were almost non-existent in her diet, and did not improve after the classes. Breads and cereals were consumed in higher amounts

Table 4

Subject Number 3

Food groups (recom- mended no. of servings)	Diet history scores (no. of serv.)					Changes	Snack cards (no. of tallies)		Changes	
	Pre-test scores		Post-test scores				Pre-test scores 4 days' totals	Post-test scores 4 days' totals		
	Day 1	Day 2	Total	Day 1	Day 2					Total
Milk group (5)	2	2 3/4	4 3/4	2 1/2	3 1/4	5 3/4	+1	1	6	+5
Meat group (3)	1 3/4	1	2 3/4	1 1/4	1	2 1/4	0	1	0	-1
Fruit and vegetable group (4)	1	0	1	0	1	1	0	0	1	+1
Bread and cereal group (4)	5	3 1/2	8 1/2	5 1/4	6 1/2	11 3/4	+3 1/4	4	1	-3
"Other" group	4	4 1/2	8 1/2	4	4	8	0	8	7	-1

after the classes. The use of foods in the "other" category did not change.

The lunch observations and her twenty-four-hour recall diet histories correlated well. She reported everything except a pear and a cookie, which the teacher observed her eating.

Conclusions from Her Diet Histories

The milk group increased in use, as did the bread and cereal group, after the nutrition classes. The other groups did not change.

Summary of Her Snack Cards

This subject increased her use of milk for snacks greatly. The meat group was almost non-existent. Fruits and vegetables increased slightly. The bread and cereal group decreased quite a bit, and there was a slight decrease in her consumption of the meat group, and the "other" foods.

Conclusions from Her Snack Cards

The milk group, and fruit and vegetable group were increased in use as snack food. Both the bread and cereal group and meat group, along with the "other" group were decreased in use.

SUBJECT NUMBER 4

Personal Data

This seventeen-year-old Caucasian primipara, in her second trimester, stated that her mother usually fixed the meals for her at home. She ate two to four meals a day. She ate breakfast at home, lunch at school, and dinner was eaten at home or at her place of evening employment. Occasionally, she skipped breakfast. Her snacking took place throughout the day and evening. She said that her appetite was "good," and was bothered with occasional nausea and vomiting. Her food dislikes were liver and milk. Her diet was supplemented with multiple vitamins twice daily.

Her attendance during the entire study was without any absences.

(See table 5)

Summary of Her Diet Histories

In comparing the two pre-diet histories with the two post-diet histories, there were decreases in the use of the milk group, the meat group, the bread and cereal group, and the "other" group on the post-tests. Throughout the diet histories, the milk requirements for pregnancy were not met. Even though there were decreases in the use of the meat group and the bread and cereal group, the serving requirements were met for both of these groups, and did not fall below the recommended allowances.

Table 5

Subject Number 4

Food groups (recom- mended no. of servings)	Diet history scores (no. of serv.)					Changes	Snack cards (no. of tallies)		Changes
	Pre-test scores		Post-test scores				Pre-test scores 4 days' totals	Post-test scores 4 days' totals	
	Day 1	Day 2	Total	Day 1	Day 2				
Milk group (5)	3 1/3	2 1/4		1 1/2	3		5	9	+4
			5 7/12		4 1/2	-1			
Meat group (3)	2 1/2	4 3/4		3 1/4	2		6	5	-1
			7 1/4		5 1/4	-2			
Fruit and vegetable group (4)	3	4 1/4		4 1/2	3 1/2		7	5	-2
			7 1/4		8	0			
Bread and cereal group (4)	8	4 1/2		5	3		6	7	+1
			12 1/2		8	-4 1/2			
"Other" group	4	5		2	4		14	13	-1
			9		6	-3			

Lunch observations and her twenty-four-hour recall diet histories correlated very closely as to what she ate for lunch. She reported she had a soft drink, and one fruit during the four days observed, which the teachers evidently missed. She was observed to have had candy one day for lunch, which she did not report.

Conclusions from Her Diet Histories

There was a decrease in the use of all the food groups after the nutrition classes.

Summary of Her Snack Cards

There was an increase in the use of milk for snacks, and a slight increase in the use of breads and cereals. The decreases were in the meat group, fruit and vegetable group, and in the "other" group.

Conclusion of Her Snack Cards

There was an increase in the use of the milk group, and the bread and cereal group. Decreases were found in the meat group, fruit and vegetable group, and the "other" group.

SUBJECT NUMBER 5

Personal Data

Subject number 5 was a sixteen-year-old Negro primipara, in her third trimester. She ate three meals a day, and fixed the meals

herself. Seldom did she skip any meals, she said. Snacking was preferred in the afternoon by her. When describing her appetite, she said that it was "not big." There was no problem with nausea or vomiting. Not being allergic to any foods, she stated that her dislikes were cooked carrots, peas, and liver. One multiple vitamin, and two iron tablets supplemented her daily diet.

Throughout the entire study, this girl was never absent. (See table 6)

Summary of Her Diet Histories

The twenty-four-hour recall diet history scores did not change very much. Her use of milk was sufficient in quantity, and remained about the same through the pre- and post-tests. Her use of the meat group was quite low, and remained unchanged after the classes. Her use of fruits and vegetables, and use of the "other" foods remained the same. There was a decrease in the use of breads and cereals, which resulted in one post-test not meeting the recommended number of servings.

Her twenty-four-hour recall diet histories correlated well with the lunch observations, except for one discrepancy. She reported having had milk one day for lunch, whereas she was observed to have had a coke.

Table 6

Subject Number 5

Food groups (recom- mended no. of servings)	Diet history scores (no. of serv.)					Changes	Snack cards (no. of tallies)		Changes	
	Pre-test scores		Post-test scores				Pre-test scores 4 days' totals	Post-test scores 4 days' totals		
	Day 1	Day 2	Total	Day 1	Day 2					Total
Milk group (5)	4	6 1/4		5 1/4	4 3/4	10	0	2 1/2	1	-1 1/2
Meat group (3)	2 1/2	1/8		1	1	2	0	0	0	0
Fruit and vegetable group (4)	4	1 1/4		2	3 1/4	5 1/4	0	3	4	+1
Bread and cereal group (4)	6	3 1/2		4	3	7	-2 1/2	1	0	-1
"Other" group	3	3		3	3	6	0	5	5	0

Conclusions from Her Diet Histories

There was only one change in her post-tests--a decrease in the use of the bread and cereal group.

