

TEEN-AGE PREGNANCIES: EFFECT OF FOOD HABITS AND ATTITUDES

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INTRODUCTION

A mother's nutrition is the most important single environmental influence in the life of her unborn child. It is by means of the food she eats that a mother has a profound and lasting effect on a child's development (1). While it is recognized that there are other important factors in the successful outcome of pregnancy, the nutrition of the mother during the prenatal period can influence the whole course of pregnancy. In addition, the nutritional status of the mother during pregnancy can directly affect the health of the child during its early period of life (2). The nutritional well-being of the mother prior to conception can also affect fetal outcome and the ongoing health of the infant (3).

Inadequate dietary intake during pregnancy can result in maternal illness, prematurity, immaturity, malformations and neurological defects such as convulsive seizures, mental deficiency, and cerebral palsy (4).

The adolescent girl often ingests a decidedly unbalanced diet. This reflects itself in either a low plane of nutrition or malnourishment (5). When the nutritional demands of pregnancy are added to the nutritional demands of adolescence, the results are frequently detrimental to both the mother and her infant.

The purpose of this paper is to review literature regarding the effects of teen-age food habits and attitudes upon the state and outcome of pregnancy. Consideration will be given to the following related factors: the incidence of teen-age pregnancies, the effects of nutrition upon the outcome of pregnancy, recommended dietary intake, and nutritional needs. In addition, recent action programs which deal with the problems of teen-age pregnancy will be reviewed.

TEEN-AGE POPULATION, MARRIAGES, AND BIRTHS
IN THE UNITED STATES

The teen-age population has increased considerably during the last several decades. In 1960, there was a total of 13.2 million individuals, aged 15 to 19 years. This represented a 25% increase over the 10.6 million individuals of the same age in 1950 (6). In 1960, the Bureau of Census showed a total teen-age population of 20 million and expressed an expected increase of more than one-third by 1970 (7). This estimation was relatively exact as the 13 to 19 year olds numbered 24 million in 1970 (8). The young, 14 to 24 years of age, were 40 million strong in 1970. This represented an increase during the 1960-1970 period of 12.8 million or 48% (9).

In conjunction with this decided increase in the teen-age population, there has been a trend toward earlier marriage. In 1959, 39% of all brides were in their teens, as compared to 33% in 1950. Data for 1959 concerning first marriages showed that 51% of all brides and 17% of all grooms were in their teen years. The proportion of 15 and 16 year old girls who marry has also increased during the 1950's and 1960's (6). Statistics for 1970 show that 203,000 females, aged 14 to 17 years, and 859,000 females, aged 18 to 19 years, were married (10).

There has also been a decline in the age at which maturity is reached. The age of menarche in this country has declined from 17 to 13 years during the past 100 years (11). In teen-age marriages there are high rates of fertility as evidenced by the following statistics: of all high-school and teen-age brides who are not pregnant at the time of marriage, 75% will become pregnant within the first 12 months of marriage (12). Birth statistics for 1959 indicate that 14% of all children were born to teen mothers.

From 1950 to 1959, first babies born to teen mothers increased by one-third, i.e. from 27 to 36 percent. During this same period, first babies born to mothers in their early teens, i.e. mothers under 18 years of age, rose from 10% to 14% (6).

The live birth rates for 1968 showed 66.0 births per 1000 women, aged 15 to 19 years (10). In Chicago, the birth rate in girls under 16 years of age rose from 12.0 per 10,000 live births in 1950 to 51.3 per 10,000 in 1966 (13). The Obstetric Coding and Data Processing of the Bureau of Medicine and Surgery of the United States Navy coded 125,000 deliveries during the fiscal year 1961-1964. In this particular obstetric population there were 24,022 (19.2%) confinements under the age of 20 years (12). In 1968, Georgia women gave birth to between 88-89,000 infants, over 4200 of which were to girls 16 years of age or under and over 22,000 were to those aged 19 and under (14). Similar statistics are available from other areas within the United States. Kansas birth statistics for the period of 1964 through 1965 indicate that mothers under 20 years of age produced 13,651 of a total of 80,887 births (15).

Pregnancy within the adolescent population is not always limited to a single birth during the teen years. Estimations for 1971, indicated that some 210,000 school-age girls under 18 years of age, nation-wide, would give birth. For nearly 15% of these girls, it would be a second or later birth (16).

Semmens (7) reported the findings of Kinsey and others who correlated modalities of sexual behavior with levels of education. Results showed that premarital sexual relationships occur among approximately 90% of males whose education is limited to eighth grade or high-school levels. He expressed the

opinion that, "it does not seem unreasonable that with an increasing number of high-school dropouts, with the number of youngsters whose educational levels are limited by economic demands in depressed areas, and with an increasing acceptance of teen-age marriage in general, that we should see increasing numbers of pregnancies in this age group."

In Baltimore, a city with a population of 900,000, Stine (17) reported that over 800 school-age girls became pregnant annually for years, 1957, 1960, and 1961, and gave birth to live infants. The actual number of pregnancies is far in excess of this as data do not include women who aborted, produced non-viable children or who were non-residents.

Estimations by the National Conference of Maternity and Infant Care indicate that there may be 180,000 criminal abortions among school-age adolescents, a number far in excess of pregnancies annually cared for by all federal Maternal and Infant Care Projects. One girl in six in the United States is pregnant out-of-wedlock before the age of 20. This statistic does not include those who marry, abort, or bear a child under an assumed name (14).

Illegitimacy in this country has been on the rise for the past 25 years. Over two-fifths of all illegitimate children are born to teenage mothers. During 1965, it was estimated that more than 100,000 girls 18 years of age and younger had a child out of wedlock (18). In 1968, 158,000 illegitimate births were by mothers 15 to 19 years of age (9).

