Condit, Mary Garidel

NUTRITIONAL STATUS OF NONGRAVID FEMALE ADOLESCENTS, THEIR KNOWLEDGE, AND ATTITUDES ABOUT PREGNANCY

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NUTRITIONAL STATUS OF NONGRAVID FEMALE ADOLESCENTS, THEIR KNOWLEDGE, AND ATTITUDES ABOUT PREGNANCY

by

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APPROVAL PAGE

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The purposes of this study were (1) to measure the knowledge and attitudes of nongravid female adolescents about health care and nutrition during pregnancy, and (2) to examine both dietary intake and pyridoxine status. The sample population was composed of 199 teenagers 12, 14, and 16 years of age from Guilford County, North Carolina. A questionnaire was developed which measured responses regarding knowledge of proper weight gain and diet during pregnancy; the recommended amount of caffeine, drugs, alcohol, food, exercise, and cigarettes during pregnancy; the effect of maternal age on the outcome of pregnancy; the timing and frequency of prenatal care; and the knowledge and use of contraception by female adolescents. Dietary intake was obtained by two 24-hour recalls. Pyridoxine status was assessed by stimulation of alanine aminotransferase.

Knowledge about restriction of cigarettes, drugs, caffeine, and alcohol during pregnancy was good. Awareness of the need for prenatal care was good. Knowledge of proper diet and weight gain during pregnancy was poor. Knowledge of birth control was minimal. Most subjects thought teenagers did not use contraception because they did not think about getting pregnant. The dietary intake of vitamin D, folic acid, and all the trace minerals was poor, as measured by the percentage of subjects who did not receive two-thirds of the 1980 Recommended

Dietary Allowance (Food and Nutrition Board, 1980). Pyridoxine status as measured by the standard of Woodring and Storvick (1970) was acceptable for 58 percent of the sample. It is recommended that junior and senior high school students be instructed about the role of nutrition during pregnancy and childhood, about the risk factors which affect the outcome of teenage pregnancy, and about contraception.

TO THE MANY, MANY PEOPLE WHO
SUPPORTED ME, BODY AND SPIRIT,
AND ENCOURAGED ME TO CONTINUE,
TO STRIVE FORWARD . . .

TO MARY DICKEY, JUDI DAVIS,
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STUDENTS MAY LEARN AND GROW.

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CHAPTER I

INTRODUCTION

Adolescence is a period of maximal height and weight gain; nutritional needs during this time are high (Burman, 1979; Dwyer, 1981; Heald, 1975; Marino & King, 1980; Sjolin, 1981; Truswell & Darton-Hill, 1981). The dietary intake of adolescents has been examined by numerous research groups across the country (Appendix A). No study could be found which examined adolescent knowledge regarding the relationship between pregnancy and nutrient needs.

Several studies on the nutritional status of adolescents were published from 1960 to 1969 (Baker, Frank, Feingold, Christakis, & Her, 1967; Dibble, Brin, McMullen, Peel, & Chen, 1965; Edwards, Hogan, Spahr, & Guilford County Nutrition Committee, 1964; Hampton, Huenemann, Shapiro, & Mitchell, 1967; Hinton, Eppright, Chadderdon, & Wolins, 1963; Hodges & Krehl, 1965; Huenemann, Shapiro, Hampton, & Mitchell, 1966; Morse, Merrow, & Clarke, 1965; Spindler & Acker, 1963). One-half of these early studies examined eating behavior, i.e., meal and snacking patterns, rather than specific nutrient intake (Edwards et al., 1964; Hinton et al., 1963; Huenemann et al., 1966; Spindler & Acker, 1963); three provided biochemical data (Baker et al., 1967; Dibble et al., 1965; Morse et al., 1965); only one study provided information on nutrient consumption of adolescents (Hampton et al., 1967).

Since 1972, many investigators (Gaines & Daniel, 1974; Greger, Higgins, Abernathy, Kirksey, DeCorso, & Balingar, 1978; Haider & Wheeler, 1980; Koh, 1980; Lee, 1978; Lopez, Schwartz, & Cooperman, 1980; Prothro, Mickles, & Tolbert, 1976; Schorr, Sanjur, & Erickson, 1972; Schuster, Bailey, & Mahan, 1981) have examined the nutritional status of adolescents. Several studies focused on teenagers from low-income families (Gaines & Daniel, 1974; Koh, 1980; Lopez et al., 1980; Prothro et al., 1976; Schuster et al., 1981); one examined a small sample of 17 blacks (Koh, 1980). None of the investigators evaluated nutrient intake by income level.

No study could be found in the literature which included adolescents from all regions of the country. Six investigations were carried out in the South (Edwards et al., 1964; Gaines & Daniel, 1974; Koh, 1980; Lee, 1978; Prothro et al., 1976; Schuster et al., 1981), four in the Midwest (Greger et al., 1978; Hinton et al., 1963; Hodges & Krehl, 1965; Spindler & Acker, 1963), five in the Northeast (Dibble et al., 1965; Haider & Wheeler, 1980; Lopez et al., 1980; Morse et al., 1965; Schorr et al., 1972), and two in California (Hampton et al., 1967; Huenemann et al., 1966). No study was found which examined the nutrient intake of teenagers in North Carolina.

During the early adolescent years, pregnancy demands specific nutritional and medical guidance (Burman, 1979; Claman & Bell, 1964; Hassan & Falls, 1964; Heald & Jacobson, 1980; Kaminetzky & Baker, 1977; Hollingsworth & Kreutner, 1980). The effect of poor nutrient and calorie intake during pregnancy has been studied extensively in animals (Roeder & Chow, 1972). Investigations with human

subjects (Jacobson, 1977; Kaminetzky, Langer, Baker, Frank, Thompson, Munves, Offer, Lehrle, & Glista, 1973; Kaminetzky & Baker, 1977) have reported similar results: (1) nutrient and/or energy restrictions singly or in combination affect both the mother and the child; (2) low-birth-weight children may be the result of suboptimal nutrition (Jacobson, 1977; Kaminetzky et al., 1973; Kaminetzky & Baker, 1977). A thirty-fold greater mortality rate has been reported for low-birth-weight children than for children born above five and one-half pounds (Worthington-Roberts, Vermeersch, & Williams, 1981).

The outcome of a pregnancy depends on far more than nutrient intake and the nutritional status of the mother; an important factor of any pregnancy is prenatal care (Claman & Bell, 1964; Hassan & Falls, 1964; McGanity, Little, Fogelman, Jennings, Calhoun, & Davidson, 1969; Tyrer, Mazlen, & Bradshaw, 1978; U.S. Department of Health, Education, & Welfare (USDHEW), 1978). For very young mothers who lack knowledge about health care, special guidance from the medical profession is essential due to the risk of developing such complications as toxemia, fetopelvic disproportion, and cervical laceration (Claman & Bell, 1964; Hassan & Falls, 1964; Marino & King, 1980; McGanity et al., 1969; Tyrer et al., 1978; Worthington-Roberts et al., 1981). Several investigators reported inadequate prenatal care among adolescents (McGanity et al., 1969; USDHEW, 1978); McGanity et al., however, reported that the adolescents in their study were aware of the need for prenatal care.

The U.S. infant mortality rate for 1977 was 14.1 per 1000 live births (U.S. Bureau of the Census, 1978). In North Carolina, the

infant mortality rate for 1977 was 14.1 per 1000 live births. The state rate, however, masks the almost unbelievable Camden County level of 48.2 (North Carolina Vital Statistics, 1978).

The principal objectives of this study were to measure the level of knowledge in nongravid adolescent females regarding health care and nutrition during pregnancy and to assess their nutritional status. The objectives of this dissertation were based on the relationship between nutrient intake, birth weight, and infant mortality. Because there is little information on the nutrient intake of North Carolina adolescents and their knowledge of nutritional needs during pregnancy, these goals were identified for this investigation:

1. To measure knowledge and attitudes regarding health care during pregnancy among Guilford County adolescents,
2. To examine their nutrient intake,
3. To measure the pyridoxine status of Guilford County teenage girls as one index of clinical nutritional status.

Hypotheses

The following directional hypotheses were tested:

1. The adequacy of dietary intake among the female adolescents will be positively correlated with their knowledge of health care and nutrition during pregnancy.
2. Knowledge about the effects of nutrition and health care on the outcome of pregnancy will increase with increasing age and per capita income.

Definition of Terms

For the present research, the following terms were defined:

Adequacy of the Diet

1. Excellent: when the diet meets or exceeds the 1980 RDA for all nutrients.
2. Good: when the diet meets greater than two-thirds of the RDA for all nutrients.
3. Fair: when only one nutrient does not meet two-thirds of the RDA.
4. Poor: when more than one nutrient does not meet two-thirds of the RDA.

The following knowledge areas were needed in order to understand whether such knowledge, or lack of it, is a factor in North Carolina's infant mortality rate:

Knowledge of Contraception: when the subject accurately names and correctly states the efficacy of greater than or equal to two methods of birth control on the questionnaire, A Healthy Pregnancy (Appendix B).

Knowledge of Nutrition During Pregnancy: when the subject recognizes that pregnancy is a time of increased nutrient needs on the questionnaire.

Assumptions

The following assumptions were made:

1. The nutritional status of females before and during pregnancy is a major factor affecting the outcome of pregnancy.
2. Knowledge of the need for adequate health care during pregnancy is a major factor determining the amount of medical care received.

Limitations

This study was limited to 12-, 14-, and 16-year-old adolescent females (n = 199) from Guilford County, North Carolina. These age groups were selected, because true biological differences are difficult to detect at one age level, given the limited number of subjects that can be examined within the scope of the study. Including two-year age intervals improves the chance of observing true biological differences due to maturity rather than simple chronological differences. The nutritional health of 12-, 14-, and 16-year-old females was examined via cross-sectional analysis. The sample was limited to those adolescents willing to participate, and is therefore a select sample. Hence, the results are not necessarily representative of the total population.

The nutritional analysis was limited, in part, by the choice of method used to measure food intake, the 24-hour recall. Because the 24-hour recall represents a test of memory, certain biases are inherent in this method of collecting food intake data. Also, because

the 24-hour recall is a single day's food intake and represents a specific time period, food intake data may not be representative of a person's usual food consumption pattern (Bazzarre & Meyers, 1979; Pekkarinen, 1970). Since one's nutritional status is a reflection of long-term dietary intake, a single day's measure of food intake may not be a very accurate means of identifying nutritionally related health problems. The 24-hour recall, however, is considered to be an adequate measure of group trends (Bazzarre & Meyers, 1970; Pekkarinen, 1970). An additional limitation originated from the table of food composition utilized to provide data on the nutrient content of the diet. Tables of food composition contain average values for the nutrient content of food; therefore, tables do not reflect exact amounts of nutrients consumed.

The study was limited by the inability of the author to pretest the first half of the questionnaire on a large, unbiased, representative sample. Due to the sensitivity of the questions addressing the use of contraception, the questionnaire was pretested on a group of five girls from Greensboro aged 11 to 13 years.

CHAPTER II

REVIEW OF LITERATURE

This review of literature will be presented as four major areas of research: (1) adolescent nutritional status, (2) adolescence and pregnancy, (3) medical risks of teenage pregnancy, and (4) adolescent knowledge and attitudes about pregnancy. Each area will discuss significant results from topical literature which has been published since 1960.

Adolescent Nutritional Status

The nutritional status of adolescents has been examined by several research groups since 1960 (Baker et al., 1967; Dibble et al., 1965; Edwards et al., 1964; Gaines & Daniel, 1974; Greger et al., 1978; Haider & Wheeler, 1980; Hampton et al., 1967; Hinton et al., 1963; Hodges & Krehl, 1965; Huenemann et al., 1966; Koh, 1980; Lee, 1978; Lopez et al., 1980; Morse et al., 1965; Prothro et al., 1976; Schorr et al., 1972; Schuster et al., 1981; Spindler & Acker, 1963). This discussion will include dietary intake data and biochemical findings reported by the above authors.

Calories

Caloric intake among American adolescents since World War II has shown considerable variation. A 1965 study by Hodges and Krehl in Iowa reported a mean caloric intake of 2449 calories which was greater

than the 1980 RDA (Food and Nutrition Board, 1980). In California (Hampton et al., 1967), only 11 percent did not meet two-thirds of the RDA. In more recent surveys, the percentage of teenage girls who failed to receive two-thirds of the RDA for calories ranged from 41 percent in Kentucky (Lee, 1978) to 52 percent in Alabama (Prothro et al., 1976). Both of the latter studies included many girls from low-income families. Haider and Wheeler (1980) observed a mean caloric intake of 65 percent of the RDA for the 13-14-year-old Hispanics to 89 percent for the black 19-year-old girls. Dwyer (1981) stated that caloric intake among adolescents is frequently low, but not sufficiently low to impair growth.