Summary of Her Snack Cards

After the nutrition classes, there was an increase in the use of the fruit and vegetable group as snacks. Two of the food groups were decreased in their use after the classes; the milk group, and the bread and cereal group. The "other" category of foods remained the same. She did not use the meat group at all for snacks.

Conclusions from Her Snack Cards

There were increases in the use of the fruit and vegetable group for snacks. Decreases were found in the milk, and the bread and cereal groups.

SUBJECT NUMBER 6

Personal Data

This subject was a seventeen-year-old Mexican-American primipara who lived at home with her parents. She ate three meals a day which her mother usually fixed, and snacked between meals while at school. Meals were not usually skipped. She described her appetite as "average," with no problems with nausea, vomiting, or allergies to foods. The foods which she disliked are spinach, liver,

cottage cheese, and squash. She supplemented her diet with a tablet she took one or two times a day, but was supposed to take it three times a day. She claimed that the tablet was a multiple vitamin, but it sounded like it was possibly an iron tablet, since it was taken frequently during the day.

This girl had nearly perfect attendance during the study, missing only one class on nutrition. (See table 7)

Summary of Her Diet Histories

The analysis of the diet histories showed that her use of the milk group was consistently too low to meet the nutritional needs of pregnancy. Her usage of milk products did not improve after the nutrition classes. Her use of the meat group decreased after the classes. Fruits and vegetables were much too low, and their use decreased even more after the classes. Breads and cereals decreased in use, but still met the recommended number of servings after the decrease. Her use of foods in the "other" group decreased after the classes.

Lunch observations, and her twenty-four-hour recall did not correlate well. She was observed to have had candy, cookies or cake, sandwich, and snack foods for lunch over the four days observed, which she did not report. She stated that she had cookies another day for lunch which was not observed by the teachers. Perhaps it is

Table 7

Subject Number 6

Food groups (recom- mended no. of servings)	Diet history scores (no. of serv.)				Changes	Snack cards (no. of tallies)		Changes
	Pre-test scores		Post-test scores			Pre-test scores 4 days' totals	Post-test scores 4 days' totals	
	Day 1	Day 2	Day 1	Day 2				
Milk group (5)	2 1/2	3	3 1/2	1 1/2	0	1 3/4	1	0
Meat group (3)	3 1/4	3 1/2	2 1/2	1 1/4	-3	1/2	1/2	0
Fruit and vegetable group (4)	1 1/2	2	2	3/4	0	1/4	0	0
Bread and cereal group (4)	6	6	4	4	-4	1	1	0
"Other" group	6 1/2	7	4 1/2	6	-3	4	5	+1
			13 1/2	10 1/2				

difficult for her to recall accurately what she ate the previous day, which would make the accuracy of her twenty-four-hour recall diet history questionable.

Conclusions from Her Diet Histories

There were no increases in the use of the food groups after the classes. Decreases were found in the meat group, bread and cereal group, and "other" group.

Summary of Her Snack Cards

There was very little change in the two sets of snack cards. In the post-tests, milk decreased slightly, but not by one whole serving, so it was not counted as a change. The same was true with the fruit and vegetable group. The meat group, and the bread and cereal group did not change. There was an increase by one tally in the number of foods used in the "other" category.

Conclusions from Her Snack Cards

There was only one change, that being an increase by one tally in the "other" food group.

SUBJECT NUMBER 7

Personal Data

A petite nineteen-year-old primipara, in her third trimester,

stated that her mother usually prepared the meals at their home. She was the only subject in the study who stated there was utilization of the county's food assistance program in the home. She usually ate three meals a day, skipping lunch occasionally. Her dislikes for foods included squash, and cottage cheese. Her diet was not supplemented by any vitamins or minerals.

This girl's attendance was quite good for most of the study. She did miss attending three classes on nutrition because of the birth of her baby. She was also absent for the last lunch observation, the last diet history, and one Friday for nutrition games. (See table 8)

Summary of Her Diet Histories

With only one post-diet history, it was difficult to see if there was a change in eating habits. Her use of the milk group was too low for her health during pregnancy, and remained about the same after the classes. The meat group decreased after the classes, but met the recommended number of servings. The fruit and vegetables group was too low, which decreased after the classes. The post-test showed a tremendous decrease in the use of breads and cereals. It was too difficult to ascertain with the one post-test figure if there was actually a decrease in the use of the "other" food group.

The correlation between the lunch observations and what she reported as eating were close, except for two discrepancies. During

Table 8

Subject Number 7

Food groups (recom- mended no. of servings)	Diet history scores (no. of serv.)				Changes	Snack cards (no. of tallies)		Changes
	Pre-test scores		Post-test scores			Pre-test scores 4 days' totals	Post-test scores 4 days' totals	
	Day 1	Day 2	Day 1	Day 2				
	Total	Total	Total	Total				
Milk group (5)	2 4	3 1/2	-	3 1/2	0	7	1	-6
Meat group (3)	3 1/2 3	6 1/2	2	2	- 1 1/2	1/2	1	0
Fruit and vegetable group (4)	3 1/4 2	5 1/4	2 1/4	2 1/4	-1	8 1/2	6	-2 1/2
Bread and cereal group (4)	10 8	18	3 1/2	3 1/2	-6 1/2	1/2	2	+1 1/2
"Other" group	6 1/2 3 1/2	10	4	4	-2 1/2	6	6	0

one lunch, she was observed to have had cupcakes, whereas she reported having had oatmeal cookies. Again, the teachers observed her having had one-half pint of milk, while she reported having had one quart of milk. Perhaps the teacher did not notice the amount of milk brought, and merely put a check in the "one-half pint milk" column.

Conclusions from Her Diet Histories

There were no increases in the use of the various food groups after the nutrition classes. Decreases were found in all the food groups, except the milk group, which remained unchanged.

Summary of Her Snack Cards

There was a definite drop in the use of milk products for snacks during the post-testing. There was also a decrease in the use of fruits and vegetables as snacks. The only increase was in the use of the bread and cereal group. The "other" food category remained unchanged.

Conclusions from Her Snack Cards

The only increase was in her use of the bread and cereal group for snacks. Decreases were found in the milk group, and the fruit and vegetable group.

SUBJECT NUMBER 8

Personal Data

This subject was a seventeen-year-old Caucasian primipara who was in her second trimester. She ate four to five meals a day, which her mother usually fixed. There usually was no meal-skipping involved. Her appetite was reported as "good," and liked to snack both in the morning and afternoon. Strawberries caused an allergy with her. Liver was the only food she listed as a dislike. There were no problems with nausea or vomiting. She took a multiple vitamin and an iron tablet once a day.