From the foregoing information, it is obvious that the incidence of teen-age pregnancy is of major public health concern.

EFFECTS OF NUTRITION UPON PREGNANCY

Nutrition directly affects the course and outcome of pregnancy in all women, regardless of age. Good maternal nutrition results in healthy fetal growth. Poor nutrition on the other hand is the cause of deficient growth (1).

Dr. Genevieve Stearns, nutritionist at the University of Iowa, summarized the importance of prenatal nutrition: "The best provision for well-being in any period of life is to arrive at that point in good nutrition and physical status. The well-born infant is sturdier throughout infancy than the baby poorly born; the sturdy infant has stores to give impetus to growth in the preschool years. The child who is in excellent nutrition will have stores to be drawn upon during the rapid growth at puberty. The well-nourished mother can nourish her fetus well; therefore, the best insurance for a healthy infant is a mother who is healthy and well nourished throughout her entire life, as well as during the period of pregnancy itself" (5).

Nutrition is closely interwoven with many social, economic, and educational factors. Good nutrition, for example, is often associated with a relatively high standard of living, and poor nutrition with a low standard of living. But any consideration of standards of living must include factors in addition to nutrition. Education also plays a part. People who suffer from malnutrition, are with few exceptions, ignorant of the facts of human growth and development or for one reason or another insufficiently motivated to put what they know into practice (1).

The effects of a nutritional deficit on fetal development and offspring viability involve timing, severity, and duration of the deficit (4). If malnutrition affects the zygote, the outcome may be infertility, possibly

involving irregular sex cycles. Amenorrhea often results from malnutrition. Women who are malnourished are more likely not to conceive or to miscarry children. If malnutrition coincides with the first trimester of pregnancy, i.e. during the sensitive periods of organ development, malformations and even fetal death may be the sequelae. During the second and last trimesters of prenatal life, nutritional deficiencies may result in functional disturbances. In the case of extreme deficiency, the fetus dies or a non-viable infant is born (19).

The importance of the mother's preconceptual dietary state in determining fetal outcome, as well as the on-going health of the infant, has been documented by experiences during World War II (3). Antonov (20) reported a study which dealt primarily with children during the Siege on Leningrad in 1942. The severe quantitative and qualitative hunger from which the women of Leningrad suffered during the siege affected the course and the result of their pregnancies and the conditions of their newborn. During severe hunger, the stillbirth rate rose to 5.6%, twice the normal figure and the rate of premature births reached the unusually high figure of 41.2%. There was a marked decrease in the proportion of children born at term with heavy weights and conversely a considerable increase in the proportion of light-weight children. The average weight of infants born at term in the first half of 1942 was 500 to 600 grams less than normal. The physiologic loss of weight after birth in these young infants was greater and continued longer than usual. Newborns exhibited lowered vitality, brightly colored erythema, rare toxic erythema, rare physiologic swelling of the mammary glands and congenital softening of the skull bones. Morbidity and mortality were unusually high for babies born at term as well as those born prematurely.

Pre-World War II nutrition was considered generally good in Holland but as a result of the blockade during the war, acute nutritional deprivation developed. During the 6 to 7 months preceding the liberation of northwestern Holland in May of 1945, a state of severe malnutrition occurred among peoples of urban areas. Smith (21) reported the effects of this nutritional crisis upon infants at birth in Rotterdam and The Hague. According to official food distribution figures, the average pregnant woman (calculated for the entire famine-stricken area) consumed 1145 calories and 34 grams of protein daily. This state of hunger prevailed during a 6 to 7 month period. It, however, occurred after years of regulated but reasonably adequate nutrition. Menstruation ceased in about 50% of the urban women and became highly irregular in almost 50% of the others. This resulted in a sharp decline in the birth rate at appropriate later months (i.e., the decline in birth rates occurred about 9 months later). Amenorrhea ceased after adequate food supplies were made available. Average birth weights were 240 grams less than normal (any infant weighing 5 pounds or less at birth was considered premature). Data were inconclusive as to the relation between undernutrition in early pregnancy and malformations of the fetus because of the drastic fall in conception rate (21).

Results of the Leningrad situation differed strikingly from those of Holland. This is attributed to the fact that women in Leningrad did not consume adequate diets before the siege as undernutrition and malnutrition were common. During the siege, these women were compelled to do outdoor work in bitter cold. Chronic malnutrition of some degree for a long period of time was followed by acute undernutrition and malnutrition during the siege period. The birth of full-term infants with low vitality, poor sucking

ability, and low resistance to infection support this conclusion (5). In Holland, the maternal nutritional reserves were apparently sufficient to provide adequately for the demands of pregnancy (3).

A study by Burke et al. (22) pointed out the necessity of good preconceptual nutrition not only for a single pregnancy but also the need to maintain or acquire good nutritional status for succeeding pregnancies. The condition of second siblings was compared to that of the first when there had been a change in the mean general prenatal dietary rating of the mother from the time of one pregnancy to the time of the following pregnancy. The diet was considered to have changed if the rating shifted one or more dietary categories (i.e., from "good" to "excellent," etc.) on a 5-category scale of "excellent," "good," "fair," "poor," and "very poor." Data were presented concerning the birth condition of 53 matched pairs of siblings.