Protein

Protein is well supplied to all age groups including adolescents (Chopra, Forbes, & Habicht, 1978; Greger et al., 1978; Marino & King, 1980). Hodges and Krehl (1965) reported a mean intake of 96.6 grams of protein. Chopra et al. (1978) concluded in their article based on the United States Department of Agriculture (USDA) Household Study of 1965, the Ten-State Nutrition Survey of 1968-1970, and the Hanes study of 1971-1972, that protein is more than adequate among American adolescents. More recent reports (Lee, 1978; Prothro et al., 1976) indicate that a small but significant minority of adolescents do not receive two-thirds of the RDA. In rural Alabama, 11 percent of the sample received less than two-thirds of the RDA (Prothro et al., 1976); in Kentucky, 12 percent of the white girls and 19 percent of the black girls did not meet 67 percent of the RDA (Lee, 1978).

Vitamin A

Dietary surveys among adolescents (Hampton et al., 1967; Lee, 1978; Prothro et al., 1976; Schorr et al., 1972) have all reported marginal to poor vitamin A consumption. In California, Hampton et al. (1967) observed that 16 percent of the students did not receive two-thirds of the RDA; in Alabama, Prothro et al. (1976) stated that 41 percent of the sample did not meet two-thirds of the RDA; Schorr et al. (1972) in New York reported that 51 percent did not meet two-thirds of the RDA; Lee (1978) in Kentucky observed that 73 percent of the white and 67 percent of the black girls did not receive two-thirds of the RDA.

Thiamin

Only four investigators (Greger et al., 1978; Hampton et al., 1967; Lee, 1978; Prothro et al., 1976) examined the thiamin intake of adolescents. Hampton et al. (1967) noted that 5.6 percent of the girls did not meet two-thirds of the RDA. Greger et al. (1978) reported that more than 20 percent of the students did not receive two-thirds of the RDA, while Lee (1978) observed that 49 percent of the white and 57 percent of the black girls did not receive two-thirds of the RDA for thiamin.

Riboflavin

The incidence of marginal riboflavin intake among adolescents appears to have increased since the early studies reported in the sixties. Three nutritional surveys released in 1965 (Dibble et al.; Hodges & Krehl; Morse et al.) stated that riboflavin status among

teenagers was excellent; each study noted a high excretion rate of the vitamin. Hampton et al. (1967) stated that only four percent of the girls received less than two-thirds of the RDA. Greger et al. (1978) stated that less than ten percent of the sample did not meet two-thirds of the RDA.

Prothro et al. (1976) have documented decreased riboflavin consumption. In their study, 37 percent of the students received less than two-thirds of the RDA. Lee (1978) reported that 31 percent of the white and 24 percent of the black teenagers did not meet two-thirds of the RDA. In New York City, Lopez et al. (1980) stated that 26 percent of the sample was deficient in riboflavin using the erythrocyte glutathione reductase assay.

Niacin

Niacin intake of adolescents has been studied thoroughly by Hampton et al. (1967), who examined both the preformed vitamin and the niacin equivalent from tryptophan. In their study of 127 subjects, only three boys received less than 100 percent of the RDA. Three studies reported low intakes of the preformed vitamin (Greger et al., 1978; Lee, 1978; Prothro et al., 1976).

Pyridoxine

The dietary intake of pyridoxine has been examined by a few researchers. Three research groups reported a significant lack of dietary pyridoxine (Chrisley & Driskell, 1979; Pao & Mickle, 1981; Schuster et al., 1981). Chrisley and Driskell measured the level of

pyridoxine in the diets and blood of 29 adult women in Virginia. The mean intake of the 19-22-year-old women in their study was only 69 percent of the RDA. Schuster et al., in Florida, reported that among 37 gravid adolescents, 77 percent received less than two-thirds of the RDA. Pao and Mickle observed that in the recent 1977-1978 USDA Food Consumption Survey, pyridoxine was the nutrient most lacking in American diets; 51 percent of the sample received less than 70 percent of the RDA. Among the adolescent females in the same study, 47 percent of the 12-14-year-olds and 67 percent of the 15-18-year-olds did not receive 70 percent of the RDA.

Biochemical assessment of pyridoxine nutriture among American adolescents has been performed by two research groups (Baker et al., 1967; Schuster et al., 1981). Baker et al. studied the serum level of pyridoxine among New York City schoolchildren. The average concentration of pyridoxine was 36 ng/ml. According to Sauberlich, Canham, Baker, Raica, and Herman (1972), 50 ng/ml or greater is normal, while 25 ng/ml or less is indicative of a deficiency. Thus, the girls were low in pyridoxine. Schuster et al. (1981) in Florida measured the *in vitro* stimulation of alanine aminotransferase (formerly glutamic pyruvate transaminase) among low-income, gravid adolescents. Thirty-seven percent were deficient, with a stimulation greater than 25 percent.

Cobalamin

Only one study attempted to examine the cobalamin intake of adolescents. Prothro et al. (1976) found that 63 percent of the

sample, i.e., 17 students, did not consume two-thirds of the RDA for vitamin B_{12}.

Vitamin C

The consumption of ascorbic acid is frequently poor in the diets of teenagers. Hampton et al. (1967) observed that 15.5 percent of the students received less than two-thirds of the RDA. Schorr et al. (1972) and Prothro et al. (1976) found that 22 percent of their subjects did not receive two-thirds of the RDA. Greger et al. (1978) mentioned that 26 percent of the teenagers received less than two-thirds of the RDA.

Calcium

Calcium is regarded as one of the four most commonly lacking nutrients in the American diet. This situation is particularly true among adolescents (Pao & Mickle, 1981). In the late sixties, Hampton et al. (1967) reported that 49 percent of the girls did not receive two-thirds of the RDA for calcium. In 1976, 67 percent of the girls did not consume two-thirds of the RDA (Prothro et al., 1976). In 1978, Lopez et al., reported that 76 percent of the girls did not consume two-thirds of the RDA. Only one study (Greger et al., 1978) showed greater than 50 percent of the girls receiving two-thirds of the RDA.

Iron

The iron intake of adolescent females is generally poor. Hampton et al. (1967) reported that 57 percent of the girls received less than

two-thirds of the RDA. A similar result was reported by Prothro et al. (1976), who reported that 56 percent of their sample did not meet two-thirds of the RDA for iron. Schorr et al. (1972) observed that 75 percent of the girls did not receive two-thirds of the RDA. Gaines et al. (1974) noted that mean intakes of iron ranged from 46.5 percent to 60 percent of the RDA. Greger et al. (1978) reported that 55 percent of the girls were below two-thirds of the RDA, while Lee (1978) observed that 76 percent of the black girls' and 78 percent of the white girls' diets were low in iron.

Trace Minerals

The intake of other trace minerals among American adolescents is almost unknown. The intake of zinc has been researched by Greger et al. (1978); they observed that slightly over 35 percent of the teenagers did not meet two-thirds of the RDA for zinc. Dietary intake of copper was not studied. Biochemical analysis of zinc and copper was not conclusive as the techniques produced variable results.

In conclusion, it appears that only protein and niacin are fairly well supplied among American adolescents. Vitamin A, thiamin, riboflavin, pyridoxine, cobalamin, ascorbic acid, calcium, iron, and zinc were low in many teenage diets. The intake of vitamin E, vitamin K, folic acid, and many trace minerals needs further study. The etiology of these dietary deficiencies is believed to be due to the turmoil of adolescence (Burman, 1979; Marino & King, 1980). Other authors acknowledge that teenagers are frequently very active and leave little time for eating balanced meals (Edwards et al., 1964; Lopez et al.,

1980). Additionally, the socioeconomic level of families is a powerful influence on adolescent food consumption (Hampton et al., 1967; Hinton et al., 1963; Hodges & Krehl, 1965).

Adolescence and Pregnancy

Pregnancy is a special time in the human lifespan when the future of one organism is completely dependent upon the actions of another (Worthington-Roberts et al., 1981). The role of nutrition in the outcome of pregnancy is an important one. Insufficient intake of energy and nutrients during pregnancy affects both the growth and survival of the fetus, as well as the health of the mother (Committee on Maternal Nutrition, 1970; Gaines & Daniel, 1974; Gormican, Valentine, & Salter, 1980; Heald & Jacobson, 1980; Jacobson, 1977; Kaminetzky et al., 1973; Kaminetzky & Baker, 1977; Metcoff, Costiloe, Crosby, Bentle, Sandstead, Bodwell, Weaver, & McClain, 1981; Osofsky, Rizki, Fox, & Mondanaro, 1971; Pitkin, 1977; Tyrer et al., 1978; Worthington-Roberts et al., 1981).

Adolescence, like pregnancy, is also a period of dramatic growth which causes a significant increase in nutrient needs (Ancri, Morse, & Clarke, 1977; Heald, 1975; Jacobson, 1977; Marino & King, 1980; Morse et al., 1975). When pregnancy occurs during adolescence, the nutrient needs are further elevated (Heald & Jacobson, 1980; Marino & King, 1980; Weigley, 1975). How do teenagers react to pregnancy? What do they know about the physiology of pregnancy? Are they aware of the increased risks to the mother and the child when the mother is very young (i.e., less than or equal to 15 years of age)? This

section of the literature review will discuss the current nutritional status of pregnant adolescents, as well as their attitudes and knowledge regarding pregnancy.

The nutritional status of pregnant adolescents has been examined by many researchers (Baker, Frank, Thompson, Langer, Munves, deAngelis, & Kaminetzky, 1975; Gormican et al., 1980; Jacobson, 1977; Kaminetzky et al., 1973; Kaminetzky & Baker, 1977; McGanity et al., 1969; Morse et al., 1975; Schuster et al., 1981). Some degree of nutritional deficiency was noted in all of these reports. Almost one-half of the reports revealed that hypovitaminemia was common in pregnant adolescents regardless of the use of supplements (Baker et al., 1975; Lopez et al., 1980). King et al. (1973) concluded that although some pregnant teens do try to ameliorate their diets, the majority eat like their nongravid colleagues.

The nutritional status of pregnant adolescents of various income levels needs further study. In all five of the studies which examined dietary adequacy of gravid teenagers, the girls were of low socioeconomic status (Kaminetzky et al., 1973; King et al., 1973; McGanity et al., 1969; Osofsky et al., 1971; Schuster et al., 1981). Morse et al. (1975) measured biochemical parameters among pregnant Vermont adolescents, but did not specify their socioeconomic status.

The diets of pregnant adolescents have been notably low in vitamins. Although folate nutriture was assessed by only two researchers (Baker et al., 1975; Kaminetzky & Baker, 1977), both authors found it to be more lacking than any other vitamin. Vitamin A intake was low

in all studies which measured the dietary intake of the vitamin (Baker et al., 1975; Kaminetzky et al., 1973; Kaminetzky & Baker, 1977; McGanity et al., 1969; Osofsky et al., 1971). Thiamin and ascorbic acid were frequently low (Baker et al., 1975; Kaminetzky et al., 1973; Osofsky et al., 1971). Pyridoxine was inadequate in three studies (Baker et al., 1974; Kaminetzky et al., 1973; Schuster et al., 1981). Riboflavin (McGanity et al., 1969; Osofsky et al., 1971), niacin (Baker et al., 1975; Osofsky et al., 1971), and cobalamin (Baker et al., 1975; Kaminetzky et al., 1973) were each deficient in two studies.

Although protein consumption in the United States is commonly in excess of the RDA, it was observed to be dangerously low among pregnant teens in two studies (Kaminetzky et al., 1973; Osofsky et al., 1971). In both studies the intake of calories was limited. Osofsky et al. reported that 6.8 percent of the girls received less than one-half of the RDA for protein, whereas 22 percent received less than 80 percent of the RDA. Calories were even more inadequate than protein. Eighty percent of the girls did not meet 80 percent of the RDA for energy, while 18 percent received less than one-half of the desired caloric level. Kaminetzky et al. (1973) noted that ten percent of the girls consumed less than 900 calories per day before dietary instruction began; 47 percent received between 30 and 60 g of protein daily.

Mineral consumption has also been poor among pregnant teenagers. Kaminetzky et al. (1973) reported that 59 percent of the girls consumed between six and 12 mg of iron. All studies observed low levels

of iron in tissues (Chaudhuri, 1971; Kaminetzky et al., 1973; McGanity et al., 1969; Osofsky et al., 1971). Osofsky et al. (1971) noted that over 55 percent of the girls received less than one-half of the RDA for iron. The calcium level in the diet was also inadequate (Chaudhuri, 1971; McGanity et al., 1969; Osofsky et al., 1971). King et al. (1973) stated that only one-half of the girls met the RDA for nongravid teenage girls; none of the girls met the RDA for pregnant adolescents. Osofsky et al. (1971) reported that 94 percent of the girls did not meet the RDA for calcium. McGanity et al. (1969) noted that calcium was the nutrient most lacking in the girls' diets.