Her attendance was good during the study. She was absent for two classes on nutrition; one nutrition game day, and one pre-test lunch observation. (See table 9)

Summary of Her Diet Histories

The analysis of her diet histories indicated that she consumed large and very adequate amounts from the milk group. There was an increase, too, in her consumption of milk after the nutrition classes. There was no over-all change in the number of servings from the meat group, which met the serving requirements. Her use of fruits and vegetables were too low throughout, and did not change. The use of breads and cereals increased, higher than the minimum recommended number of servings. There was a decrease in the use of "other" foods.

Table 9

Subject Number 8

Food groups (recom- mended no. of servings)	Diet history scores (no. of serv.)						Changes	Snack cards (no. of tallies)		Changes
	Pre-test scores			Post-test scores				Pre-test scores 4 days' totals	Post-test scores 4 days' totals	
	Day 1	Day 2	Total	Day 1	Day 2	Total				
	Day 1	Day 2	Total	Day 1	Day 2	Total				
Milk group (5)	5 1/8	4 1/8		5	6		+1 3/4	7	11	+3
			9 1/4			11				
Meat group (3)	3 1/2	1 1/2			2 1/2	2 1/4	0	3 1/2	4	0
			5			4 3/4				
Fruit and vegetable group (4)	2 1/2	2 1/2			1 1/2	3 1/2	0	1	0	-1
			5			5				
Bread and cereal group (4)	7	4 1/2			8 1/2	5	+2	9	13	+4
			11 1/2			13 1/2				
"Other" group	1	4			1	1	-3	9	1	-8
			5			2				

In comparing the lunch observations with the diet histories, there were several discrepancies. She reported having eaten pie, and potato chips, which were not observed by the teachers. She reported that she drank milk for lunch, whereas she was observed having drunk a soft drink that particular lunchtime. She was also observed having had cake or cookies, which she did not report. These discrepancies may indicate that she did not report everything honestly.

Conclusions from Her Diet Histories

There were increases in the use of the milk group, and in the bread and cereal group. A decrease was found in the "other" food group.

Summary of Her Snack Cards

The recordings which she made of her snacks showed that milk was utilized more after the classes. Fruits and vegetables decreased from only one tally to zero. The meat group remained about the same. Her use of foods from the bread and cereal group increased after the classes. The choice of foods from the "other" category dropped dramatically from nine to one tally.

Conclusions from Her Snack Cards

There were increases in the milk group, and the bread and cereal group after the classes. She decreased her use of foods in

the fruits and vegetables group, as well as the "other" food group for snacks.

SUBJECT NUMBER 9

Personal Data

This fifteen-year-old Mexican-American primipara was the youngest subject in this study. She was in her second trimester. She did most of the cooking for herself, although her mother did help occasionally with meal preparation. Often dinners were eaten at her boyfriend's house. The meals which she skipped were breakfast, and occasionally dinner. Snacking was preferred in the afternoon, she said. She rated her appetite as "good," and had no problems with allergies to foods, nausea, or vomiting. To supplement her diet, she took one vitamin, and two iron tablets daily. Her food dislikes were sauerkraut, and liver. (See table 10)

Summary of Her Diet Histories

The differences between the pre- and post-diet history scores showed that there was an increase in the use of the milk group after the classes. The number of servings, though, still fell below the recommended number for health during pregnancy. The meat group was too low for meeting her nutritional needs. The scores for the fruit and vegetable group were on the low side for good nutrition; their

Table 10

Subject Number 9

Food groups (recom- mended no. of servings)	Diet history scores (no. of serv.)					Changes	Snack cards (no. of tallies)			Changes
	Pre-test scores		Post-test scores				Pre-test scores 4 days' totals	Post-test scores 4 days' totals	Changes	
	Day 1	Day 2	Total	Day 1	Day 2					
	Day 1	Day 2	Total	Day 1	Day 2		Total	Pre-test scores 4 days' totals	Post-test scores 4 days' totals	
Milk group (5)	3 1/2	1 3/4		3 1/2	3 1/2	7		4	2	-2
Meat group (3)	1 1/2	1 1/2	3	1 1/4	1	2 1/4	0	1/2	1/2	0
Fruit and vegetable group (4)	3 1/2	1 3/4		3	4	7	+1 3/4	2	1	-1
Bread and cereal group (4)	6	5	11	3	5	8	-3	2	2	0
"Other" group	2	6	8	1	4	5	-3	7	5	-2

use did increase to meet minimum recommended number of servings. Breads and cereals were decreased in their use after the classes, and the "other" foods decreased, too.

There were several discrepancies on her lunch observations and her twenty-four-hour recall diet histories. There were two items which she was observed eating, but she did not report them. These were a soft drink, and candy. On her diet histories, she recalled having had chocolate milk and a banana for lunch, but the teacher did not observe her having had these items. It appears she may have been falsifying her reports to please the researcher.

Conclusions from Her Diet Histories

There was an increase in her use of the milk group, and the fruit and vegetable group. There were decreases in the use of the bread and cereal group, and the "other" group.

Summary of Her Snack Cards

From her two sets of snack cards, there were decreases found in the set of post-snack cards. These were in the milk group, the fruit and vegetable group, and in the "other" group.

Conclusions from Her Snack Cards

There were no increases in the use of food groups for snacks

after the nutrition classes. Decreases were seen in the milk group, the fruit and vegetable group, and the "other" group.

Chapter 6

ANALYSIS AND DISCUSSION OF RESULTS

The purpose of this chapter is to summarize the results, and to give a brief discussion of the meaning of these findings.

There were nine pregnant teenagers who were tested for their eating habits before and after a series of nutrition classes. The testing consisted of two twenty-four-hour recall diet histories, four daily recordings of foods eaten between meals, and two lunch observations as both pre-tests and post-tests.

ANALYSIS OF FINDINGS FOR THE FOOD GROUPS

Milk Group

The recommended minimum number of servings of milk for pregnant teenagers is five servings a day (four servings for pregnancy, plus one more serving for teenage growth). This food group was popular as a snack item, and was chosen seventy-nine times.

Seven out of the nine subjects were deficient in their milk intake, as shown by their diet histories. Only two girls (#5, #8) met the minimum number of servings on at least three out of four test scores. One other girl (#2) met the requirement once. The

rest of the girls did not meet the minimum requirements even once.