Change in the condition at birth of the second sibling from that of his older brother or sister with the change in the mean general prenatal dietary rating occurred as follows: (a) Eleven mothers improved their diets during the second pregnancy. Six of these produced second infants in better condition than the first while three produced second babies in less healthy condition than the first. (b) Twelve mothers consumed diets which were less adequate during their second pregnancy. Five produced second babies in less healthy condition. Two produced healthier infants. (c) The diets of ten mothers changed by two categories. The diets of three shifted from fair to excellent. The condition of their infants changed from good to excellent. The diets of two changed from very poor to fair. In one of these cases the second infant improved from poor to fair, while in the other case, the condition of both babies was good. There were five women whose diets during the

second pregnancy were less adequate by two categories: for four of these, the change was from excellent to fair. The condition of the infant in two cases deteriorated, it remained the same in one and in another the second infant was better than the first. One mother whose diet shifted from fair to very poor gave birth to two infants who were rated very poor at birth. From this data, it appeared that improvement of the infant's condition coincides with improvement of the maternal diet. Also, deterioration of the infant's condition coincides with deterioration of the maternal diet.

These particular studies point out the importance of adequate nutrition not only during pregnancy, but also prior to conception. This point is summarized by Thomson (23): "For the individual mother, the diet taken during pregnancy is only the most recent phase of a long history of nutritional experience. There is nothing new in the idea that the main importance of nutrition for pregnancy lies in the past. McCarrison (1937) said: 'The satisfaction of nutritional needs in pregnancy begins with the antenatal lives of the mothers of our race. It must continue during the period of their growth and development up to, during, and following the period when they find their fulfillment in motherhood; a fulfillment for which nutrition prepares and makes ready the way.'"

Studies are available which show the necessity of an adequate diet during pregnancy. An inadequate diet during this time may be detrimental to both the mother and the infant. Jeans et al. (24) studied the dietary habits of 404 pregnant women of low-income groups, living in Iowa. Results indicated that food habits were related to the incidence of premature births. Infants were considered premature if their birth weight was less than 2500 grams. The daily intake of protein was found to parallel the quality of the

diet as a whole. The relative intake level of each nutrient studied was found to range in the same order as that of protein. The groups were designated as follows: Group A--85 grams or more of protein daily; Group B--70 to 85 grams per day; Group C--60 to 70 grams per day; Group D--50 to 60 grams per day; Group E--less than 50 grams per day. As the protein intake decreased, an increased share of the total protein came from cereals, thus causing a decrease in quality as well as quantity of protein. The mean caloric intake was overly high for most groups; the mean intake of Vitamin A and its precursors was consistently good. Most of the women obtained less than 0.8 grams of calcium daily.

Of the 227 mothers in Groups A, B, and C, nine mothers (4%) gave birth to eleven infants weighing less than 2500 grams. Seven of these (3.1%) were single births. No stillbirths, neonatal deaths or congenital anomalies occurred among these infants. All children thrived during the neonatal period. Seventeen of the 177 women (9.6%) in Groups D and E, however, delivered prematurely.

Of the 17 premature infants of mothers in Groups D and E, seven were in poor physical condition at birth, while ten of the eleven born to mothers in Groups A, B, and C were in good condition at birth and the eleventh suffered a transitory jaundice. Jeans et al. conclude that the diets of the two lowest groups provided less than the minimum requirements of some of the essential nutrients. Also, that premature births may occur as a means to conserve the mother's body nutrients.

Burke et al. (25) studied the value of adequate protein during pregnancy. These workers reported observations on 216 women and their infants. The women observed attended the prenatal clinic of the Boston Lying-in Hospital.

Only 10% had "excellent" diets as rated according to protein content. Seventy percent consumed diets rated as "fair" or below. Results revealed a significant relationship between the protein content of the mother's diet during the latter part of pregnancy and the birth length of the infant. A decrease in length accompanied a decrease in protein intake. The amount of protein in the mother's diet had a greater effect on the infant's length than did the mother's height (heredity). Consideration of the birth weight in relation to the average number of grams of protein during the latter months of pregnancy revealed an increase in birth weight with each additional 10 grams of protein per day in the mother's prenatal diet. It was obvious that the longer and heavier infants were also in better physical condition. This was manifested by fewer stillbirths, fewer congenital malformations, less prematurity and less "functional immaturity" (i.e., the physical development or reactions of the infant are below normal in ways other than weight and length).

Burke et al. (26) in the study of 216 pregnant women previously mentioned (25), demonstrated that relationships exist between the diet of mothers during pregnancy, and the condition of the infant at birth and after the first two weeks of life. Pediatric ratings of infants were studied in relation to the mean general dietary rating assigned to the mother's diet during pregnancy. Infants of superior condition (i.e., at birth and during the first two weeks of life were rated by a pediatrician as "excellent" or "good") were studied in relation to the mother's mean general dietary rating for the prenatal period. Fifty-six percent of the mothers of these children consumed "good" or "excellent" diets; 35% "fair" diet, and 9% "poor" diets. The condition of the "poorest" infants (i.e., those who were stillborn, those who

died within a few hours or days after birth, those with marked congenital malformations, or those who were premature or "functionally immature") were also studied in relation to the mother's diet during pregnancy. Seventy-nine percent of the mothers of these children consumed diets which were rated as "poor" or "very poor"; 18% "fair"; and 3% "good" or "excellent."

Analysis of the mother's dietary rating rather than the pediatric rating revealed that 42% of the infants born to mothers with dietary ratings of "good" or "excellent" were "superior" infants; 45% had pediatric ratings of "good"; 10% had two minor physical counts each; and one infant (3%) had a congenital defect. Sixty-seven percent of the mothers with dietary ratings of "poor to very poor" produced infants who were either stillborn, deceased within three days of birth, born with congenital defects, premature or "functionally immature." Twenty-eight percent were considered in "fair" or "poor" general condition, and 5% in "good" or "excellent" condition.

Infants born of mothers with "superior" dietary ratings had an average birth weight of 8 pounds and 8 ounces and an average birth length of 28.4 inches. Infants born of mothers with "poor to very poor" diets, had an average weight of 5 pounds, 13 ounces and an average length of 18.6 inches.