The role of nutrition in the development of pre-eclampsia and toxemia has been discussed by several research groups (Chadhuri, 1971; Kaminetzky et al., 1973; Tyrer et al., 1978). Tyrer et al. (1978) suggested that malnutrition was a cause of toxemia, early detachment of the placenta, and premature labor. Kaminetzky et al. (1973) observed inadequate protein and calories with low plasma levels of pyridoxine in all patients with signs of pre-eclampsia.

The most direct examination of nutrition's role in the etiology of pre-eclampsia was performed by Chaudhuri (1971) who reported that toxemia patients were anemic (iron deficiency), had increased levels of pyruvic acid (thiamin deficiency), and had decreased serum calcium levels. To test if toxemia were caused by the lack of iron and thiamin, Chaudhuri (1971) gave the patients thiamin and iron. Improvement of toxemic features occurred quickly. Chaudhuri also reduced the incidence of toxemia from 15 percent to five percent by providing vitamin and mineral supplements.

Medical Risks of Teenage Pregnancy

The medical profession recognizes that pregnancy among girls 15 years and under has numerous risks (Hassan & Falls, 1964; Hollingsworth & Kreutner, 1980). The main risk is biological immaturity (Hassan & Falls, 1964). The most commonly reported problems in very young primiparas include pre-eclampsia, premature labor, lower birth weight, hypertensive disorders, prolonged labor, fetopelvic disproportion, and abnormal presentation and position (Claman & Bells, 1964; Hassan & Falls, 1964; Marino & King, 1980; McGanity et al., 1969; USDHEW, 1978; Worthington-Roberts et al., 1981). Two of the above authors recommend that all young primiparas be given special medical guidance (Claman & Bell , 1964; Hassan & Falls, 1964).

Adolescent Knowledge and Attitudes About Pregnancy

The rise in teenage pregnancies in the last 30 years has been described as "one of our most studied population problems" (McGanity et al., 1969, p. 773). Many authors from the clergy to the medical profession have discussed the etiology of the problem. A 1980 article by Ryan and Sweeney presented both old and new concerns regarding why adolescents become pregnant. In contrast to the classic myth about teenage pregnancies which states that teens simply do not know how to prevent pregnancies, Ryan and Sweeney (1980) observed that 94 percent of the girls were capable of explaining methods of contraception. Sixty-three percent of the same girls decided not to use contraception. It is notable that in a study performed ten years earlier than the

Ryan and Sweeney article, few of the subjects knew anything about male or female anatomy (McGanity et al., 1969).

One of the most revealing statements from Ryan and Sweeney (1980) was the desire of most of the teenagers to become pregnant. Whereas only 30 percent of the pregnancies were intentional, over 60 percent were desired. This finding is in direct contrast to the assertions of Claman and Bell (1964), who believed that the very young, single adolescent does not want to believe or accept her pregnancy. In the former study, based on a population in Memphis, the subjects were predominantly black, and 15 to 17 years old. In the latter study completed 16 years ago, the subjects were 13- to 15-year-old girls from Vancouver, British Columbia.

One possible motive for becoming pregnant is peer acceptance. Ryan and Sweeney (1980) noted that 87 percent of the girls had friends with babies. Also, in the same study, 63 percent of the girls equated abortion with murder. Other reasons for becoming pregnant included pressure from boyfriends to give their stagnant lives a new direction, to provide someone to love, and to rebel against or escape from their parents.

Zelnick and Kantner (1980) studied sexual activity, contraceptive use, and pregnancy among adolescents in metropolitan areas during three time periods in the 1970's. In their compendium article, several significant changes during the last decade were reported. From 1971 to 1979, the percentage of young women 15-19 years of age engaging in sexual activity before marriage rose from 30 to 50.

Zelnick and Kantner (1980) reported a paradoxical rise in the use of contraceptives and the number of pregnancies.

The rise in the number of pregnancies reported by Zelnick and Kantner is due partially to a significant change in the type of contraceptive method used. In 1976, the pill and the IUD were popular; such methods are effective in preventing pregnancy. By 1979, however, the most popular reported methods included three of the least effective methods: withdrawal, rhythm, and the douche. Zelnick and Kantner believed the second major reason for the rise in adolescent pregnancies is the rise in sexual activity, particularly among those who never use contraception.

Another significant finding observed by Zelnick and Kantner (1980) was the increase in young women who did not desire pregnancy, and therefore used contraceptives. In 1971, only 8.6 percent of the females who did not want to get pregnant used a method of contraception, whereas by 1979, this figure was 31.5 percent.

The differences noted between the findings of Ryan and Sweeney (1980) and Zelnick and Kantner (1980) are significant. These differences, however, may have originated in the samples used by both research groups. Ryan and Sweeney studied predominantly black 15 to 17-year-old girls from Memphis. Zelnick and Kantner, in contrast, examined a sample of 15 to 19-year-old girls, 45 percent white and 38 percent black, from households in large metropolitan areas throughout the continental United States.

Although the medical risks of adolescent pregnancies in this study are well documented, an important question has yet to be answered: Do teenagers know that pregnancy before 18 years has a much higher risk of complications (Committee on Maternal Nutrition, 1970) than one occurring from age 18 to 29? The answer is difficult to interpret based on available work. McGanity et al. (1969) reported that all of their subjects acknowledged the need for prenatal care; 41 percent of the subjects visited the physician fewer than four times before delivery. Claman and Bell (1964) also observed that over one-half of their 224 adolescents received less than three months of prenatal care. In a national report, Prenatal Care 1969-1975, by the U.S. Department of Health, Education, and Welfare (1978), it was stated that "teenage girls were less likely to start prenatal care early in pregnancy than any other age group of women."

CHAPTER III

METHODS AND PROCEDURE

This study was designed to measure the knowledge of female adolescents regarding nutrition and health care during pregnancy, and to determine adequacy of dietary intake as well as pyridoxine status. Information was gathered about the knowledge and use of contraception by female adolescents.

Experimental Design

This study was cross-sectional in design and was part of a Southern Regional research project entitled The Nutritional Health of Adolescent Females.[1] A questionnaire was used to obtain information about (1) knowledge of health care and nutrition during pregnancy, (2) knowledge and use of contraception, and (3) attitudes regarding health care and diet during pregnancy. Pyridoxine data were obtained by analysis of alanine aminotransferase. Dietary intake data were collected from two 24-hour recalls.

The following variables were used to measure knowledge regarding health care and diet during pregnancy: desirable weight gain during pregnancy; the effect of smoking, caffeine, drugs, and alcohol during pregnancy; and the relationship between maternal age and the outcome of pregnancy. Knowledge of contraception was obtained by asking each subject to list one to six methods of birth control and to mark the effectiveness of each method in preventing pregnancy.

The attitudes of the subjects regarding health care and diet during pregnancy were measured by an examination of the following variables: timing and frequency of prenatal care, effect of exercise during pregnancy, willingness to attend maternal nutrition classes, and proper diet during pregnancy. Pyridoxine status was measured by analysis of alanine aminotransferase. Dietary intake data were obtained by two 24-hour recalls (Appendix C). Dietary adequacy was measured by comparing the intake of calories, protein, vitamin A, vitamin D, thiamin, riboflavin, niacin, pyridoxine, folic acid, cobalamin, ascorbic acid, calcium, phosphorus, iron, magnesium, zinc, copper, iodine, and fluorine with the respective 1980 RDA's.

Description of Study Population

Participating in this study were 199 nongravid adolescent females ranging in age from 12 to 16 years. The questionnaire developed by the author was completed by all 199 girls; dietary intake data were obtained from 195 girls, whereas assessment of pyridoxine status was performed on 149 subjects. Forty-five percent of the subjects were black, 55 percent were white. The distribution of the sample by age and race is presented in Table 1. The subjects were selected from public schools in Guilford County, North Carolina.

The median per capita income is presented in Table 2. The median per capita income of the black girls was less than one-half of the median per capita income of the white girls.

Table 1

Age and Race of Sample Population

	Ages			
Race	12	14	16	Total
Blacks	33	37	19	89
Whites	51	40	19	110
	84	77	38	199

Table 2

Median Per Capita Income of Sample by Age and Race[1]

	Race	
Ages	Black	White
12	3,595	6,250
14	2,240	6,250
16	4,420	5,000
Totals	3,100	6,250

[1]Figures reported are in dollar amounts.

Recruitment of Study Population

The major criteria used in sample selection were voluntary participation and the absence of known medical disorders such as diabetes and food allergies. The sample was stratified by age and race. All girls 12, 14, and 16 years of age attending public schools in Guilford County received information about the purpose of the investigation from teachers at their junior or senior high schools. Each potential participant was given a letter to take home to her parents.

The letter instructed all interested girls to discuss the project with their parents, and to call the project director's office for specific details. When a potential participant or her parent called the project director's office, he or she was told that anthropometric, biochemical, dietary, and socioenvironmental data were needed from each subject, and that information would be obtained during a home interview and at the university. A written consent form signed by the parent or guardian was obtained for each subject (Appendix D).

Development of the Questionnaire

A questionnaire was designed for use in obtaining information regarding adolescent knowledge and attitudes concerning nutrition and health care during pregnancy (Appendix B). The questionnaire was composed of 20 questions, seven questions on knowledge of health care and diet during pregnancy, six on knowledge and use of contraception, and six about attitudes regarding health care and diet during pregnancy.

The questions which dealt with both knowledge and attitudes about health care and nutrition during pregnancy were written by the author under the guidance of two graduate faculty members. Advice given by Drs. Schiller and Clawson and a consulting obstetrician altered the wording and style of several questions so as to improve understanding of the questions by the subjects.

The seven questions concerning knowledge of diet and health care during pregnancy asked the subjects to categorically specify how and why their diets would change were they to become pregnant. The subjects were asked if they would alter their normal use of intake of cigarettes, caffeine, alcohol, and drugs. The participants also stated the suggested weight gain during pregnancy and the effect of maternal age on the outcome of pregnancy.

Knowledge of contraception was obtained by asking the subjects to list names of birth control methods and to mark the efficacy of each method in preventing pregnancy. Reasons for intentional use and non-use of birth control were also obtained. In addition, the subjects were asked if contraception were available in their neighborhood, and to evaluate their personal knowledge of birth control.

The last question on actual knowledge and effectiveness of birth control methods originated from an adolescent behavior study conducted by Warren B. Miller and sponsored by the American Public Health Association. All other questions about self-reported knowledge of birth control, sources of birth control, and use of contraception came from a study by the Youth Values Project Committee of the Population Institute, Washington, DC.

Attitudes about health care and nutrition during pregnancy were measured through questions about types and amounts of food consumed during pregnancy, the desired amount of exercise during pregnancy, as well as the timing and frequency of prenatal care. Subjects were also asked if they were interested in learning about maternal and child nutrition.

Pretesting of the questionnaire was done by a selected sample of five Greensboro girls 11 to 13 years of age. Field testing within a county school system was denied due to the sensitive questions involving contraceptive use.

Training of Interviewers

The socioenvironmental data and the dietary intake data were obtained by graduate students and upperclassmen of the Department of Foods, Nutrition and Food Service Management of the University of North Carolina at Greensboro. Each student was instructed in the proper methods of obtaining dietary intake data by one of the project directors. All interviewers practiced the dietary recall method and were critiqued by each other and the faculty. All initial dietary recalls on the subjects were examined by the faculty member. Errors were corrected so as to improve the skill and accuracy of the interviewer.

Pyridoxine Assessment

Collection of Blood Samples

Fasting venous blood was collected in a 10 ml vacutainer tube treated with heparin. Filled vacutainer tubes were packed in ice in a covered container until they could be processed. The tubes were centrifuged at four degrees centigrade for ten minutes at 2000 X gravity.

Preparation of Red Blood Cells

Centrifugation was followed by removal of both plasma and buffy coat by Pasteur pipettes; erythrocytes were then washed with cold physiological saline. The erythrocyte-saline mixture was then inverted and centrifuged for ten minutes at four degrees as before. The saline supernatant was then discarded.

The washed red blood cells were then diluted with a phosphate buffer at 7.4 according to the method of Heddle, McHenry, and Beaton (1963). One ml of washed erythrocytes was added to nine ml of phosphate buffer. The diluted samples were then frozen for subsequent aminotransferase determinations.

Coenzyme Activity of Alanine Aminotransferase

The enzymatic activity of alanine aminotransferase was measured by the Tonhazy, White, and Umbreit (1950) method as modified by Heddle et al. (1963).[2] Twenty-five hundredths of a ml of prepared erythrocytes were placed in a test tube with .25 ml of cold alanine

reagent. The tube was vortexed and then placed in a shaker bath at 37 degrees centigrade for ten minutes. The tubes were then transferred to an ice brine bath. The reaction was terminated when one drop of 100 percent trichloroacetic acid was added.