There were two girls who increased their use of the milk group, as shown by either their diet histories or their snack cards (#3, #8). Three other girls decreased their use of milk after the classes (#2, #5, #7).

To summarize, these girls were usually very deficient in the milk group, and the nutrition classes did not appear to improve its use.

Meat Group

The recommended minimum number of servings of the meat group for pregnant teenagers is three or more servings per day. In this study the meat group was the least popular group of foods for snacking between meals, chosen forty times.

Five of the nine girls were consistently too low in their consumption of foods from the meat group, as shown by their diet histories. Three of the nine girls met the minimum serving requirements on both their pre-test scores (#2, #6, #7), but only one girl (#2) met the requirement on both of the post-test scores. Most of the girls did not meet the meat requirements even once.

None of the girls increased their use of the meat group after the classes, whereas, four girls decreased their consumption after the classes (#3, #4, #6, #7).

To summarize, these girls were too low in their intake of the meat group, and the nutrition classes did not appear to improve the situation.

Fruit and Vegetable Group

The recommended minimum number of servings from the fruit and vegetable group is four per day. Fruits and vegetables were next to the lowest in popularity for snack foods, chosen forty-nine times.

Of the nine girls in the study, all of them were consistently too low in their consumption of fruits and vegetables. None of them met the requirements on both their pre-tests, or their post-test scores. Most of the girls did not meet the requirements even one time.

Two girls increased their use of fruits and vegetables after the classes (#3, #5), whereas, four decreased their use of this food group (#1, #4, #7, #8).

Fruits and vegetables seemed to be quite unpopular in their diets, and there was no indication that they were used more frequently after the classes.

Bread and Cereal Group

The minimum recommended number of servings from this group is four daily. Foods from this group were the second most popular for snacks (including sandwich bread, taco shells, etc.), as they were chosen ninety-eight times.

From the diet histories, seven of the nine girls met the minimum number of servings on both pre-test scores, and the remaining two girls (#3, #5) met the requirement once. Six met the requirement on both post-tests, and the three remaining girls (#4, #5, #9) met the requirement once.

There was one girl (#8) who increased her use of this food group after the classes. Four girls showed a decrease in breads and cereals (#1, #5, #6, #9).

To summarize, this food group was very popular with most of the girls having higher scores than the recommended number of servings which might indicate a calorie intake higher than ideal. Almost one-half of the girls decreased their use after the classes, which can be considered a favorable decrease.

"Other" Food Group

Foods high in calories in comparison to their nutritional value, and fatty foods were placed into this food category. Cake, cookies, candy, soft drinks, french fries, etc., were all considered in the

"other" category. These foods were the most popular items for snacks, being chosen 129 times.

Seven of the nine girls decreased their use of foods in this food category on their post-diet histories (#1, #2, #3, #4, #7, #8, #9). Subject #6 showed an increase in one test, but a decrease in the other. Subject #5 showed no change.

To summarize, this food group was most popular, with most of the girls having high scores for this group. After the classes, most of the girls decreased their use of this food group, which was felt by the researcher to be the most positive change in the study.

FOOD DISLIKES OF STUDY SUBJECTS

During the personal interview the first week of pre-testing, each girl was asked to name the foods she disliked. These are listed under "personal data" of each subject in Chapter 5. Listed below are the foods named, in descending order. The total number of girls naming that food is given in parentheses: liver (8), cooked vegetables (7), cottage cheese (3), fresh fruit (2), carrots fresh or cooked (2), and milk (1).

SNACK PREFERENCES

The foods chosen for in-between-meal snacks, as recorded on their snack cards, are listed below in descending order:

Milk, ice cream, shakes (85)

Sandwich, hamburger, taco, etc. (67)

Candy (46)

Soft drinks (39)

Cake, cookies, etc. (29)

Bread and butter (26)

Apples, carrots, celery (25)

French fries (21)

Potato chips, corn chips, etc. (16)

Fruit juice (written in) (16)

Pickles, olives (6)

Nuts (2)

SACK LUNCH DAYS VERSUS FOOD TRUCK DAYS

Lunch observations were done by the teachers on Mondays and Tuesdays. Mondays the girls brought their own lunches to school. Tuesdays, a catering truck came at noon, so the girls were able to buy lunch items. There was one pre-test and one post-test observation of lunches on Mondays, and one pre- and one post-test observation done on Tuesdays. (See appendix A for tool used.) The two test scores done on Mondays were added together, as were the scores obtained from the Tuesdays' observations to compare the nutritional intake on those days.

Table 11

Sack Lunch Days Versus Food Truck Days

Foods observed*	Mondays sack lunches total observed: (26)	Tuesdays food truck total observed: (22)	Changes
Protein sandwich	29	26	0
Milk	10	2	-
Soft drink	16	19	+
Vegetable or fruit	22	9	-
Cake or cookies	16	17	+
Snacks	9	17	+
Candy	4	18	+

*taken from lunch observation forms, see appendix A

As shown in Table 11, on the days the truck came to the school, there were increases in the consumption of soft drinks, cake or cookies, candy, potato or corn chips, etc. There were decreases in the use of milk, fruits, and vegetables. It would appear that having the truck come to the school increases the use of high calorie, low nutritional foods.

REACTIONS OF STUDENTS TO NUTRITION CLASSES

Use of Goals as Appeals to Better Nutrition

Wanting to appeal to the girls for better nutrition, some of the ideas of Spindler and Earl were used. (See page 40 of this manuscript.) A show of hands was asked to signify whether they wished to be beautiful, to have nice skin, lots of energy, and to be popular. Most of the girls raised their hands for the first three items. When they were asked about wanting to be popular, many slumped forward, and none raised their hand. This would suggest that popularity was not a goal which appealed to the girls during the period of time the study was done.

Reactions to Class Content

The reaction was felt to be negative during the first week which dealt with nutritional needs and absorption of nutrients. There were complaints that the material was repetitious. The movie "How

Hamburger Turns Into You," from the Dairy Council did not hold their interest, and seemed to be beyond their comprehension. During the second week, which involved use of group activities, there appeared to be more interest. Games seemed to cause excitement and interest. The two games by Spitze seemed to be far superior to others used.

(See appendix B "Class 8")

Effect on School Food Supplies

The school sells certain items such as fruit drinks, milk, chocolate milk, hot cocoa, instant hot soups, and crackers. Milk was one unpopular item before the classes on nutrition began, with one small order of milk lasting one week. After the classes started, there was a sudden increase in demand for milk. This might suggest that the classes caused this change, but it did not show up in the test results.