Interesting correlations between nutrition and prematurity have been made in several countries of Europe. These support the investigations which conclude that poor maternal nutrition affects the condition of the infant. In England and Wales, the number of premature births dropped significantly when supplementary diets were fed to pregnant women. In the Scandinavian countries the welfare of their pregnant women is government controlled. This includes making good diets available, and freeing pregnant women from heavy work. With the instigation of this government policy, the rate of prematurity

has fallen to 5% within the Scandinavian countries other than Finland. In that country, a rate of 2.4% has been achieved. In the United States, the rate of prematurity is 10% (1).

Burke et al. (26) have also presented evidence of the relation of maternal nutrition to complications in pregnancy. These investigators reported a normal pregnancy for 68% of the women with a mean general dietary rating of "excellent" or "good." Complications were evident in 32% of the cases of their 216 subjects. Forty-two percent of the women consuming "poor to very poor" diets experienced a normal prenatal course whereas 58% had complications. Complications were due largely to pre-eclampsia which occurred in approximately half of the group consuming poor diets. This condition, it should be noted, did not occur in women with diets rated "excellent" or "good."

Ebbs et al. (2) studied the relation of maternal nutrition to complications of pregnancy. The prenatal diets of 400 low-income women in the Toronto General Hospital were studied. Of these women, 120 were permitted to consume their customary diets which were inadequate. These subjects served as controls (Poor Diet Group). A second group of 90 women consuming poor diets received dietary supplements during the last 3 to 4 months of pregnancy (Supplemented-to-Good Diet Group). A third group of 170 had moderately good diets. Women in this group were given instruction on dietary needs during pregnancy (Good Diet Group).

An obstetrician rated the condition and the progress of patients in each period of pregnancy. The mothers in the Supplemented-to-Good Diet Group and the Good Diet Group proved to be better obstetrical risks. The average duration of labor for these women was 5 hours shorter than for those in the

Poor Diet Group. In addition, there was marked improvement in the general mental attitude of these mothers. Past obstetrical records of the multiparous patients showed a much higher incidence of previous major complications in the Poor Diet and Supplemented Diet Groups than in the Good Diet Group.

During the prenatal period the incidence of anemia, toxemia, and threatened miscarriage was higher in the Poor Diet Group than in the Supplemented-to-Good Diet Group. The total number of complications in the former group was almost double that of the latter group. The Poor Diet Group had an incidence of 6% of miscarriages, 8% of premature births, and 3.4% of stillbirths. In the Supplemented-to-Good Diet Group there were no miscarriages, only 2.2% of the mothers delivered prematurely and there were no stillbirths. Following delivery there were fewer cases of uterine or breast infections in the Supplemented-to-Good Diet Group.

These same workers followed the progress of 250 babies from birth to the age of 6 months. They found a striking increase in minor and major diseases in babies born of mothers in the Poor Diet Group. In a large proportion of children, it was possible to tell the diet group of the mother by simply observing her baby.

RECOMMENDED NUTRITIONAL INTAKE DURING PREGNANCY

Adequate nutrition for all pregnant females, regardless of age, is of vital concern to both the mother and the fetus. From a nutritional point of view, the 9 months of pregnancy must be considered a period of stress during which the nutrient demands of the developing fetus are superimposed on those required for normal maintenance of the woman (8). During the last 6 months of pregnancy, nutrient needs are increased (27).

Increased nutrient requirements are necessary during pregnancy for building of new tissue and the formation of nutritional stores in the fetus. In the mother, nutrient needs are increased due to the increased work load associated with movement, increased resting metabolic rate, formation and growth of the placenta, enlargement of the uterus and breasts, increased blood volume, formation of amniotic fluid, and storage reserves for labor, delivery, and lactation (27, 28, 29).

Table 1 contrasts the nutrient requirements for non-pregnant women and women during their last two trimesters of pregnancy.

Table 1 A Comparison of the Daily Nutritional Needs of Non-Pregnant and Pregnant Women.¹

Nutrient	Non-pregnant		Pregnant (2nd and 3rd Trimesters)
	18-35 Yrs	35-55 Yrs	
Energy, kcal	2000	1850	+200
Protein, gm	55	55	65
Iron, mg	18	18	18
Iodine, ug	100	90	125
Calcium, gm	0.8	0.8	+0.4
Magnesium, mg	350-300	300	450
Vitamin A, IU	5000	5000	6000
Vitamin D, IU	400	---	400
Vitamin E, IU	25	25	30
Riboflavin, mg	1.5	1.5	1.8
Thiamine, mg	1.0	1.0	+0.1
Niacin, mg eq	13	13	15
Folacin, mg	0.4	0.4	0.8
Vitamin B ₆ , mg	2.0	2.0	2.5
Vitamin B ₁₂ , ug	5	5	8
Ascorbic Acid, mg	55	55	60

¹From the 1968 revision of the daily dietary allowances as recommended by the Food and Nutrition Board of the National Research Council, National Academy of Sciences.

These nutritional requirements can be met by the consumption of a balanced diet containing a wide variety of foods from the Basic Four Food Groups. From conception through parturition and lactation, maternal nutrition should provide adequate amounts of nutrients essential for the mother's maintenance and the growth and development of the fetus (30). Since pregnancy is a normal state generally speaking, it should involve a normal diet, even though nutrients are needed in increased quantities to meet the demands of this physiologic state (31).

NUTRITIONAL NEEDS OF TEEN-AGERS

Adolescence is a period in the life cycle with increased nutritive needs. These increases result from an accelerated rate of physical growth, biochemical activity and emotional development (8). The rate at which these processes occur varies widely among individuals (28). For girls, these needs are surpassed only during pregnancy and lactation (8).

Caloric needs increase with metabolic demands of growth and energy expenditure. Because of the marked variations in energy need, individual values for caloric allowances range from 2000 to 2500 kcal (28).