Once the reaction was stopped, the tubes were then removed from the ice brine mixture and allowed to come to room temperature. The development of color occurred when one-half ml of dinitrophenylhydrazine was added to the tube. The tubes were immediately shaken and allowed to stand for precisely five minutes. One ml of toluene was then added. The tubes were then covered with saran wrap and shaken for 15 seconds. Centrifugation for ten minutes at 3000 X gravity followed.

The toluene layer (one-half ml) was removed from each tube, and added to 2.5 ml of alcoholic potassium hydroxide. One-half ml of water was added to clarify the solution as suggested by Heddle et al. (1963). The tubes were then shaken; absorbance was read at 430 nm on a Bausch and Lomb Spectronic Twenty Spectrophotometer.

Coenzyme Stimulation

The enzymatic activity of alanine aminotransferase was modified by Raica and Sauberlich (1964) to include a step through which the activation of the enzyme was stimulated by the addition of pyridoxal phosphate. For each tube, in vitro stimulation was performed by the addition of ten ul of pyridoxal phosphate to .25 ml of cold prepared erythrocytes. The steps which followed were repeated exactly as discussed in the previous section, i.e., the method of Tonhazy et al., as modified by Heddle et al.

Interview Procedure and Questionnaire Administration

In order to obtain the first dietary recall and the socio-environmental data, an appointment was made by the project director's office for a home interview. At the appointed time, a team of trained interviewers went to the subject's home. One interviewer asked the subject's parent or guardian questions about the family, including education, income, and occupation of the parent or guardian. Concomitantly, the second interviewer obtained the dietary intake data from the subject.

One to three weeks after the home interview, the subject was brought to the Department of Foods, Nutrition and Food Service Management of the University of North Carolina at Greensboro to obtain the second dietary recall, the sample of blood for the pyridoxine assay, and to complete the questionnaire on health care and diet during pregnancy. Upon arrival at the department, the subject was first given her code number to ensure confidentiality and then taken to the blood-drawing room. The name of the subject did not appear on any of the data; only the subject's code number was used.

After the blood was drawn, the subject was given breakfast. Whenever the subject finished breakfast, she was escorted to a classroom and asked to complete the questionnaire on health care and nutrition during pregnancy. Upon completion of the questionnaire, the subject was interviewed by a trained interviewer to obtain the second dietary recall.

Treatment of Data

The data from the questionnaires were coded and keypunched for computer analysis. Frequency of responses to all questions was calculated for all age and race groups. The chi-square test of independence was used to ascertain the effect of age and race on the responses from the questionnaire. Results from the questionnaire were correlated with dietary intake data, per capita income, knowledge of health care and nutrition during pregnancy, race, and age.

Pyridoxine data were keypunched for computer analysis and classified according to standard values as acceptable or unacceptable within all age and race groups. The effect of age and race on pyridoxine status was computed using analysis of variance.

Dietary intake data were coded according to the Nutritional Analysis System of Louisiana State University.[3] The data were then keypunched and tabulated by computer for nutrient content. The intake of energy, protein, vitamins, and minerals was calculated in the appropriate unit and as a percentage of the 1980 RDA. Means, medians, and ranges of intake were calculated. The effect of age, race, and age/race interaction on dietary intake was calculated by analysis of variance.

CHAPTER IV

RESULTS

An examination of knowledge and attitudes regarding health care and diet during pregnancy, pyridoxine status, and dietary adequacy was made of 199 Guilford County adolescent females. Fifty-five percent of the sample were white; forty-five percent were black. Forty-two percent of the subjects were 12 years of age, 39 percent were 14 years of age, and 19 percent were 16 years of age. Knowledge regarding health care and diet during pregnancy was obtained from all 199 subjects. Pyridoxine status was measured in 149 girls, from whom blood samples were available. Complete dietary intake data were obtained from 195 girls.

The variables used to measure knowledge regarding health care and diet during pregnancy were desirable weight gain during pregnancy; effect of smoking, caffeine, drugs, and alcohol during pregnancy; and the relationship between maternal age and the outcome of pregnancy. Knowledge and use of contraception were also investigated. The hypotheses involving knowledge of health care and diet during pregnancy are addressed at the end of the section on that subject.

The attitudes of the subjects regarding health care and diet during pregnancy were measured by an examination of the following variables: timing and frequency of prenatal care, effect of exercise during pregnancy, willingness to attend maternal nutrition classes,

and proper diet during pregnancy. The data on attitudes follow the results on knowledge regarding health care and diet during pregnancy.

Pyridoxine status was measured by analysis of alanine aminotransferase. Dietary intake data were obtained by two 24-hour recalls. Dietary adequacy was measured by comparing the intake of calories, protein, vitamin A, vitamin D, thiamin, riboflavin, niacin, pyridoxine, folic acid, cobalamin, ascorbic acid, calcium, phosphorus, iron, magnesium, zinc, copper, iodine, and fluorine with the respective 1980 RDA's.

Knowledge Regarding Health Care During Pregnancy

A weight gain of 20 to 30 pounds is recommended during pregnancy (Committee on Maternal Nutrition, 1970; Worthington-Roberts et al., 1981). Only 15 percent of the subjects recognized the desirable range for weight gain (Table 3). Neither age nor race made a significant difference in the subjects' response to weight gain as performed via the chi-square test of independence. The largest percentage of correct answers (25 percent) was seen among the 12-year-old black subjects, while among whites, the correct answer was marked more often by 16-year-olds (22 percent). Over one-half of the girls thought 11 to 20 pounds was the preferred range for weight gain. This response was marked almost equally by 16-year-old whites (67 percent) and 14-year-old blacks (68 percent).

Smoking cigarettes during pregnancy is associated with lower birth weights in a linear fashion according to the number of

Table 3

Knowledge About Desirable Weight Gain

During Pregnancy[a]

	Response[b]							
	Black (Ages)				White (Ages)			
Answer	12 (n=33)	14 (n=37)	16 (n=19)	All (n=89)	12 (n=51)	14 (n=40)	16 (n=19)	All (n=110)
0-10 Pounds	25	19	37	25	31	30	11	27
11-20 Pounds	50	68	47	57	55	63	67	60
21-30 Pounds	25	14	16	18	14	8	22	13

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b]Neither race nor age had a significant effect on response as measured by the chi-square test of independence.

cigarettes smoked (Beal, 1980). Neither race nor age made a significant difference in the subjects' responses to smoking as performed by the chi-square test of independence. Seventy-eight percent of the subjects stated that they did not smoke. Fifty-six percent of the nonsmokers were white, and 44 percent were black (Table 4). The largest subgroup of nonsmokers was composed of the 12-year-old white girls (90 percent). Among the groups who smoked, 20 percent thought pregnant women should smoke less. This group of smokers was almost identical in age and race except for the 12-year-old whites; less than ten percent of this subgroup felt that pregnant women should smoke less. Three girls thought pregnancy did not require a change in smoking habits; two were black. Two of the three were 12 years old.

Ninety-two percent of the girls stated that pregnant women should decrease their consumption of caffeine-containing beverages; the majority were 14 and 16 years old. Seven percent felt no decrease in the amount of caffeine was needed (Table 5). Three girls, all 12 years old, responded that pregnant women should increase their caffeine consumption. No significant difference was noted in the responses of the subjects by race or age as performed via the chi-square test of independence.

Use of medications during pregnancy is usually very restricted in order to prevent damage to the fetus (Worthington-Roberts et al., 1981). No significant difference was noted in the responses of the subjects by race or age as performed by the chi-square test of

Table 4

Knowledge About Smoking During Pregnancy[a]

	Response[b]								
	Black (Ages)				White (Ages)				
	12	14	16	All	12	14	16	All	
Answer	(n=33)	(n=37)	(n=19)	(n=89)	(n=51)	(n=41)	(n=19)	(n=110)	Total
Nonsmokers	79	68	79	74	90	73	74	81	78
Not Change	3	3	0	2	2	0	0	1	2
Decrease	18	30	21	24	8	28	26	18	20

Note. Each question was not answered by all respondents.

[a]Percentage of each column total.

[b]Neither race nor age had a significant effect on response as measured by the chi-square test of independence.

Table 5

Knowledge About Caffeine Intake During Pregnancy[a]

	Response[b]								
	Black (Ages)				White (Ages)				
Answer	12 (n=33)	14 (n=37)	16 (n=19)	All (n=89)	12 (n=41)	14 (n=40)	16 (n=19)	All (n=110)	Total
Not Change	3	5	5	5	12	8	0	8	7
Decrease	91	95	95	93	86	93	100	91	92
Increase	6	0	0	2	2	0	0	1	1

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b]Neither race nor age had a significant effect on response as measured by the chi-square test of independence.

independence. Twenty percent of the girls marked that there were no drugs which should be avoided during pregnancy. One-half of these girls were 12 years old; one-half were black. Eighty percent of the subjects answered that there are drugs which should not be taken during pregnancy. The majority of the girls who felt medications should not be taken during pregnancy were 14 and 16 years old (Table 6). In the questionnaire, the term "medication" was changed to "drug" so that all of the girls would understand the question. Unfortunately, the word drug was interpreted to mean drug as in cocaine, marijuana, heroin, etc.

Ninety-nine percent of the girls agreed that pregnant women should consume less alcohol (Table 7). Only one 12-year-old black girl marked that no change was necessary. Neither race nor age had a significant effect on response as measured by the chi-square test of independence.

The knowledge of the subjects regarding health care and diet during pregnancy was compared with their age, race, income, and dietary adequacy by correlation analysis (Table 8). Based on the initial definitions, most of the subjects' diets were poor, thus a new method for evaluating the diets was created. The total number of nutrients whose RDA's were met (V 100), and the total number of nutrients when at least two-thirds of the RDA were met (V 67) were used as a means of measuring dietary adequacy.

No significant relationship was found between knowledge of health care and nutrition during pregnancy and dietary adequacy at either 100 or 67 percent of the RDA. Knowledge of health care and nutrition

Table 6

Knowledge About Restriction of Drugs

During Pregnancy[a]

	Response[b]								
	Black (Ages)				White (Ages)				
Answer	12 (n=33)	14 (n=37)	16 (n=19)	All (n=89)	12 (n=51)	14 (n=40)	16 (n=19)	All (n=110)	Total
Yes	70	77	90	77	80	87	84	84	80
No	30	23	10	23	20	13	15	16	20

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b]Neither race nor age had a significant effect on response as measured by the chi-square test of independence.

Table 7

Knowledge About Alcohol Consumption

During Pregnancy[a]

	Response[b]								
	Black (Ages)				White (Ages)				
	12	14	16	All	12	14	16	All	
Answer	(n=33)	(n=37)	(n=19)	(n=89)	(n=51)	(n=40)	(n=19)	(n=110)	Total
Not Change	3	0	0	1	0	0	0	0	1
Less	97	100	100	99	100	100	100	100	99

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b]Neither race nor age had a significant effect on response as measured by the chi-square test of independence.

Table 8

Correlation Analysis Between

Hypothetical Variables

	V100[b]	V67[c]	Score	Income	Race	Age
V 100 r[a]=	1.000	.895	.047	.185	.261	-.066
p =	.001	.001	.515	.010	.001	.363
V 67 r =		1.000	-.005	.142	-.259	-.119
p =		.001	.950	.050	.001	.097
Score r =			1.000	.215	-.157	.173
p =			.001	.010	.050	.050
Income r=				1.000	-.403	-.199
p =				.001	.001	.010
Race r =					1.000	.086
p =					.001	.231
Age r =						1.000
p =						.001

[a] r = correlation coefficient.

[b] V 100 signifies the number of nutrients which met or exceeded 100 percent of the RDA.

[c] V 67 signifies the number of nutrients which met or exceeded 67 percent of the RDA.

during pregnancy was, however, significantly affected by income ($p < .01$) and age ($p < .05$).

Dietary adequacy as measured by the total number of RDA's met (V 100), was significantly related to income ($p < .01$) and race ($p < .001$). The former relationship was positive; thus, the quality of the subjects' diets improved with increasing per capita income. The association of race with dietary adequacy was negative, since the black girls' diets were not as complete as the diets of the white girls. This relationship is questionable, however, since income was significantly ($p < .01$) and negatively affected by race. The per capita income among the white subjects was significantly greater than the per capita income of the black girls.

The total number of nutrients representing adequacy at two-thirds of the RDA (V 67) was also significantly affected by income ($p < .01$) and race ($p < .001$) as was the first measure of dietary adequacy (V 100). Age did not significantly affect dietary adequacy at either 100 or 67 percent of the RDA.