Chapter 7

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

SUMMARY

Problem

Teenage girls in the United States have the poorest eating habits of any family members. They adopt bizarre eating patterns for many reasons; therefore, their diets are usually deficient in several important nutrients. During the period of growth in adolescence, the nutritional requirements increase. With the already faulty diet typical of teenage girls, adding the stress of pregnancy creates a nutritional demand that is seldom met through diet.

Purpose of Study

This study was interested in the effect a certain nutrition education program would have on the eating habits of pregnant teenagers. It was hoped that the nutrition classes would bring about positive changes in their eating habits.

Research Methodology

Information obtained on the subjects was reported in case study form. Each of the nine girls in the study was used as her own control.

There were three pre-tests on each girl before the nutrition classes started, and the same three tests were done as post-tests. One test was a twenty-four-hour recall diet history done two consecutive days as a pre-test, and as a post-test. The second test was a recording each girl made of the snacks she ate in-between her meals for four days. The third test was a recording of lunch observations on each girl, done twice as a pre-test, and twice as a post-test.

A series of nutrition classes was used as the stimulus. The content and teaching methods for the classes were planned and presented by the researcher.

The diet history and snack card scores were analyzed according to use of the four food groups, and the "other" food group. Each girl's combined pre-test scores were compared to her combined post-test scores. If the difference between these scores for each food group was one or more points, it was considered a change. If the post-test score was one point or more larger, it was counted as an increase in the use of that food group, and visa versa.

Findings

The diets of the study subjects were high in the use of breads and cereals, and foods in the "other" category. Most of the girls were consistently too low in their consumption of the milk group, meat group, and fruit and vegetable group.

The findings showed few increases in the use of the four food groups as a result of the nutrition classes. There were two girls who increased their use of the milk group, two who increased their fruit and vegetable consumption, and one girl who increased her use of breads and cereals.

All the study subjects decreased their use of one or more of the four food groups after the classes which may indicate that certain nutrition classes can have detrimental effects on eating habits. There were also decreases in the use of the "other" food group by seven of the nine girls, which was a favorable outcome.

Another finding was that on the days a catering truck came to the school, the nutritional values of their lunches was inferior to the days they brought their lunch from home. On the truck days, there were decreases in the use of milk, fruits and vegetables, and increases in the consumption of soft drinks, cake, cookies, candy, and potato chips, corn chips, etc.

CONCLUSIONS

This series of nutrition education classes apparently had little positive effect upon changing the eating habits of the class. Tests done on their eating habits before and after the classes suggest that in some areas the classes had a negative effect.

One reason for the apparent outcome might be that the word "nutrition" has certain negative connotations to students (MacReynolds, 1970, p. 13), causing the reaction of the girls to decrease their food intake. It would be interesting to know if this is a common reaction to nutrition classes.

Food habits are deeply rooted and take a long time to change (Niehoff, 1969, p. 10; Lamb, 1969, p. 22). This study was conducted over a short period of time, and if the study had allowed more time for change, different results may have been observed.

This group had certain characteristics which may have effected the outcome, such as personal problems, and unstable home situations. Many seemed to resent school authorities, and this may have carried over to other areas.

Short contacts in nursing situations, such as in prenatal clinics, do not allow sufficient time to motivate patients to change their eating habits. Telling someone what to eat, or handing her a diet plan is not going to change eating habits. Diet counseling is a type of preventive care. Unlike diet counseling in other conditions such as heart disease or diabetes where there is more immediate cause and effect, it is more difficult to motivate patients to change their eating habits during pregnancy.

RECOMMENDATIONS

As a result of this study, the following recommendations are made:

1. Instead of setting aside a block of time for teaching nutrition, nutrition education should be incorporated into all aspects of education throughout childhood.
2. Creation of activities to involve students, such as nutrition games, should be further expanded and utilized.
3. There should be values clarification research done on pregnant teenagers to discover what goals are important to them, and utilize these findings when trying to appeal to them.
4. The school for pregnant girls should make other plans for providing lunch food of better nutritional value than obtained from the catering truck.

The following changes would be advised for another study:

5. There should be a larger sample.
6. The study should cover a longer period of time for class content and allowance for change.
7. The snack cards should include amounts of food eaten.

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- Wyman, J. R. Teenagers and food, their eating habits. Food Nutr 2:3, 1972.
- Zirkle, V. Eat right--you're on candid camera. Ext Ser Rev 43:3, June, 1972.

APPENDIX A
TOOLS FOR DATA COLLECTION

PERSONAL DATA SHEET

NAME _____ BIRTH DATE _____ M. _____ S. _____

EDC _____ GRAVITY _____ TRIMESTER _____

RACE: CAUC. _____ WHO PREPARES MEALS?:
 MEX. -AM. _____ PARENT, OR GUARDIAN _____
 NEGRO _____ SELF _____
 HUSBAND _____

USE OF: FOOD STAMPS? _____
 FOOD COMMODITIES? _____

 FACTORS RELATING TO NUTRITION

Meals per day

Where eaten

Meals skipped

Food between meals

Appetite

Food dislikes

Allergies

Nausea and vomiting

Vitamin-mineral supplements

Other

Adapted from: Seiler, Jo Ann K. Factors related to dietary adequacy in the very young pregnant adolescent. Lincoln, Nebraska, University of Nebraska, 1968, p. 86 (Unpublished thesis).

FOOD INVENTORY

List below all foods eaten yesterday. This should include butter, jelly, any liquor, sugar in coffee and all snacks.