Protein requirements, like caloric requirements, are closely related to maturational events. During the prepubertal period of accelerated growth, there is an increased need for protein. It is accompanied by an enhanced ability to retain nitrogen. The post-pubertal period is marked by a deceleration in growth, and is accompanied by decreased protein needs and a diminished ability to retain nitrogen (32). The daily ingestion of 50 to 60 grams of protein of high biologic value will adequately support the growth of adolescence (18).

Calcium and iron both play significant roles during adolescence. Bone growth demands calcium (28). A mean retention of 400 mg of calcium daily for several years during adolescence is necessary for adequate mineralization of the skeleton. Such calcium retention is possible only when intake range from 1.0 to 1.6 gram daily and the Vitamin D intake reaches 400 IU daily (32).

Considerable iron is required during adolescence to meet the demands of rapid growth, to replace menstrual losses, and to maintain available iron stores. A daily iron intake of 15 to 18 mg is adequate for these purposes and allows for variability in iron absorption (32).

During periods of accelerated growth as occurs in adolescence and pregnancy there is an increase in thyroid activity (28). This increase in hormonal activity increases the need for iodine from 110 to 115 ug for the 12 to 14 year old, from 115 ug to 120 ug for the 14 to 16 year old, and back to 115 ug for the 16 to 18 year old female (27).

Vitamins are necessary for regulation of metabolic activity. Increased amounts of B-vitamins are needed to meet extra demands of energy metabolism and muscle tissue development (28).

When the adolescent girl becomes pregnant, the needs of this physiologic state are superimposed upon the already existing additional nutritional needs for body maturation (3).

The relationship of nutrition to teen-age pregnancy is significant because of the undernutrition which frequently occurs at this period. Studies of nutrition in pregnancy consistently demonstrate the relationship of the maternal diet, especially its protein content, with infant birth weight and length, and the incidence of prematurity (6).

Stearns (5) studied the nutritional needs of girls and young women who were illegitimately pregnant. Subjects ranged in age from 13 to 30 years. Her data indicate that emotionally stable young women are able to absorb and retain nutrients needed during pregnancy regardless of their prior nutritional status; girls with poor nutritional backgrounds were able to retain as much of these nutrients as those whose background had always been good. The authors conclude that pregnancy increases utilization and storage of essential nutrients. The subject most continuously disturbed over her situation lost calcium steadily during the study. Her total calcium loss was at least twice the amount used by the fetus. Loss of phosphorus and nitrogen were less striking but left her body with a serious deficit.

Stearns also reported that if a young pregnant girl remains emotionally stable during her pregnancy and ingests a good diet, she will be in an excellent position both to improve her own nutritional status and at the same time produce a sturdy full-term infant. The earlier in pregnancy the mother's nutritional habits can be improved, the better for both her infant and herself.

This worker is of the opinion that the girl who marries during her mid-teens is apt to be poorly nourished through most of her lifetime and ill-equipped to meet the many psychologic problems inherent in the establishment of a successful marriage and a new family. It is therefore not surprising that she is the least successful mother in producing a healthy full-term infant. The young adolescent girl therefore needs counseling in nutrition and in the whole area of preparation for a successful family life.

TEEN-AGE FOOD HABITS AND ATTITUDES

In all strata of society in the United States, the adolescent girl is most apt to consume an inadequate diet. The urge for slenderness and the compulsion to follow the group frequently results in poor dietary habits. Snacks are often consumed in place of meals. This type of food, high in carbohydrate, often destroys the appetite for meals and at the same time causes the consumption of excessive calories. This results in a low plane of nutrition (5).

The teen years are a period in life when individual expression and frank social rebellion seem not only desirable but also essential to the development of a "mature personality." The teen-ager often is unwilling to consume foods which are essential for normal nutrition. She is inclined to invent individual eating patterns and to develop rather limited dietary habits (33).

Nutritionists throughout the United States have become increasingly concerned about the dietary patterns of adolescents. Surveys show food intake to be more variable and less adequate at this age than during childhood or adulthood (34).

Dr. Arnold C. Schaefer (35) in a report to the United States Senate concerning preliminary findings of the National Nutrition Survey indicated the following concerning the 3000 ten to fifteen year olds in the study sample: 12% exhibited less than acceptable hemoglobin levels, 18% exhibited less than acceptable serum Vitamin A levels, and 13% exhibited less than acceptable serum Vitamin C levels. Also, for individuals aged 10 to 16 years: 33% consumed 50% or less of the recommended allowance for iron, 39% consumed 50% or less of the recommended allowance for Vitamin A, and 32% consumed 50% or less of the recommended allowance for Vitamin C.

In 1961, a county nutrition committee in North Carolina surveyed the food practices of 6200 seventh, ninth, tenth and twelfth grade students in the city schools of Greensboro by the 24-hour recall method (34). All subjects completed the dietary forms the same day of the week. Results showed that during the period surveyed less than 2% of the subjects consumed no food from the meat group, whereas 70% consumed the recommended 2 or more servings daily. A lower consumption of food from the meat group was found in the seventh and twelfth grades than in the ninth and tenth grades. Sixty-six percent consumed 2 or more cups of milk daily (or its equivalent in milk products) whereas 14% consumed no milk or milk products. The intake of food from this group was highest in the seventh and ninth grades (72% consumed 2 or more servings), and lowest in the tenth and twelfth grades (57% consumed 2 or more servings). Consumption of coffee and tea increased with age; 5% of those surveyed in the seventh and ninth grades consumed these beverages, 8% in the tenth grade, and 15% in the twelfth grade.