Knowledge and Use of Contraception

The availability of information concerning knowledge about birth control among teenagers is considered by many professionals to be limited (McGanity et al., 1969; Teenage Pregnancy, 1981). Over 65 percent of the subjects admitted their ignorance regarding the availability of birth control. The majority of these 130 girls (n = 120) was less than 16 years of age (Table 9). The response of the three age groups regarding the availability of birth control was

Table 9

Availability of Birth Control in Subject's Area Without a Hassle[a,b**]

	Response								
	Black (Ages)				White (Ages)				
Answers	12 (n=33)	14 (n=37)	16 (n=19)	All (n=89)	12 (n=51)	14 (n=40)	16 (n=19)	All (n=110)	Total
I Don't Know	76	56	32	58	86	75	32	73	66
No	9	8	0	7	2	3	16	5	6
Yes	15	36	68	35	12	22	52	22	28

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b**]Age had a significant effect on response as measured by the chi-square test of independence ($p < .001$).

significantly different at the ($p < .001$) level. The major effect of age was among the 12 and 16 year olds. There was a five-fold increase in knowledge of availability between the 12-year-olds (13 percent) and the 16-year-olds (61 percent). Twenty-eight percent of the girls stated that birth control was easy to obtain in their area; most of these subjects (80 percent) were 14 and 16 years of age. Only five percent of the girls noted that birth control was difficult to obtain in their area.

Almost 40 percent of the subjects stated they had adequate knowledge of birth control (Table 10). Among the black girls, one-third of the 12- and 14-year-old girls stated they knew enough about birth control. Among the white girls, almost one-half of the 14- and 16-year-olds said they were knowledgeable.

One-third of the sample stated they did not know enough about birth control. More than 50 percent of the 14-year-old black girls and all age groups of the white girls reported that they did not know enough about birth control.

Fifteen percent of the subjects marked that they knew nothing about contraception; almost all of these girls were less than 16 years of age. The effect of age was significant between the three age groups at the ($p < .01$) level. The greatest difference across age groups was observed between the 12-year-olds and the 16-year-olds. The youngest group stated most frequently (25 percent) that they knew nothing about birth control compared to the 16-year-olds (three percent). The oldest age group responded almost twice as frequently as the 12-year-olds (31 percent) that they knew enough about contraception.

Table 10

Self-Reported Knowledge of Birth Control[a,b**]

	Response								
	Black (Ages)				White (Ages				
	12	14	16	All	12	14	16	All	
Answers	(n=33)	(n=37)	(n=19)	(n=89)	(n=51)	(n=40)	(n=19)	(n=110)	Total
Nothing	30	16	5	19	22	5	0	12	15
Not Enough	33	50	32	40	51	50	53	51	46
Enough	36	33	63	41	27	45	47	37	39

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b**]Age had a significant effect on response as measured by the chi-square test of independence ($p < .01$).

The listing of the various birth control methods correctly and incorrectly was significantly related to age, but not to race (Table 11). Of the eight methods mentioned by the subjects, only withdrawal and rhythm were not significantly associated with the age of the girls.

Actual knowledge of birth control among the subjects was limited (Table 12). Over one-third of the sample did not list one method of birth control. Almost two-thirds of the subjects could not list one contraceptive method and its degree of effectiveness correctly (Table 13). In four out of five cases, the number of whites able to list methods correctly was greater than the number of blacks. The two girls who listed five methods correctly were both black; one was 14 and the other was 16 years old.

Effectiveness of methods to prevent pregnancy is based on the actual effectiveness of each method as reported by Hatcher, Stewart, Stewart, Guest, Schwartz, and Jones (1980). Eighteen percent of the girls could list one method correctly; 11 percent listed two methods; six percent could list three methods correctly (Table 13). Only one percent of the sample could list five methods accurately.

The most frequently listed method of birth control was "the pill," i.e., oral contraceptives (60 percent). The condom ranked second; it was listed by 37 percent of the girls (Table 14). Only 15 percent of the sample could list the effectiveness of the pill and the condom correctly. The 14- and 16-year-old girls of both races were consistently more knowledgeable about the effectiveness of contraception than the 12-year-old girls.

Table 11

Statistical Analysis of Birth Control

Methods by Race and Age[a]

Methods	Listed[b]		Listed Correctly[c]	
	Race ($p \leq$)	Age ($p \leq$)	Race ($p \leq$)	Age ($p \leq$)
Condom	.444	.001	.974	.010
IUD	.154	.001	.249	.050
Withdrawal	1.000	.052	1.000	.119
Diaphragm	.138	.001	.328	.001
Foams, Jellies	.517	.001	1.000	.001
Surgery	.675	.054	.919	.050
Rhythm	.625	.067	1.000	.329
Oral Contraceptives	.051	.001	.715	.050

[a]Performed by the chi-square test of independence.

[b]Includes the method when the true effectiveness of the method were not known.

[c]Includes only those subjects who marked the effectiveness correctly.

Table 12

Number of Birth Control Methods

Listed by Race and Age[a]

Number of Methods Listed	Black (n=89)	White (n=110)	12 (n=84)	14 (n=77)	16 (n=38)	Total (n=199)
0	53	35	63	33	18	43
1	21	36	26	35	26	30
2	18	17	8	21	32	18
3	5	9	2	8	16	7
4	2	2	0	1	8	2
5	1	0	0	1	0	.5
6	0	1	0	1	0	.5

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

Table 13

Number of Birth Control Methods Listed Correctly by Race and Age[a]

Number of Methods	Ages			Race		Total
	12 (n=84)	14 (n=77)	16 (n=38)	Black (n=89)	White (n=110)	(n=199)
1	13	21	24	15	21	18
2	4	12	24	10	11	11
3	1	7	13	6	6	6
4	0	5	3	1	4	2
5	0	1	3	2	0	1

Note. Each question was not answered by all respondents.

[a]Percentage of each column total.

Table 14

Types of Birth Control Methods

Listed Correctly[a,b]

	Black (Ages)				White (Ages)				
	12	14	16	All	12	14	16	All	
Methods	(n=33)	(n=37)	(n=19)	(n=89)	(n=51)	(n=40)	(n=19)	(n=110)	Total
Condom	12	19	16	16	2	28	21	15	15
IUD	0	6	11	5	0	0	6	1	3
Withdrawal	0	8	0	4	0	0	6	1	2
Diaphragm	0	8	27	9	2	38	48	23	12
Foams, Jellies	0	14	32	12	2	20	21	12	12
Surgery	6	8	27	11	8	15	21	12	12
Rhythm	0	3	0	1	0	3	6	2	2
Oral Contraceptives	9	14	21	13	8	18	37	16	15

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b]The effect of age and race on specific birth control methods is presented in Table 11.

Contraceptive foams and jellies were mentioned by 21 percent of the girls; 12 percent correctly noted their effectiveness (Table 14). Among the 12 percent of the sample which correctly marked the efficacy of foams and jellies, the 14- and 16-year-old girls were the most knowledgeable. The diaphragm was listed by 19 percent of the sample; 12 percent were able to mark its efficacy correctly. Two-thirds of the 24 girls were white; all but one were over 12 years of age. Surgical techniques such as vasectomy, abortion, and hysterectomy were listed among 14 percent of the subjects; 12 percent marked the effectiveness of these surgical procedures correctly. The largest percentage of correct answers came from 16-year-olds of both races.

All other methods were listed correctly by less than five percent of the subjects. The IUD was listed by 14 percent of the sample; the correct answers were predominantly from 16-year-olds of both races. Rhythm was listed by seven girls; however, only three girls correctly stated its effectiveness: one 14-year-old black girl, one 14- and one 16-year-old white girl. Withdrawal was the least mentioned method of birth control. Six girls listed it, but only one, a white 16-year-old, noted its efficacy properly.

Self-reported knowledge of birth control was compared with actual results of the methods listed correctly (Appendix E). For all eight major methods, those who stated they knew enough scored higher than those who said they did not know enough about contraception; those who felt they did not know enough scored consistently higher than those who said they knew nothing about birth control. Thus, it

appears that the girls accurately estimated their knowledge of contraception.

Seventy-seven percent of the girls wrote that most adolescents do not think about getting pregnant (Table 15). This response was selected more frequently by the 12- and 16-year-olds of both races than the 14-year-olds. Seventy-four percent of the sample felt that most teenagers think they cannot get pregnant. The third principal reason as noted by the subjects was fear of parental knowledge of contraceptive use, and therefore sexual activity. Fourteen-year-old white girls (80 percent) and 16-year-old black girls (79 percent) answered this more frequently than any of the other age-race groups. Neither race nor age had a significant effect as measured by the chi-square test of independence.

Sixty-seven percent of the subjects stated they do not engage in sexual relations often enough to warrant the use of contraceptives (Table 15). This response was similar among the 12- and 14-year-old girls of both races; more white 16-year-olds (84 percent) gave this answer than blacks (74 percent). Lack of knowledge about birth control and where to obtain birth control equipment have also been cited as major reasons why teenagers do not use contraception (Teenage Pregnancy, 1981; Shah, Zelnick, & Kantner, 1979). Over 60 percent of the girls felt that teenagers do not know enough about birth control. This response was similar among all ages of the whites; among the black girls, however, the percentage of girls who marked this response increased with age (Table 15). Forty-six percent of the sample stated

Table 15

General Reasons Listed by Subjects for Nonuse of Birth Control by Adolescents[a]

	Response[b]								
	Black (Ages)				White (Ages)				
Answers	12 (n=33)	14 (n=37)	16 (n=19)	All (n=89)	12 (n=51)	14 (n=40)	16 (n=19)	All (n=110)	Total
They don't think about getting pregnant	82	73	84	79	73	55	68	76	77
They think they can't get pregnant	76	73	84	76	73	73	68	72	74
They're afraid their parents will find out	67	70	79	77	68	80	74	74	72
They don't have sexual relations often enough	70	62	74	67	61	68	84	67	67

Table 15 (Continued)

	Response[b]								
	Black (Ages)				White (Ages)				
Answers	12 (n=33)	14 (n=37)	16 (n=19)	All (n=89)	12 (n=51)	14 (n=40)	16 (n=19)	All (n=110)	Total
They don't know enough	46	57	68	55	66	65	74	67	62
They don't know where to get it	42	38	60	44	37	65	47	49	46
They don't want the hassle of using it	39	46	47	44	37	43	53	42	43
Their partner doesn't like it	33	18	47	41	33	40	43	37	39
They feel it is unnatural	36	32	21	32	41	28	37	35	34
They feel it is bad for their health	18	46	53	37	26	15	32	23	29

Table 15 (Continued)

	Response[b]								
	Black (Ages)				White (Ages)				
	12	14	16	All	12	14	16	All	
Answers	(n=33)	(n=37)	(n=19)	(n=89)	(n=51)	(n=40)	(n=19)	(n=110)	Total
It makes sex too planned	18	30	21	24	27	18	37	25	25
It is too expensive	15	24	53	17	24	18	16	20	19

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b]Neither race nor age had a significant effect on response as measured by the chi-square test of independence.

that adolescents usually do not know where to obtain birth control devices. This response was given most frequently by the 16-year-old blacks (58 percent) and the 14-year-old whites (65 percent).

Twenty-nine percent of the girls mentioned that birth control was not used for health reasons. The largest group of girls who wrote this response were 14- and 16-year-old black girls. One-fourth of the sample checked the nonuse of birth control because it made sexual relations seem too planned. This response was observed most frequently by 14-year-old black girls (30 percent) and 16-year-old white girls (37 percent).

Seventy-eight percent of the girls stated they had never used birth control; 89 percent of the white girls and 65 percent of the black girls wrote they had never used birth control. Of the 11 reasons given for contraceptive use, none was marked by more than 15 percent of the sample. Nine girls did not answer this question (Table 16).

The major reasons given for past contraceptive use were related to maturity. The most frequently selected response was "I'm not ready to have kids yet" (15 percent). This response was selected almost completely by black girls. The second most commonly noted cause for contraceptive use was familial discord; 14 percent wrote that their families would be upset if they became pregnant. Over four-fifths of the subjects who marked this answer were black. It is interesting that many adolescents do not use contraception for fear their parents will find out they are engaging in sexual relations.

Table 16

Reasons Reported by Subjects for

Past Use of Birth Control[a]

	Response								
	Black (Ages)				White (Ages)				
	12	14	16	All	12	14	16	All	Total
Answers	(n=33)	(n=37)	(n=19)	(n=89)	(n=51)	(n=40)	(n=19)	(n=110)	
Not ready to have kids yet yet[b*,c**]	21	22	32	24	6	3	26	8	15
Family would be upset[c***]	24	24	26	25	2	3	16	5	14
Too young to be a good parent[c*]	15	22	21	9	10	3	11	7	13
Couldn't support a baby	15	22	26	9	8	3	5	5	12
Haven't completed my education[c***]	15	19	32	20	8	0	11	6	12

Table 16 (Continued)

	Response								
	Black (Ages)				White (Ages)				
	12	14	16	All	12	14	16	All	Total
Answers	(n=33)	(n=37)	(n=19)	(n=89)	(n=51)	(n=40)	(n=19)	(n=110)	
Baby would interfere with plans[c***]	12	24	26	20	4	0	5	3	11
Not ready to settle down[c**]	13	19	26	18	4	0	3	3	10
Costs too much to raise a kid	15	14	11	13	6	0	16	6	9
Couldn't handle an abortion	6	6	16	8	6	3	16	6	7
Society would look down on me	7	11	11	9	4	3	5	4	6

Table 16 (Continued)

	Response								
	Black (Ages)				White (Ages)				
	12	14	16	All	12	14	16	All	Total
Answers	(n=33)	(n=37)	(n=19)	(n=89)	(n=51)	(n=40)	(n=19)	(n=110)	
I don't want to have children	7	3	21	8	6	0	5	4	6

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b*]Age had a significant effect on response as measured by the chi-square test of independence (* indicates $p < .05$).