M.G.	M.G.	V&F	B&C	OTHER
------	------	-----	-----	-------

MORNING

NOON

EVENING

Total number of servings					
Recommended number of servings					

THE FOUR FOOD GROUPS

Servings and sizes

(Adapted from "The Four Food Groups Serving Sizes Game," Dairy Council of California)

MILK GROUP

	1 minimum serving equals:
Children--3 servings per day	8 ounces (1 cup) milk, buttermilk, or skim milk, yogurt
Teens --4 servings per day	1 1/3 oz. cheese
Adults --2 servings per day	1 1/2 cups cottage cheese
	2 cups ice cream

MEAT GROUP*

2 servings per day	1 minimum servings equals:
	2 oz. meat, cooked (not including bones or fat)
*increase size or number of servings for teenagers, mothers- to-be and nursing mothers.	2 oz. luncheon meats
	4 tablespoons peanut butter
	2 eggs
	1 cup dried peas or beans, cooked

VEGETABLES AND FRUITS*

4 servings per day	1 minimum serving equals:
	1/2 cup cooked or raw
	1/2 cup juice
*1 source of Vitamin C every day.	1 medium-sized orange or potato, or apple
1 source of Vitamin A three to four times a week.	1/2 medium grapefruit
	1/4 cantaloupe

BREADS AND CEREALS*

4 servings per day	1 minimum serving equals:
	1 dinner roll
	1 slice bread
*must be whole grain or enriched.	1 oz. ready-to-eat cereal (3/4 cup)
	1/2 cup cooked cereal, corn meal, grits, macaroni, rice, spaghetti
	5 saltine crackers
	1 5-inch tortilla

SNACK CARDS

NAME	<u>Check Each Time You Have a Snack</u>					DATE
TYPE OF SNACK	TIME OF DAY					
Milk, ice cream, shakes						
Pop						
Sandwich, hamburger, taco, pizza, etc.						
Nuts						
Apples, carrots, celery, etc.						
French fries						
Potato chips, corn chips, etc.						
Pickles, olives						
Bread and butter, etc.						
Cake, cookies, etc.						
Candy						
Other: _____						

The above form was stenciled onto 4 X 6 inch cards which made the cards easy to carry, or to place in a convenient place at home.

The analysis of the snack cards was accomplished by tallying the types of foods used for snacks as recorded by the girls. Tallies for the snacks were placed under the four food groups as follows:

Milk Group--milk, ice cream, shakes.

Meat Group--sandwich meat, hamburger, tacos, nuts, etc.

Fruit and Vegetable Group--apples, carrots, celery, pickles,
olives.

Bread and Cereal Group--bread and butter, sandwich bread,
taco shells, etc.

"Other" Food Group--pop, french fries, potato chips, corn
chips, cake, cookies, candy.

Date: _____

LUNCH OBSERVATIONS

NAMES	CHECK TYPE OF FOODS OBSERVED HERE				
	Protein source in sandwich form	Milk 1/2 pt.	Soft Drink	Vegeta- bles or Fruit	Cake or Cookies
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

*Snacks include potato or corn chips, cheese crackers, popcorn, or anything other than cake or cookies.

Adapted from: Boysen, S. C. and R. A. Ahrens. Nutrition instruction and lunch surveys with second graders. J Nutr Educ 4(4):173, Fall 1972.

APPENDIX B
OUTLINE OF NUTRITION CLASSES

OUTLINE OF NUTRITION CLASSES

CLASS 1

Objectives

By the end of the class period, the students will:

- A. Be acquainted with the importance of good food for beauty and health.
- B. Understand some reasons why teenagers may have poor eating habits.
- C. Be aware of the need to increase nutritional intakes during teenage years, and pregnancy.
- D. Be acquainted with "leader" nutrients.

Class Content

- I. Importance of good eating habits
 - A. For beauty, nice skin and hair, vitality, and popularity
 - B. Poor nutrition: tiredness, skin problems, overweight or underweight, tooth decay, unhealthy hair, etc.
- II. Teenage diets
 - A. Teenagers are poorest eaters of any family member.
 - B. Girls usually worse than boys
 - C. Reasons for faulty diets:
 1. Fad diets
 2. Peer pressure
 3. Figure conscious
 4. Often too busy to eat
 5. Eat what is handy
 6. Skip meals
 - D. Need more food during growing teenage years
 - E. When pregnant, body requires more nutrients
- III. Some medical problems associated with teenage pregnancy
 - A. Anemia
 - B. Toxemia
 - C. Prematurity
 - D. Low birth weight
 - E. High infant death rate
 - F. Weight gain

- IV. Long-term effects of good diet versus poor diet on pregnancy
 - A. Good diet: new mother will have reserves to produce a normal, full-term infant
 - B. Poor diet:
 - 1. Maternal problems--toxemia, premature delivery, poor nutritional reserves
 - 2. Infant problems--prematurity, low birth weight, neonatal deaths or stillbirths

- V. "Leader" nutrients--when leader is present in foods we eat, its followers are there, too.
 - A. Protein
 - B. Fat
 - C. Carbohydrate
 - D. Vitamins (Vitamins A, B, C, D)
 - E. Minerals (calcium, iodine, iron)

CLASS 2

Objectives

By the end of the class period, the students will:

- A. Learn some of the effects of poor nutrition on the mother and baby.
- B. Be acquainted with some of the deficiency diseases.
- C. Be able to name the "leader" nutrients, and their sources.

Materials Used

- I. Graph depicting loss of brain cells in malnourished rats
- II. "Comparison Cards for Teenagers," National Dairy Council
- III. "Choose Your Calories by the Company They Keep," National Dairy Council

Class Content

- I. Dietary deficiency diseases
 - A. Protein-calorie deficiency (kwashiorkor)
 - B. Vitamin A deficiency (avitaminosis A)
 - C. Thiamine deficiency (beriberi)
 - D. Niacin deficiency (pellagra)
 - E. Vitamin C deficiency (scurvy)
 - F. Vitamin D deficiency (rickets)

- G. Mineral deficiencies--iron (anemia); iodine (goiter); calcium (tooth decay, poor bones, muscle cramps, abnormal blood clotting mechanism)
- II. Nutrient requirements in pregnancy
 - A. Calories--200 more than normal in second and third trimester
 - B. Protein--10-15 gm more than normal, to 65 gm, total
 - C. Vitamin A--daily intake of 1,000 I. U. in latter one-half of pregnancy
 - D. Vitamin B--usually supplied by adequate diet
 - E. Vitamin C--daily increase of 5-10 mg. to 60 mg. total
 - F. Vitamin D--400 I. U. daily
 - G. Calcium--50 percent increase last half of pregnancy to total of 1.2 gm.
 - H. Iron--18 mg.
 - III. Functions and sources of "leader" nutrients
Held up some "Comparison Cards" showing how foods high in leader nutrients also have follower nutrients

CLASS 3

Objectives

By the end of the class, the students will:

- A. Understand some of the basic concepts of food absorption and utilization of nutrients by the body.
- B. Be acquainted with placental and fetal absorption of nutrients.

Materials Used

- I. Film "How Hamburger Turns Into You," Dairy Council
- II. Poem, "I Am What I Eat," Illinois Teacher 14(1):17, 1970
- III. Illustration from "You Are What You Eat," Boy's Life, April 1973, p. 35.