Children of all grades consumed few foods from the vegetable and fruit group; eighty-three percent ate no deep green, leafy or yellow vegetables and 59% ate no Vitamin C-rich foods. Sixteen percent included one serving of a green or yellow vegetable and 35% consumed one serving of a Vitamin C-rich food. Sixty-four percent included 2 or more servings of other fruits or vegetables.

The bread and cereal group foods were generally more adequately consumed as 86% consumed 3 or more servings. Overall data suggest that Vitamin A, ascorbic acid and calcium were low in these diets.

Results of a study by Whitehead (36) indicated that during the period of adolescence food habits tend to deteriorate. Data were collected to evaluate

the effectiveness of a nutrition education program in Ascension Parish, Louisiana. A positive relationship existed between grade increment in the elementary grades and reduction of poor food habits. Food consumption data from children in the eighth grade and throughout high school however, indicated a deterioration in food habits and the adequacy of their diet.

The average daily nutrient intakes of 1188 Iowa school children were ascertained through 7-day dietary records by Eppright et al. (37). Data revealed that the intakes of girls, aged 6 to 12 years, tended to increase regularly up to the age of 12 years. Beyond this age, food energy and nutrient consumption remained the same or decreased with but one exception, i.e., Vitamin C. At 12 years of age, the trend in nutrient intake of girls changed markedly and at 16 years of age, negative deviations from the recommended allowances were especially noticeable. After 12 years of age, the girls tended to consume diets below the recommended allowances in most nutrients, with deviations greatest for calcium and iron.

The mean daily calcium intake of girls aged 6 to 12 years varied from 900 to 1000 mg daily. After the age of twelve, 25% had mean daily intakes of less than 600 to 700 mg of calcium. The mean daily intake of iron was 9 mg at ages 6, 7, and 8 years and 12 mg at 12 through 15 years of age. After 15 years of age, the mean daily intake declined to an average of 11 mg daily. For girls 14 years of age or older, the mean daily intake approximated 75% of the recommended daily allowance.

Snacking is prominent within the teen population. Wharton (38) evaluated the food intake of 421 adolescent boys and girls in Illinois by means of a 3-day dietary record. Results showed that more than 35% of the girls received over 20% of their calories as snacks.

Spindler and Acker (39) reported attitudes and motivating forces behind food habits of 75 interviewed male and female adolescents. These subjects were participants in the "Teen Time Food Fare," a nutrition project for improving teen-age nutrition in Rock Island County, Illinois. The majority of the subjects were 15 to 17 years old. Twenty-one percent of the girls reported that they did not eat breakfast. Weight control was a prime concern of girls. Those who skipped meals seemed "skinny" and "rundown"; those who ate too much were fat and often had complexion problems. The girls avoided foods which they believed to be "fattening"; thus, milk, bread, and cereals were low in their diets.

Data from a 24-hour recall showed only one-fourth of the girls consumed 4 cups of milk or its equivalent daily. Two-thirds ate 2 or more servings of meat, poultry, fish, eggs or an alternate. Less than half ate 4 servings of fruits and vegetables. Fifty percent consumed diets lacking a good source of Vitamin C. One-third consumed 4 servings of whole-grain or enriched bread or cereal.

Concern for body weight as a motivating force in teen-age food habits was evident in the report by Dwyer (40). A group of 446 high-school girls of a middle and upper-middle class suburban community were surveyed in Massachusetts. Of these, 16.4% reported that at some time in their life, they dieted to lose weight. Thirty-seven percent of the group were dieting at the time of the survey.

All subjects were presented with a check list and asked to select all practices employed on their last diets. Of the 274 dieting girls, the most common practices were cutting out certain foods and privately consumed snacks. Less popular practices included cutting out snacks eaten with others, eating

less of the same foods which were always eaten, taking more exercise, and skipping meals usually eaten. Total fasts or taking diet pills were relatively rare practices. Reasons given for dieting included personal discontent with body appearance, beauty and good looks and the simple urge to diet.

Hinton (41) conducted a study of the dietary intake and eating behavior of 140 girls aged 12 to 14 years in Iowa towns of approximately 14,000 population. The object of this study was to investigate the relationships of certain physiologic, sociologic and psychologic factors in the eating behavior and nutrient intake. Girls who placed high values on sociability, independence, and status or enjoyment of food as an end in itself, tended to consider health unimportant. These subjects, generally speaking, consumed poor diets. Those who recognized food as important for health, selected better diets.

EFFECT OF TEEN-AGE FOOD HABITS AND ATTITUDES ON THE COURSE AND OUTCOME OF PREGNANCY

The nutritional status of the adolescent is an important aspect of preparation for pregnancy. Although, as previously stated, diet during pregnancy is important, the lifelong nutritional status of the adolescent girl when she enters pregnancy is critical to her reproductive performance (32).

One can assume, since dietary habits are set early in childhood, that the food intake of the pregnant adolescent girl will be little different during pregnancy (32). This assumption is supported by the work of Smith (42). The eating habits of 996 pregnant girls aged 15 years or less were studied. These subjects were participants of the Maternity and Infant Care Project in Chicago. Most of the girls were Negroes. Poor diets were found

in 43.6% of the subjects; 26% were rated fair, and 30% were rated good. One-fifth of the subjects ate no more than 2 meals daily; only 12% of those who ate less than 3 meals per day consumed diets rated as good.

Analysis of individual groups of foods consumed revealed that approximately 40% of the diets were low in foods from the milk, vegetable and fruit groups. Most subjects however, consumed adequate quantities of bread, meat and cereals. A large proportion of total calories consumed appeared to be from snacks such as soft drinks, potato chips, french fries, candy, ice cream, and other sweets. Food habits of teen-agers in this study support observations made by others that teen-agers' diets tend to be low in calcium, Vitamin C, and iron (35, 36, 43).