[c*, **, ***]Race had a significant effect on response as measured by the chi-square test of independence (* indicates $p < .05$; ** indicates $p < .01$; *** indicates $p < .001$).

Use of birth control was significantly related to age and race. Two responses (e.g., I don't want to have children; I'm not ready to have kids yet) were associated with the age of the subjects, while seven answers (e.g., family would interfere with my plans; not ready to settle down; couldn't support a baby; haven't completed my education; not ready to have kids yet) were related to race. The effect of age on past use of birth control was more apparent between the youngest and the oldest age groups. The 16-year-old girls responded most frequently that they were not prepared for motherhood. "I'm not ready to have kids yet," "I don't want to have children," and "I haven't finished my education" were noted twice as frequently by 16-year-old subjects as by 12-year-olds.

The third most commonly selected response concerned age and parental skill. Thirteen percent of the total sample marked that they were not old enough to be a good parent. Two-thirds of the girls who chose this answer were black; most (76 percent) were 12 and 14 years of age.

The fourth and the eighth most frequently selected responses were related to financial status. The fourth most commonly selected response was the inability to support a child; three-quarters of the subjects who chose this answer were black 14- and 16-year-old girls. The eighth most commonly selected response was recognition of the cost of rearing children; two-thirds of the girls who selected this answer were black, although the greatest response was among 16-year-old white girls (16 percent). Both of these responses suggested that these girls were aware of the financial costs of rearing children.

Other reasons for the use of contraceptives were related to goals, desires, and beliefs. Over ten percent of the subjects stated that pregnancy would not be desired because their education was not complete, or that a baby would interfere with their education plans. Ten percent noted that they were not "ready to settle down yet." All three of these responses were made predominantly by black girls (75 to 86 percent). Seven percent felt they would not have an abortion; this response was most common among 16-year-olds. Twelve girls wrote that society would not respect them if they became pregnant; eight were black, most were 14 years of age. Eleven girls, seven of whom were black, stated they did not want to have children; most were 16 years old.

The major source of information on contraception among the subjects was school or class (Table 17). Over 60 percent of the sample stated they had received formal instruction on birth control, i.e., studied birth control in school. This response was similar among both races; the most frequent response was noted among the 16-year-olds. For those girls who listed two sources, friends were mentioned more often than any other source (Table 18). Among the nine major sources of birth control, only three (friends, clinics, and magazines) were significantly related to age of the subjects. The greatest difference in response frequency by age was observed between the 12- and 16-year-old subjects. In each of the three answers (friends, clinic, magazine) the percentage of girls who learned from these sources rose with age. The response among the 16-year-olds was two to three times

Table 17

Source of Knowledge of Birth Control[a]

	Response								
	Black (Ages)				White (Ages)				
	12	14	16	All	12	14	16	All	Total
Answers	(n=33)	(n=37)	(n=19)	(n=89)	(n=51)	(n=40)	(n=19)	(n=110)	
School, Class	61	52	63	58	55	65	90	65	61
Parents[b***]	58	54	63	57	55	55	37	52	54
Friends	45	65	69	59	39	40	79	47	52
Adults	49	38	37	42	34	20	37	29	35
Books	33	33	53	37	36	30	27	32	44
Clinic, Planned[b*, c**]	9	38	42	28	10	3	11	8	17
Magazines	21	30	48	30	24	28	42	28	29
Church	6	3	11	6	4	13	6	8	7
Drug Store	9	8	5	8	4	3	0	3	5

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b*, ***]Age had a significant effect on response as measured by the chi-square test of independence (* indicates $p < .05$; *** indicates $p < .001$).

[c**]Race had a significant effect on response as measured by the chi-square test of independence (** indicates $p < .01$).

Table 18

Double Response to Source of

Birth Control Knowledge

Double Sources	Number of Responses
1. School, Parents	69
2. School, Friends	62
3. Friends, Parents	58
4. Parents, Adults	50
5. School, Adults	45
6. Friends, Adults	45
7. School, Books	45
8. Friends, Magazines	44
9. Friends, Books	45

that of the 12-year-olds. Race was significantly ($p < .01$) associated with clinics as a source of contraceptive knowledge. Twenty-eight percent of all blacks marked this response as compared to eight percent of all whites. Forty-two percent of all 16-year-old black girls marked this response.

Parents were the second most commonly listed source of contraceptive knowledge (54 percent). The frequency of the response of 12- and 14-year-old girls of both races was similar; black 16-year-old girls (63 percent) marked this response almost twice as often as 16-year-old white girls (37 percent).

Other major sources of information as recorded by the subjects included (1) adults (35 percent), (2) books (34 percent), and (3) magazines (29 percent). These responses were similar among all age and race groups; 16-year-old girls (39 percent) selected these sources more often than 12-year-old girls (32 percent) and 14-year-old girls (30 percent). None of the subjects specified the adults, books, or magazines from which they learned about birth control. Only 17 percent of the sample received any contraception education at family-planning clinics such as Planned Parenthood. Most of the girls who marked this answer were 14 and 16 years old. Drug stores and churches were sources of birth control information for approximately five percent of the subjects. Churches were most frequently listed as a source of birth control knowledge by 16-year-old black girls, while drug stores were marked most often by 12-year-old white girls.

Attitudes Regarding Health Care During Pregnancy

The first two questions on the questionnaire addressed the timing and frequency of prenatal care (Tables 19 and 20). Almost one half of the subjects stated that they would visit a doctor as soon as they knew they were pregnant. This response was common among all age-race groups except the 16-year-old black girls. Twenty-six percent of the girls said they would see a physician during the first two months of their pregnancy. This response was chosen more frequently by white girls (12 percent) than by black girls (eight percent). No significant difference was noted in the responses of the subjects due to either age or race, as performed by the chi-square test of independence.

Answers regarding the frequency of prenatal visits were varied (Table 20). The responses for frequency of visits to the physician were statistically significant both between the age groups ($p < .01$) and the races ($p < .001$), as analyzed by the chi-square test of independence. The major difference across age groups was greater awareness of the need for prenatal care among the 16-year-old girls than 12-year-old girls. None of the 12-year-old girls stated they would visit a physician every two months; this response was selected by approximately 15 percent of the 14- and 16-year-old subjects. Forty-five percent of the girls indicated they would visit a doctor every two weeks during pregnancy. This answer was selected more frequently by white girls (53 percent) than by black girls (34 percent), and more often by 12- and 14-year-olds than by 16-year-olds. Eighteen

Table 19

Knowledge About Time of First Visit for

Health Care During Pregnancy[a]

	Response[b]								
	Black (Ages)				White (Ages)				
Answers	12 (n=33)	14 (n=37)	16 (n=19)	All (n=89)	12 (n=51)	14 (n=40)	16 (n=19)	All (n=110)	Total
When I first became pregnant	39	51	21	40	46	58	53	51	45
First month	16	16	21	17	17	18	11	16	16
First two months	13	5	5	8	8	13	21	12	10
Other	32	27	53	35	29	13	16	21	26

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b]Neither race nor age had a significant effect on response as measured by the chi-square test of independence.

Table 20

Knowledge About Frequency of Prenatal Visits[a]

	Response[b**,c***]								
	Black (Ages)				White (Ages)				
Answers	12 (n=33)	14 (n=37)	16 (n=19)	All (n=89)	12 (n=51)	14 (n=40)	16 (n=19)	All (n=110)	Total
Monthly	21	19	21	20	18	13	21	17	18
Every Two Weeks	36	35	26	34	54	60	37	53	44
When Doctor Says	3	0	5	2	6	0	0	3	3
Other	39	46	47	44	22	28	16	42	35

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

b** Age had a significant effect on response as measured by the chi-square test of independence (** indicates $p < .01$).

c*** Race had a significant effect on response as measured by the chi-square test of independence (*** indicates $p < .001$).

percent of the subjects stated that they would see their physician monthly. This response was observed equally among both races and all three age groups, except for the white 14-year-old girls whose predominant answer was every two weeks.

More than one half of the girls felt that pregnant women should exercise more than nonpregnant women (Table 21). Twenty-six percent of the subjects thought pregnancy did not alter a woman's need for physical activity. Increased exercise was selected more frequently by the 14-year-old and 16-year-old girls of both races, i.e., 79 percent of the 16-year-old blacks versus 56 percent of the 12-year-old blacks. Twenty-two percent of the girls answered that pregnant women should exercise less than nongravid women; the majority (24 percent) were 12 and 14 years of age. The effect of race was significant at the ($p < .01$) level via the chi-square test of independence.

When asked if they would be interested in studying the effect of diet on their health and the health of their baby, 78 percent of the subjects revealed a willingness to attend such classes. This answer was noted by approximately equal numbers of 12 year olds in both races (Table 22). Neither race nor age made a significant difference in the subject's willingness to study the effect of diet on the outcome of pregnancy, as performed by the chi-square test of independence. For both races, the largest positive response was noted among the 16-year-old girls; 95 percent of the black 16-year-olds and 84 percent of the white 16-year-olds answered they would attend nutrition classes. Twenty percent of the subjects stated they might attend classes on child nutrition. More whites (25 percent) than blacks (15 percent) chose this response.

Table 21

Knowledge About Exercise During Pregnancy[a]

	Response[b**]								
	Black (Ages)				White (Ages)				
	12	14	16	All	12	14	16	All	Total
Answers	(n=33)	(n=37)	(n=19)	(n=89)	(n=51)	(n=40)	(n=19)	(n=110)	
Not Change	19	11	16	15	35	35	32	25	26
Less	25	27	5	22	26	20	16	22	22
More	56	62	79	64	39	45	53	44	52

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b**]Race had a significant effect on response as measured by the chi-square test of independence (** indicates $p < .01$).

Table 22

Subject's Interest in Maternal

Nutrition Education[a]

	Response[b]								
	Black (Ages)				White (Ages)				
Answers	12 (n=33)	14 (n=37)	16 (n=19)	All (n=89)	12 (n=51)	14 (n=40)	16 (n=19)	All (n=110)	Total
No	3	5	0	3	0	0	0	0	2
Yes	75	81	95	82	74	73	84	75	78
Maybe	22	14	5	15	26	27	16	25	20

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b]Neither race nor age had a significant effect on response as measured by the chi-square test of independence.

Adequate dietary intake during pregnancy is essential for the growth and survival of the fetus (Hurley, 1980; Worthington-Roberts et al., 1981). Fifty-three percent of the girls marked that pregnant women should eat more often than nonpregnant women. Fourteen- and 16-year-olds of both races answered this more often than 12-year-olds. Thirty-two percent stated that pregnant women do not need to change their diets, while 15 percent thought pregnant women should eat less than nonpregnant women (Table 23). The responses for dietary changes in pregnancy were statistically significant both between the races ($p < .001$) and among age groups ($p < .05$). The greatest difference across age groups was observed between the 12-year-olds and the 16-year-olds. The youngest subjects (21 percent) responded most often that pregnant women should eat less, while the 16-year-old subjects stated most frequently (66 percent) that pregnant women should eat more. Forty-three percent of the subjects who felt no change would be necessary during pregnancy were white, whereas two-thirds of the girls who stated that pregnant women should eat less were black. Twelve-year-olds marked this response more frequently than did 14- or 16-year-old girls.

Dietary modifications during pregnancy are essential in order to provide the additional nutrients for the growing child (Committee on Maternal Nutrition, 1970). Fifty-three percent of the subjects marked that they would alter their current diets, but the changes to be made were frequently vague. More than 50 percent stated that they would eat better or consume more nutritious food. Five percent specified

Table 23

Knowledge About Food Intake During Pregnancy[a]

	Response[b*,c***]								
	Black (Ages)				White (Ages)				
	12	14	16	All	12	14	16	All	Total
Answers	(n=33)	(n=37)	(n=19)	(n=89)	(n=51)	(n=40)	(n=19)	(n=110)	
Not Change	12	27	11	18	49	41	37	43	32
Less	39	14	21	25	10	3	5	6	15
More	49	60	68	57	41	56	63	51	53

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b*]Age had a significant effect on response as measured by the chi-square test of independence (* indicates $p < .05$).