Class Content

- I. Poem
- II. Picture of boy made of foods
- III. Discussion

- IV. Film and discussion
- V. Discussion of digestion, absorption, and utilization of nutrients in pregnancy

CLASS 4

Friday--Game Day

Objective

To reinforce what has been learned during the week.

Materials Used from the National Dairy Council

- I. "Choose Your Calories by the Company They Keep"
- II. "Comparison Cards"
- III. "Food Models" (cardboard pictures of food servings)

Activity 1

Class divided into two teams. Each team listed leader nutrients and their sources, using resources. Time limit.

Activity 2

"Food Models" laid in center of two teams. Each team picked one person to go to center. Instructor called out one leader nutrient, and the team representatives chose food models for that nutrient, as many as possible within time limit. One point for each right choice, two points off for wrong choice.

CLASS 5

Objectives

By the end of the class period, the students will:

- A. Name the four food groups, and list types of foods in each group.
- B. Know how to categorize foods into food groups by the presence of leader nutrients.

- C. List the recommended minimum number of servings of four food groups for pregnant teenagers.

Materials Used from the National Dairy Council

- I. "A Guide to Good Eating"
- II. "Comparison Cards for Teenagers" made into "mystery cards" by covering up the name of the food on each card

Class Content

- I. Four Food Groups--had girls name food groups; listed on blackboard
- II. "A Guide to Good Eating," Dairy Council
 - A. The students will look carefully at the picture content of the four food groups.
 - B. They will list by memory what were in the pictures for each food group and how many servings were recommended.
- III. "Comparison Cards"
 - A. Students will be shown how each food group is dominant in certain leader nutrients.
 - B. Names of foods on cards covered; cards passed around. Students will write down which food group each card represented.
 - C. Mystery cards identity revealed

CLASS 6

Objectives

By the end of the class period, the students will:

- A. Practice dividing grocery items into four food groups, and the "other" food group.
- B. Analyze a typical daily diet (compiled from their diet histories), using four food groups, computing number of servings for the day.
- C. Practice reading labels for content.
- D. Understand caloric values of protein, carbohydrate, and fats.

Materials Used

- I. Grocery bags full of variety of items
- II. One diet to analyze

Class Content

- I. Grocery bag items
 - A. Grocery items passed out to each student
 - B. Students will lay items on table according to the four food categories, plus "other" food group.
 - C. Corrections will be made for misplaced items.
- II. Label reading--contents analyzed according to label
- III. Analysis of one day's diet--they will analyze how many servings from each food group were present, and compare these to recommended minimum number of daily servings.

CLASS 7

Objectives

By the end of the class period, the students will:

- A. Name the three nutrients usually deficient in teenage and pregnancy diets--calcium, iron, and ascorbic acid.
- B. Demonstrate they could choose foods which are sources of the three nutrients.
- C. Learn the importance of milk in daily diet for source of calcium.

Materials Used

- I. "Food Models," National Dairy Council
- II. "What to Eat" pamphlet, National Dairy Council
- III. "Your Food--Chance or Choice?" National Dairy Council
- IV. Cafeteria food trays

Class Content

- I. Requirements of calcium, iron, ascorbic acid needed for teenage pregnancy
- II. Cafeteria game
 - A. Teams of two pick food models one would eat for a whole day

- B. From the computations on the back of each food model, each team analyze how much calcium, iron, and ascorbic acid they receive from their choices.
- III. Milk as source of calcium--teenagers, expectant mothers, nursing mothers need more calcium

CLASS 8

Friday--Game Day

Objective

Students will learn aspects of nutrition through games.

Materials Used

- I. "The Nutrition Game," by Spitze
- II. "The Calorie Game," by Spitze
to order: Games That Teach
P. O. Box 331
Urbana, Illinois 61801
- III. "Soup's On!"
to order: Diator Systems, Didactron Inc.
P. O. Box 1501
Ann Arbor, Michigan 48106

CLASS 9

Objectives

By the end of the class period, the students will:

- A. Discuss types of snacks beneficial to pregnancy, health, and good looks.
- B. Learn the parts of a kernel of wheat and how flour processing removes nutritional parts of kernel; what "enriched" and "fortified" means.
- C. Learn about sugar consumption in the United States; soft drink consumption.
- D. Learn importance of breakfasts, and regular mealtimes.

Materials Used

- I. "Your Snacks: Chance or Choice?" National Dairy Council
- II. "Breakfast in Haste," Dairy Council of Detroit
- III. Illustration of kernel of wheat
- IV. Visual aids on sugar consumption statistics

Class Content

- I. Snacks
 - A. Discuss types of snacks as listed on "Your Snacks: Chance or Choice?"
 - B. Discuss how snacks can help provide balanced diet and encourage the girls to utilize snacking wisely
 - C. Discuss snack foods beneficial during pregnancy
- II. Grain
 - A. Parts of kernel--large illustration as visual aid
 - B. Flour processing--what parts are removed
 - C. "Enriched," "Fortified," flour
 - D. Unenriched flour--common foods made from them
- III. Sugars
 - A. Refined sugars versus unenriched sugars
 - B. Sugar consumption per person in the United States
 - C. Soft drinks
- IV. Breakfasts
- V. Meal skipping

CLASS 10

Objectives

By the end of the class, the students will:

- A. Evaluate costs of foods, comparing foods of similar nutritional values.
- B. Write a paragraph, or draw a poster depicting what they learned from this series of classes.

Materials Used

- I. Script of play--two women comparing the amounts of food purchased with \$10.
- II. Paper, pens, etc.

Class Content

- I. Purchasing power
 - A. Two girls read script
 - B. Shopping bag contents listed on blackboard: discussion of how one woman saved money, purchased more food items than other woman
- II. Summary

Girls will be asked to write a paragraph, or draw a poster, summarizing what they learned from the nutrition classes.

APPENDIX C

PARENT CONSENT FORM

PARENT CONSENT FORM

October 22, 1973

Dear Parents or Guardians:

There will be a special nutrition instruction program for teenage pregnant girls conducted at the school _____ is presently attending. The identity of the students, and any information obtained will remain confidential. The classes will be held at the school during the Health Education period, for three weeks. We hope that the classes will be interesting and helpful for all the girls who attend.

Do we have your permission to have _____ participate in this special program?

If so, please sign on the line below, and return it to the Home Economics teacher by October 26.

If you have further questions about the classes, you may call me at my home, at 796-2441.