Studies on the dietary habits of the pregnant teen-ager are limited in number. Available data, however, when coupled with the role of nutrition during pregnancy and the high incidence of teen-age pregnancies are cause for public health concern. The following supports this attitude.

The Committee of Maternal Nutrition of the National Research Council reported that girls pregnant before the age of 17 years are highly susceptible to obstetric complications. The incidence of premature labor, iron-deficiency anemia, feto-pelvic disproportion, prolonged labor, and toxemia is greater in the teen-ager than in the mature woman. A disproportionately large number of infants weighing less than 5.5 pounds are born to adolescents. Death rates are higher among mothers under 15 years of age (44).

Young, unmarried pregnant girls are often reluctant to accept pregnancy. They are unaware of the importance of prenatal care or are indifferent to seeking this type of care. Thus, the hazards of pregnancy increase for both the teen-age mother and her infant (11).

ACTION PROGRAMS

The present and projected proportion of births to teen-age mothers (as a part of the total births) has risen. Two factors may either reverse or diminish the sharpness of this rise: (1) The recent liberalization of State laws on abortion (with many legal abortions now being performed on teen-age girls); and (2) Increasing requests by teen-age girls for family planning services (16). At present, however, numerous action programs for maternal and infant care exist to assist the teen-ager with her pregnancy.

Title V of the Social Security Act authorizes programs related to Maternal and Child Health Services. These programs are designed to promote the health of mothers and children. They are available to teen-agers as well as adults, especially those who are disadvantaged with respect to health, income, or environment. Research concerning the improvement of these health services is currently in progress. Efforts have been made to evaluate these programs, i.e., do they meet the needs of the individuals they serve (45).

The Maternity and Infant Care Projects authorized under Title V, have been implemented to reduce maternal and infant mortality and morbidity, and mental retardation. These projects provide prenatal, delivery, and post-natal care to mothers from low-income families, as well as health care to their infants (46). By setting a standard for high quality medical care and following the principle of individual attention, these projects reach increasing numbers of women who previously did not obtain this service. In 1969, forty-four percent of all women admitted for maternity care were pregnant out of wedlock. This included 87% of all patients under 15 years of age (45).

Increasing attention is focused on adolescents in maternal and child health programs. The Maternal and Child Health Services authorized under

Title V are approaching the problem of adolescent pregnancies in three ways: (1) Demonstration programs. In certain communities, it has been shown that teen-age girls can be helped through their initial pregnancy and the chances lessened that they will again become pregnant out of wedlock; (2) Service programs. In some communities, family planning clinics provide ways and means for the prevention of pregnancy; and (3) Research. The causative factors of pregnancy among teen-agers is being studied (16).

Currently, there are 210 community-based multi-agency programs for pregnant girls in the United States. Through these, some 40,000 school-age pregnant girls are receiving comprehensive health, educational and social services. In 27 communities, the Maternity and Infant Care Projects have either initiated or are cooperating in these multi-service programs; in other communities, the services are operated in conjunction with Child and Youth Projects (16). Nutrition is recognized as an integral part of the entire health scene, and money is now appropriated for a large number of nutritional personnel (45).

Some innovations on the State level are as follows: (a) more pregnant girls are allowed to remain in school. For example, the Alabama State School Superintendent has publicly emphasized the importance of education for these girls. As a result of cooperative efforts among the Maternity and Infant Care Project in Broward County, Florida, the Florida State health department, VISTA workers, and the community, the school system has instituted a program to serve an estimated 500 to 700 school-age pregnant students per annum. These girls are allowed to continue their training with a minimum of disruption.

The Maternity and Infant Care Project in Palm Beach County, Florida, in

cooperation with the health department and the education department has improved school opportunities for pregnant school-age girls. Girls are allowed to remain in their school as long as is feasible. When they are unable to attend regular classes, they receive special education. The Maternity and Infant Care project in Dade County works with COPE (Continuing Opportunity for Purposeful Education for unwed teen-agers) to provide educational opportunities for these girls.

(b) Laws benefiting pregnant girls have been passed. For example, the state of Florida passed legislation requiring equal public school opportunity for all females, including those pregnant, married or mothers.

(c) Special schools have been established. For example, North Carolina has expanded its teen-age pregnancy services through the establishment of schools for pregnant teen-age girls.

(d) Work programs have been established. Adolescents constituted more than half of the patients of the Baltimore, Maryland, Maternity and Infant Care Project in 1971. Approximately 82% of this population was under the age of 25 years. Seventy percent of the teen-agers were pregnant for the first time; 22.5% for the second time; and up to the 4th time for the remaining (16). In this city's Family Planning Clinic, consumer patients serve as clinic assistants, trained in simple laboratory procedures. The youths are paid by a "Jobs for Youth" program and operate as out-reach people when they return to school. The goal of this program is to develop youths who will pass knowledge on to peers in their communities and schools.

(e) Research programs have been implemented. In 1963, through a Research and Demonstration grant authorized by Title V, research began on out-of-wedlock pregnancies among teen-age girls at the Webster School in the

District of Columbia. The aim was not only to enable these girls to continue their high school education during pregnancy but also to provide prenatal and hospital delivery care, social services, vocational counselling and family planning services. This program, as well as others subsequently initiated, demonstrated that comprehensive services can sharply reduce repeated out-of-wedlock pregnancies. Since 1963, the number of these programs has increased to over 100. They serve more than 20,000 girls annually. These programs are supported by funds from various sources, i.e. Children's Bureau, Office of Economic Opportunity, Office of Education, and local funds.

The following example is characteristic of results. In a New Haven study of 100 unwed pregnant adolescent girls, subjects gave birth to 349 babies in 5 years. Only 5 of these girls did not become pregnant again. None of the subjects had benefit of any of the aforementioned special programs. On the other hand, data from a comprehensive program for pregnant school girls in New York City supported by the Children's Bureau, indicate that only 11 out of 492 girls experienced a subsequent out-of-wedlock pregnancy after two years (14).