[c***]Race had a significant effect on response as measured by the chi-square test of independence (*** indicates $p < .001$).

that they would eat more fruits, vegetables, dairy products, or other food groups.

Almost 60 percent of the subjects felt that age affects the outcome of pregnancy (Table 24). Many girls stated that a woman should be neither too young nor too old, but did not define the meaning of the phrase. Several subjects wrote that women need to be mature to properly care for a child. Very few girls realized that young mothers may not be fully developed physiologically. The positive response to the effect of age on the outcome of pregnancy was noted by twice as many white girls of all age groups. However, neither age nor race made a significant difference in the subjects' responses concerning the effect of age on the outcome of pregnancy. Forty-one percent of the subjects stated that age has no effect on the outcome of pregnancy. This answer was most frequently observed by the 12- and 14-year-old girls of both races.

The ideal years to conceive are considered to be between 20 and 29 years of age (Beal, 1980); the best birth weights have repeatedly been associated with women 20 to 29 years of age. Seventy-six percent of the girls answered that there is an ideal age for pregnancy (Table 25). Most of these girls were 12 and 16 years of age; the most positive response, however, came from the 16-year-old girls (79 percent of the white 16-year-olds, and 53 percent of the black 16-year-olds). Twenty-four percent of the girls marked that there was no ideal age for pregnancy; 87 percent of those who stated there was no ideal age for pregnancy were 12 to 14 years of age. No significant effect of

Table 24

Knowledge of How Maternal Age Affects the

Outcome of Pregnancy[a]

	Response[b***]								
	Black (Ages)				White (Ages)				
	12	14	16	All	12	14	16	All	Total
Answers	(n=33)	(n=37)	(n=19)	(n=89)	(n=51)	(n=40)	(n=19)	(n=110)	
Yes	42	42	53	44	61	78	79	70	59
No	58	58	47	56	39	22	21	30	41

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

b***Race had a significant effect on response as measured by the chi-square test of independence (*** indicates $p < .001$).

Table 25

Recognition of an Ideal Age for Pregnancy[a,c]

	Response[b***]								
	Black (Ages)				White (Ages)				
Answers	12 (n=33)	14 (n=37)	16 (n=19)	All (n=89)	12 (n=51)	14 (n=40)	16 (n=19)	All (n=110)	Total
Yes	73	66	90	74	80	78	79	79	76
No	27	34	10	26	20	22	21	21	24

Note. Each question was not answered by all respondents.

[a]Percentage of each column total; total n = 199.

[b***]Race had a significant effect on response as measured by the chi-square test of independence (*** indicates $p < .001$).

[c]Neither race nor age had a significant effect on response as measured by the chi-square test of independence.

age or race was noted on the responses of the subjects as performed by the chi-square test of independence.

Pyridoxine Assessment

Woodring and Storvick (1970) reported that an acceptable percent stimulation of alanine aminotransferase was less than 15. On the basis of the standard of Woodring and Storvick, the pyridoxine status of 70 percent of all 12- and 14-year-old girls in the sample was less than 15 percent (Table 26). The percentage of girls observed to have normal stimulation declined with age. The percent stimulation of alanine aminotransferase was not significantly affected by age or race, as performed by analysis of variance. The percentage of girls observed to have less than acceptable levels of stimulation on the basis of the Woodring and Storvick data increased with age; the percentage of girls deficient in pyridoxine rose from 30 percent for the 12-year-olds to 36 percent for the 16-year-old girls.

Sauberlich et al. (1972) and Sauberlich, Skala, and Dowdy (1974) reported that healthy individuals do not respond with stimulation activity levels greater than 25 percent. Using an average of the Woodring and Storvick and Sauberlich et al. (1972, 1974) data (i.e., 20 percent stimulation as a standard), the percentage of girls deficient in pyridoxine still increased with age (Table 27). Eighty percent of the black girls and 84 percent of the white girls had acceptable levels of stimulation. Sixty-three percent of the white girls had acceptable levels of stimulation using the Woodring and Storvick

Table 26

Percentage of Stimulation of Alanine Aminotransferase[a,b,c,d]

	Black				White				Total			
Age	N	0-14.9	15-20	>20	N	0-14.9	15-20	>20	N	0-14.9	15-20	>20
12	28	79	11	11	42	64	24	12	70	70	19	11
14	20	75	15	10	26	65	19	15	46	70	17	13
16	15	73	13	13	18	56	17	27	33	64	15	21
	63				86				149			

Note. Blood was not obtained from all subjects.

[a]Percentage of each age group; total n = 149.

[b]Analysis of percentage of stimulation was performed by Ms. Shih Min Wu.

[c]Percentage stimulation; 15 percent stimulation is unacceptable as reported by Woodring and Storvick (1970).

[d]Neither race nor age had a significant effect on pyridoxine status as performed by analysis of variance.

Table 27

Effect of Age on Percent Stimulation of Alanine Aminotransferase[a,b]

Age	n	0-14.9	15-20	>20
12	70	70	19	11
14	46	70	17	13
16	33	64	15	21

Note. Blood was not obtained from all subjects.

[a]Percentage of all girls of that age.

[b]Age did not have a significant effect on pyridoxine status as measured by the chi-square test of independence.

figures, while 76 percent of the black girls had acceptable levels of stimulation (Table 28).

Dietary Intake

The effect of age, race, and age/race interaction on the intake of 19 nutrients was measured by analysis of variance. The results of the statistical analysis are presented in Table 29. The nutrient intake of the girls, listed as a percentage of the 1980 RDA, is reported in Table 30. Central tendency was calculated by the mean and the median to demonstrate any skewing of the mean by either high or low intakes of the nutrients and calories. The twenty-fifth and

Table 28

Effect of Race on Percent Stimulation of Alanine Aminotransferase[a,b]

Race	n	0-14.9	15-20	>20
Whites	86	63	21	16
Blacks	63	76	13	11

Note. Blood was not obtained from all subjects.

[a]Percentage of each race.

[b]Race did not have a significant effect on pyridoxine status as measured by analysis of variance.

Table 29

The Effect of Age, Race, and Age/Race on Dietary Intake[a]

Nutrient	Race[b]	Age[b]	Age X Race[b]
Calories	.060	.901	.663
Protein	.010	.928	.861
Vitamin A	.975	.324	.578
Vitamin D	.001	.113	.759
Thiamin	.247	.733	.704
Riboflavin	.869	.300	.820
Niacin	.124	.313	.577
Pyridoxine	.610	.636	.289
Cobalamin	.159	.611	.473
Vitamin C	.050	.576	.837
Folic Acid	.350	.245	.889
Calcium	.001	.711	.530
Phosphorus	.001	.956	.567
Iron	.055	.123	.287
Magnesium	.001	.984	.212
Zinc	.003	.212	.218
Iodine	.446	.156	.056
Copper	.001	.198	.400
Fluorine	.002	.450	.774

[a]Based on analysis of variance.

[b]Numbers in columns represent p values.

Table 30

Nutrient Intakes of the Sample Population

As a Percentage of the 1980 RDA[a]

Nutrient	Absolute Amount	Mean	Absolute Amount	Median	Percentiles 25th	75th
Calories	2282	104	2210	100	81	122
Protein (g)	75	164	69	149	128	199
Vitamin A (re)	1675	209	1253	157	95	257
Vitamin D (iu)	301	75	226	57	35	97
Thiamin (mg)	4	364	1	127	100	182
Riboflavin (mg)	4	300	2	146	112	208
Niacin (mg)	20	131	16	109	82	149
Pyridoxine (mg)	3	178	1	72	52	97
Cobalamin (ug)	5	173	3	117	90	190
Vitamin C (mg)	157	314	86	172	74	310
Folic Acid (ug)	232	58	179	45	26	71
Calcium (mg)	999	83	891	74	55	105
Phosphorus (mg)	1373	114	1259	106	80	139
Iron (mg)	16	91	12	68	53	97
Magnesium (mg)	266	89	250	83	60	109
Zinc (mg)	13	87	10	70	53	99
Iodine (ug)	145	97	95	64	31	115
Copper (mg)	2	85	1	65	48	105
Fluorine (mg)	.5	33	3	.2	14	42

[a]Using the RDA for 11 to 14-year-old females.

seventy-fifth percentiles for each of the nutrients and calories were also calculated as another means of evaluating food intake.

The mean intake of nine nutrients (protein, vitamin A, thiamin, riboflavin, niacin, pyridoxine, cobalamin, ascorbic acid, phosphorus) and calories was in excess of the 1980 RDA. The median intake of eight nutrients (protein, vitamin A, thiamin, riboflavin, niacin, cobalamin, ascorbic acid, phosphorus) and calories was also greater than the 1980 RDA; for all nutrients and calories, the mean was greater than the median. Of the means less than the 1980 RDA, seven nutrients (vitamin D, calcium, iron, magnesium, zinc, iodine, copper) were greater than or equal to 75 percent of the RDA. The mean intake of folic acid was 58 percent of the RDA; the median intake was 45 percent of the RDA. The mean intake of fluorine was 33 percent of the 1980 RDA; the median intake was lower at 22 percent of the RDA. The overall quality of the girls' diets was poor, as reflected by the low mean and median intakes of nine nutrients (vitamin D, folic acid, calcium, iron, zinc, magnesium, iodine, copper, and fluorine).

Calories

The caloric intake of the study population was slightly above recommended levels (e.g., 2282 Kcal) as demonstrated by mean and median figures of 104 and 100 percent of the 1980 RDA, respectively. The mean intake of calories for all race and age groups varied between 99 and 117 percent of the 1980 RDA (Tables 31 and 32; and Figures 1 and 2). The percentage of girls who did not receive two-thirds of the RDA was 11 percent. The mean intake of calories

Table 31

Mean Nutrient Intakes of the Sample Population

As a Percentage of the 1980 RDA[a]

	Black (Ages)				White (Ages)				
Nutrients	12	14	16	All	12	14	16	All	Total
Calories	101	99	102	99	105	109	117	108	104
Protein	153	153	148	152	170	177	177	174	164
Vitamin A[b]	252	180	188	209	218	205	197	210	209
Vitamin D	58	64	46	58	95	94	66	90	75
Thiamin	136	282	118	191	682	409	173	500	364
Riboflavin	154	554	138	315	238	400	185	292	300
Niacin[c]	113	128	125	120	143	155	116	141	131
Pyridoxine	78	406	65	217	217	94	70	150	178
Cobalamin	183	150	100	153	180	213	187	193	173
Vitamin C	206	246	150	218	410	440	203	392	314

Table 31 (Continued)

Nutrients	Black (Ages) 12	14	16	All	White (Ages) 12	14	16	All	Total
Folic Acid	51	60	49	54	59	70	49	61	58
Calcium	92	66	68	70	94	96	90	94	83
Phosphorus	107	98	97	101	123	129	126	125	114
Iron	73	78	74	74	84	138	87	104	91
Magnesium	85	73	80	79	94	102	96	97	89
Zinc	60	69	65	68	83	114	131	103	87
Iodine	90	94	78	89	83	88	95	103	97
Copper[d]	69	66	70	68	92	94	140	99	85
Fluorine[e]	24	23	29	25	42	34	41	39	33

[a]Using the RDA for 11 to 14-year-old females.

[b]Using retinol equivalents.

[c]Calculated using preformed niacin only.

[d]Using 2 mg as the RDA; suggested range of intake is 2-3 mg.

[e]Using 1.5 mg as the RDA; suggested range of intake is 1.5 - 2.5 mg.

Table 32

Mean Nutrient Intakes as a Percentage of the 1980 RDA[a]

Nutrients	Total (n=195)	Ages 12 (n=83)	14 (n=76)	16 (n=36)
Calories	104	103	104	110
Protein	164	163	165	163
Vitamin A[b]	209	232	193	193
Vitamin D	75	80	79	56
Thiamin	364	464	345	145
Riboflavin	300	208	477	162
Niacin[c]	131	131	142	120
Pyridoxine	178	161	244	70
Cobalamin	173	180	183	143
Vitamin C	324	329	345	177
Folic Acid	58	56	65	49
Calcium	83	87	81	79
Phosphorus	114	116	114	111
Iron	91	79	109	81
Magnesium	89	90	88	88
Zinc	87	77	93	98
Iodine[d]	97	86	92	133
Copper[e]	85	83	80	100
Fluorine	33	35	29	35

[a]Using the RDA for 11- to 14-year-old females.

[b]Using retinol equivalents.

[c]Calculated using preformed niacin only.

[d]Using 2 mg as the RDA; suggested range of intake is 2-3 mg.

[e]Using 1.5 mg as the RDA; suggested range of intake is 1.5 - 2.5 mg.