Sincerely yours,

Dorothy Whiteside, R.N.
School of Nursing
Loma Linda University

It is with my permission that _____

First name

Last

participate fully in the special nutrition instruction program.

Signed: _____

Parent or Guardian

APPENDIX D

LETTERS

10685 Seamount Drive
Loma Linda, Calif. 92354
March 19, 1973

M. E. Cosand, M.D.
Director of Public Health
The San Bernardino County Health Department
351 Mountain View Avenue
San Bernardino, California 92401

Dear Dr. Cosand,

A problem which concerns many in the medical and allied health professions is the faulty diet of teenage girls in the United States. Poor eating habits of the teenage girl is believed to be a contributing cause to complications of pregnancy often seen in this age group, such as iron deficiency anemia, and low birth weight infants. Toxemia of pregnancy and prematurity rank high among teenage pregnancies, and these complications may also be diet related. I would like to conduct a study to test the value of classes in nutrition in bringing about a change in the eating habits of pregnant teenage girls.

With your permission, a small number of pregnant girls attending _____ will be selected to participate in a health education program in nutrition. To establish if there has been a change in their eating habits due to the classes, there will be two diet histories taken on each girl on separate days prior to the classes, and two again after the classes are completed. The post-diet histories will be compared to the pre-diet histories for changes in their diets. Also, there will be a pre- and post-nutrition attitude test to establish if attitudes toward nutrition changed. There will be approximately six nutrition classes. The total program will take about one and one-half months.

I have discussed these plans with Dolores Le Roy of the San Bernardino County School's Pregnant Minor's Program, and also with Ann Ivy, and Ruth Range of the San Bernardino County Health Department. I will be keeping them advised on the methods and content of the classes. I will be working closely with my advisors at Loma Linda University: Mrs. Clarice Woodward, Miss Ruth Monroe, and Mrs. Joyce Hopp. Also, I will be working with the faculty in the Department

of Nutrition at Loma Linda University. The plans for this study have been approved by the Loma Linda University Research Advisory Committee for Human Experimentation. Safeguards are built in for the protection of the identity of the participants, and the school.

May I have permission to conduct this study in _____ School? I will be glad to make an appointment to talk to you further about the study. Should you wish, I will be glad to share the findings with you. This study is to meet part of the requirements for a master's degree in nursing at Loma Linda University. I would like to begin collecting data about April 1, 1973.

I look forward to hearing from you soon. A return card is enclosed for your convenience.

Sincerely yours,

Dorothy Whiteside, R.N.
Graduate student
School of Nursing
Loma Linda University

2

LOMA LINDA UNIVERSITY

134

LOMA LINDA, CALIFORNIA 92354

DIVISION OF RELIGION



March 16, 1973

Miss Dorothy Whiteside
School of Nursing
Loma Linda University
Loma Linda, California 92354

Dear Miss Whiteside:

Your research protocol "The Effects of Nutrition Education Classes on the Diet and Nutritional Attitudes of Teenage Pregnant Girls" has been reviewed by the Advisory Committee on Human Experimentation and has been granted its unqualified approval.

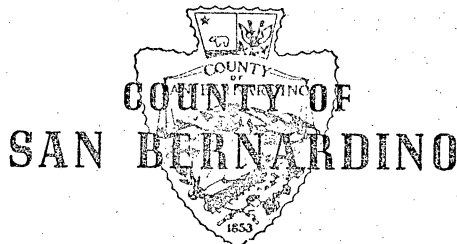
Best wishes in your research project.

Sincerely yours,

A handwritten signature in cursive script that reads "Jack W. Provonsha".

Jack W. Provonsha, Chairman
LLU Advisory Committee on
Human Experimentation

✓
JWP:mn



SAN BERNARDINO, CALIFORNIA 92401

COUNTY HEALTH DEPARTMENT
351 Mt. View AvenueM. E. COSAND, M.D.
Director of Public Health

April 3, 1973

Dorothy Whiteside, R.N.
Graduate Student
School of Nursing
Loma Linda University
Loma Linda, California 92354

RE: Health Education Program in Nutrition

Dear Ms. Whiteside:

Thank you for your interest in the nutrition problems of teenage girls.

It is my understanding that you wish to select a small number of girls attending to participate in a study to test the value of classes in nutrition in bringing about a change in the eating habits of pregnant teenage girls.

You have my permission to conduct this study.

Sincerely,

M. E. COSAND, M.D.
Director of Public Health

MEC/am

LOMA LINDA UNIVERSITY

Graduate School

THE EFFECT OF NUTRITION EDUCATION ON
THE DIET OF PREGNANT TEENAGERS

by

Dorothy Whiteside

An Abstract of a Thesis
in Partial Fulfillment of the Requirements
for the Degree Master of Science
in the Field of Nursing

June 1974

ABSTRACT

For optimal growth and development during the teens, there needs to be sufficient intake of food to meet the nutritional requirements. Pregnancy during that time increases the nutritional needs. Studies have shown that teenage girls generally have poor eating habits, not meeting the nutritional requirements.

The purpose of this study was to determine whether special nutrition education classes would improve eating habits of a group of pregnant teenagers. Case studies were used as the method to report the findings. A health education class in a special day program for pregnant girls was used as the setting for this study. The study extended over a six-week period, with the nutrition education classes lasting two and one-half weeks. The classes were planned and presented by the researcher. Testing was done before and after the classes to determine changes in the eating habits of nine subjects, ages fifteen to nineteen. Twenty-four-hour recall diet histories, recordings of snack items, and lunch observations, based on their use of the four food groups, were used for evaluating eating habits. Each girl was used as her own control, and the information obtained was reported as a case study of each subject.

From the data obtained, the nutrition education classes appeared to have little positive effect upon eating habits. The tests revealed that in some areas the classes had a negative effect. In some subjects, there was an increase in the use of the four food groups after the classes, but there were more who showed a decrease in their use. The subjects were consistently too low in their use of items in the milk group, the meat group, and the fruit and vegetable group. Fatty foods, and "empty calorie" foods were used less frequently after the classes by most of the subjects, which was considered the most positive result observed in the study. The nutrition education classes consisted of a variety of activities, and it appeared they responded more positively to classes which included activities such as nutrition games than to classes which used lectures or movies.

A conclusion from this study is that eating habits are difficult to change over a short period of time. It would be best to have nutrition education incorporated into all aspects of education throughout childhood, instead of having short blocks of time for teaching the subject.