In 1968, the Children's Bureau sponsored the Cyesis Programs Consortium composed of the Public Health Departments of Yale and Pittsburgh Universities. As a follow-up, the Maternity and Child Health Service is now funding research and demonstration grants primarily to consortium members to help communities utilize research results in comprehensive programs for school-age parents. Over 150 communities now offer comprehensive service programs for pregnant school-age girls. Prenatal and post-partum care, counselling and continuing education in the classroom are provided through these programs. The National Alliance Concerned with School Age Parents, formed in 1969, also

encourages communities to develop programs for young parents and provides them with technical assistance (47).

(f) Private organizations are meeting the problems of pregnant teenagers. An example of a maternal and child service operated outside the federal government is the Children's Hospital Adolescent Maternity Center of San Francisco. Since 1967 it has been supported by the San Francisco Unified School District, Children's Hospital of San Francisco, and occasional voluntary contributions. As an academic, medical, and social service program, it has served pregnant girls and their families, both married and unmarried.

Girls are referred to the Center by doctors or schools and other agency personnel. As the Center became better known, more girls referred themselves to it--often as soon as their pregnancy is confirmed. About half of the girls are married when they enter the program. Nearly all keep their babies now, in contrast to the 10 out of 100 girls who placed their infants for adoption during the first year of the Center's operation.

The Center program includes a school for these girls. Junior and senior high school classes are held in a building on the hospital grounds from 8:30 A.M. to 1:00 P.M. weekdays. A maternity clinic for prenatal care and post-partum follow-up is in operation. A well-baby clinic is available and follows mother and child for the first 2 years. Students meet with nurses, social workers, occupational therapists, dietitians and academic and vocational counselors for group discussion and individual guidance sessions. Most students continue to attend the Center school for a short period after their babies are born. While they attend classes, their infants are cared for in a nursery that is part of the Center's program.

The Center's interdisciplinary team consists of a basic core of individual

professional members who are directly responsible for the educational, social, and health needs of the young families with whom they work. The team consists of a teacher, social worker, nurse, hospital pediatrician, obstetrician, and other staff members.

The goals of this program are threefold: (1) To offer a pregnant young woman opportunity and encouragement to develop her inner strengths, examine her alternatives and make the best choices to meet her needs and those of her family; to help her mature; and to foster her feelings of hope for the future. (2) To assure mother and child the best obstetrical care and knowledge obtainable during pregnancy and to motivate young families to continue to pursue medical care. (3) To offer a young mother opportunity to continue her education; to encourage her to approach education as a means of self-realization; and to aid her in developing future educational or vocational plans (48).

These action programs provide for the emotional, social, and educational expansion of the young mothers involved. Gold (3) summarizes this idea: "I submit that the ultimate quality of the product of gestation can only be as good as the quality of the ingredients that produce it. Further, the reproductive efficiency of the parents depends on their total health experience. This involves not only their growth, development, educational, emotional, and socio-cultural experiences up to the time of conception, but also their nutritional know-how and background."

Pregnancy offers an excellent opportunity for positive changes in dietary practices because of the prospective mother's contacts with various professionals during her prenatal care period (31). But the adolescent girl with a poor nutritional background, emotional instability, and insistence on group

conformity is often the most refractory to nutrition education. She cannot be approached through the medium of nutrition per se but rather through the medium of beauty, popularity, or whatever else arouses her interest. Educators have a need to learn proper psychological approaches to teen-agers. Organized establishments such as the prenatal action programs mentioned above, are obligated to stress good nutrition and give credit for its achievement (5).

Each pregnant girl is an individual with attitudes toward food which involve emotional responses to her cultural background and knowledge of nutrition. For each individual the combination is unique. Creating a positive attitude toward nutrition during pregnancy requires patience, understanding, and respect for the individual's pattern of behavior (31).

A knowledgeable and positive attitude toward nutrition on the part of the pregnant adolescent can yield untold benefits for both the mother and her child.

SUMMARY

The incidence of teen-age pregnancy in the United States is of considerable magnitude and of major public health concern.

Both pre-conceptual nutrition and nutrition during pregnancy directly affect the course and outcome of this physiologic state. Good maternal nutrition is a cause of healthy fetal growth and development. Poor maternal nutrition may result in maternal illness, prematurity, immaturity, malformations and neurological defects such as convulsive seizures, mental deficiency, and cerebral palsy.

Nutrients are needed in increased quantities during pregnancy to meet

needs of the developing fetus and needs imposed by the metabolic alterations in the mother. Adolescence is a period of increased nutritive needs because of accelerated physical, biochemical, and emotional development.

If the teen-age girl becomes pregnant, the needs of this physiologic state are added to the nutritional needs for body maturation. These needs are often superimposed upon a previously existing poor nutritional status. In all strata of society in the United States, the adolescent girl consumes a diet less adequate than that consumed at other periods in the life cycle. She tends to refuse nutritious food and snacks frequently to replace skipped meals. These food habits result in a low plane of nutrition.

This inadequate nutritional intake is detrimental to the course and outcome of her pregnancy. Her biological immaturity may further complicate pregnancy with premature labor, iron-deficiency anemia, feto-pelvic disproportion, prolonged labor and toxemia.

Numerous action programs sponsored by federal, state and local governments and private organizations currently exist for the pregnant teen-ager. Their function is to provide for optimum obstetrical and postnatal care. This includes meeting the emotional, social and educational needs of the teen-age mother.

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TEEN-AGE PREGNANCIES: EFFECT OF FOOD HABITS AND ATTITUDES

by

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