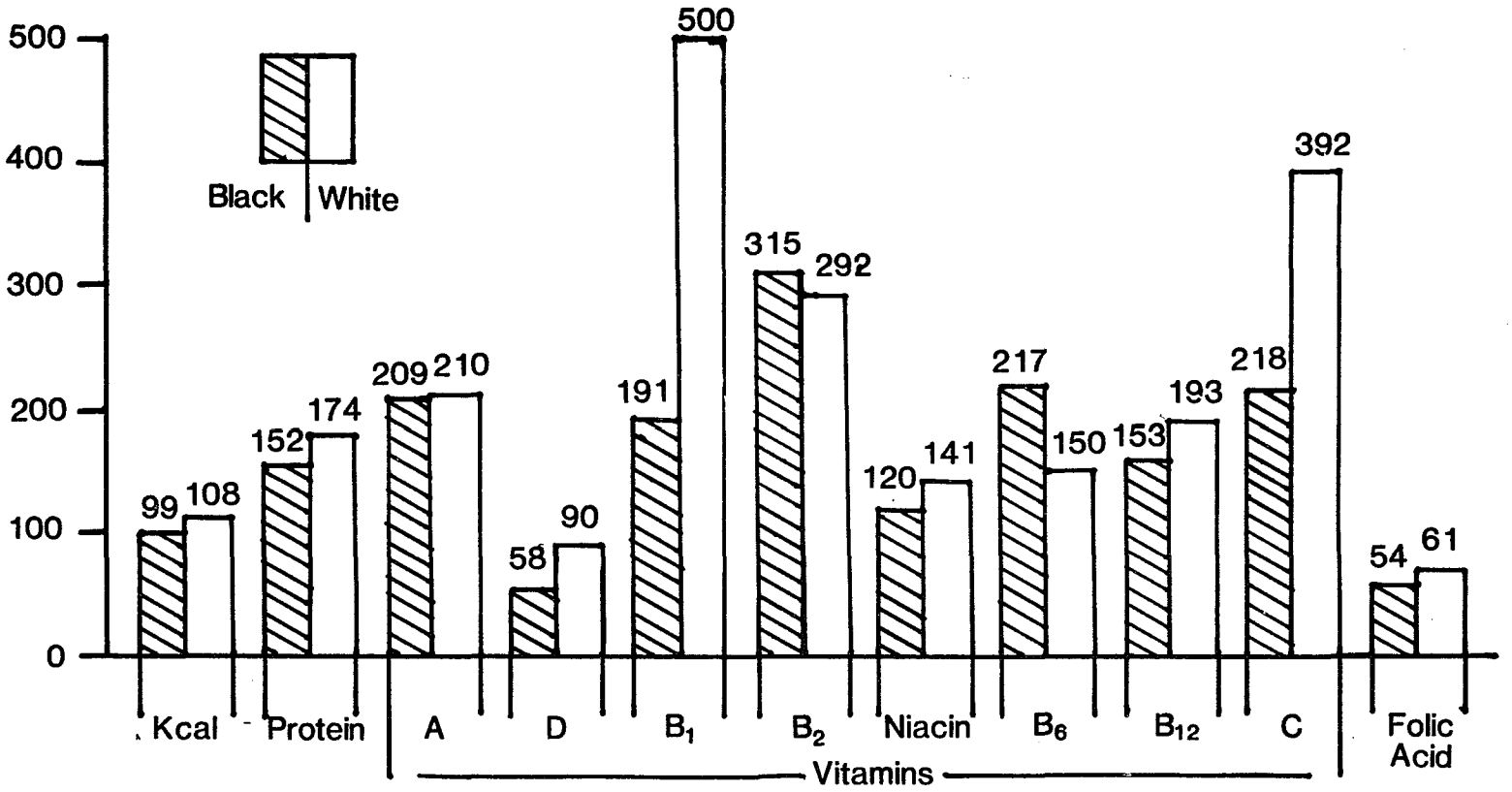

FIGURE 1

Mean energy, protein and vitamins intakes by race as a percentage of the 1980 RDA

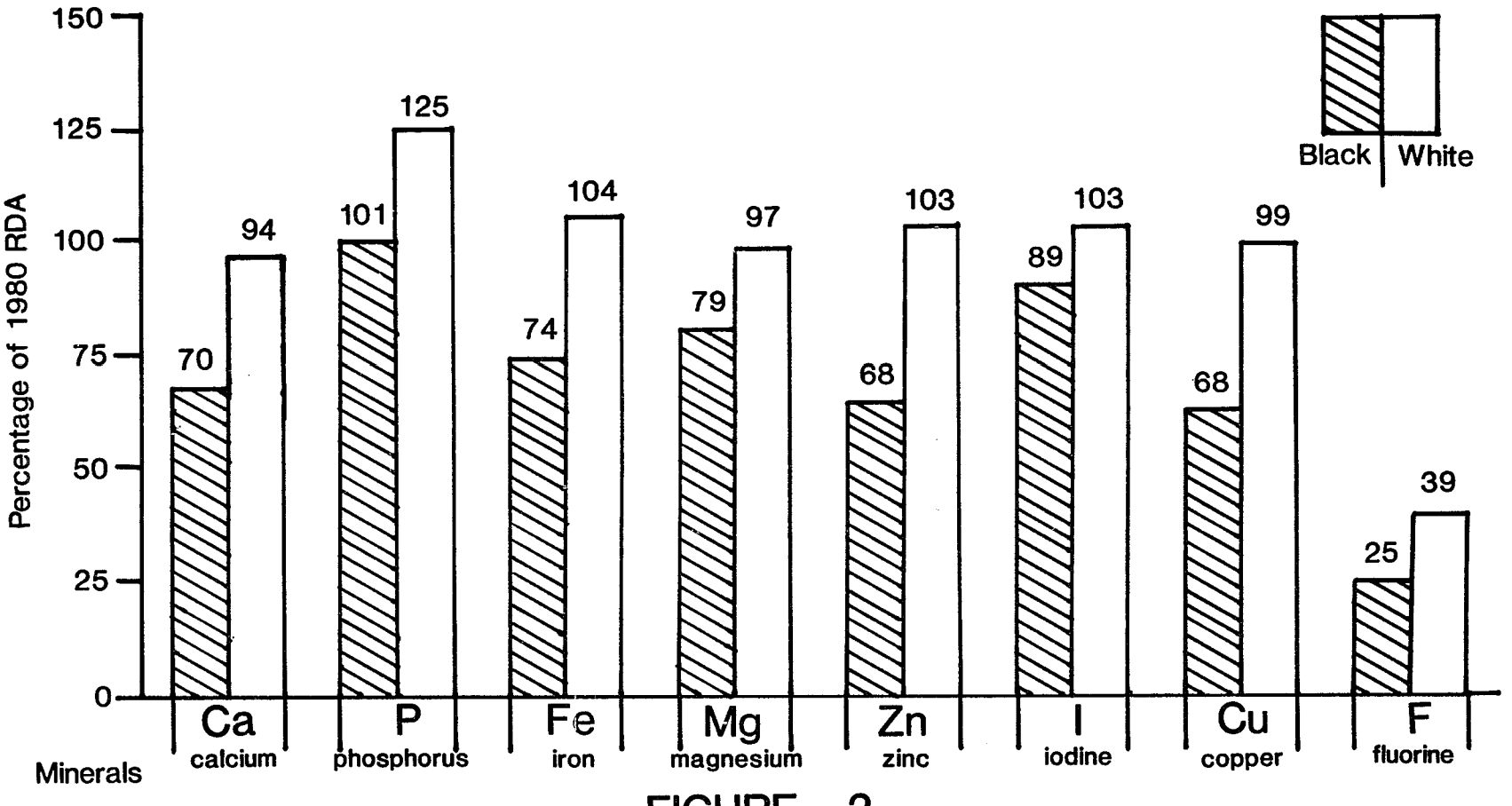

FIGURE 2

Mean Mineral Intakes by Race as a Percentage of 1980 RDA

increase with age (Table 32). The highest caloric mean intake (117 percent of the RDA) was observed among the 16-year-old white girls (Table 31). The highest percentage of caloric inadequacy was observed among the 14- and 16-year-old black girls (e.g., 16 to 17 percent did not meet two-thirds of the 1980 RDA) (Table 33). No significant relationship was observed between caloric intake and age or race (Table 29).

The mean intake of calories from the energy yielding substrates was similar to commonly reported figures (Krause & Mahan, 1979); carbohydrates provided the most calories, 49 percent; fat contributed 39 percent. Thirteen percent of the mean caloric intake was from protein (Table 33).

Protein

The mean dietary intake of protein by the sample population was 75 grams, which corresponds to mean and median intake of 164 and 149 percent of the 1980 RDA, respectively (Table 30). The mean intakes among the three ages of each race were relatively similar (Table 31). The mean intake of protein was greater than 148 percent of the 1980 RDA for all age-race groups. Only two percent of the sample, all of whom were 14- and 16-year-old black girls, did not receive two-thirds of the RDA (Table 34). Thus, protein was the best supplied nutrient.

The mean protein intakes of all three groups were similar for both races (Table 31). The mean intake among whites, however, was significantly greater ($p < .01$) than the mean intake among blacks (Table 31). None of the white girls consumed less than two-thirds of the RDA for protein.

Table 33

Caloric Distribution by Race and Age

	N	Kcal	Average Percentage of Calories		
			Protein	Fat	Carbohydrate
Total Population	198	2279	13.2	39.1	49.0
Whites	108	2358	13.6	39.3	48.9
Blacks	75	2142	12.7	39.5	48.7
Age 12	81	2260	13.5	39.0	49.2
Age 14	67	2300	13.0	39.0	48.3
Age 16	35	2234	13.1	39.1	48.7

Table 34

Percentage of Children with Nutrient Intakes Less Than Two-Thirds of the 1980 RDA[a]

	Black (Ages)				White (Ages)				
	12	14	16	All	12	14	16	All	Total
Nutrients	(n=33)	(n=37)	(n=18)	(n=88)	(n=50)	(n=39)	(n=18)	(n=107)	(n=195)
Calories	3	16	17	14	12	8	6	9	11
Protein	0	5	6	3	0	0	0	0	2
Vitamin A	0	24	6	11	2	13	17	8	10
Vitamin D	64	59	78	65	40	41	67	45	55
Thiamin	0	5	11	5	4	3	6	4	5
Riboflavin	9	3	11	3	0	3	6	2	3
Niacin	0	19	22	13	4	3	6	4	8
Pyridoxine	13	68	50	53	40	39	28	37	52
Cobalamin	0	11	33	11	2	13	11	8	9
Ascorbic Acid	12	22	39	22	20	15	11	17	20
Folic Acid	73	78	72	75	66	64	78	67	71
Calcium	36	62	61	52	26	33	22	28	40
Phosphorus	6	22	17	15	2	5	0	3	9
Iron	48	57	50	52	48	36	39	42	47
Magnesium	27	54	44	42	18	24	11	21	30
Zinc	52	57	61	56	40	31	33	36	46
Iodine	48	49	50	49	52	56	50	53	51
Copper	70	65	50	64	40	39	28	37	52
Fluorine	100	97	89	97	86	90	78	86	93

[a]1980 RDA for 11- to 14-year-old females.

Vitamin A

The mean and median intakes of vitamin A were in excess of 150 percent of the 1980 RDA. No previous study could be found which reported such elevated vitamin A intakes.

The highest mean intakes of vitamin A were observed among 12-year-old girls of both races. More than one-half of the sample population received greater than 150 percent of the 1980 RDA. Although it is not known what percentage of the sample received a nutrient supplement, it is possible that most of the girls whose vitamin A intake exceeded 300 percent of the RDA did take a supplement on one or both days that the diet was analyzed. No significant relationship, according to analysis of variance, was observed between age or race and vitamin A consumption.

Only ten percent of the sample did not receive two-thirds of the RDA for vitamin A. The highest percentage of girls whose diets were lacking in vitamin A were 14-year-old black girls and 16-year-old white girls.

Vitamin D

Age did not significantly affect the consumption of vitamin D. The intake of vitamin D was very low, as the mean and median were 75 and 57 percent of the RDA, respectively. Vitamin D was the third worst supplied nutrient, as 55 percent of the sample did not meet two-thirds of the RDA (Table 34). The percentage of blacks who did not receive sufficient vitamin D was significantly different ($p < .001$) from the percentage of white girls who did not meet two-thirds of the RDA (Table 31).

Thiamin

The intake of thiamin by the adolescents in this sample was generally in excess of the 1980 RDA. The mean and median intakes were 364 and 127 percent of the 1980 RDA, respectively, suggesting a very large intake of the vitamin by a small percentage of girls (Table 35). One girl received 62 mg, another 103 mg, and one 250 mg of thiamin. Only 25 percent of the sample received less than 100 percent of the RDA; most of these girls were 14 and 16 years old (Table 34). The mean intake of the 12-year-old girls (5.1 mg) was more than three times greater than the mean of the 16-year-olds (1.6 mg) (Table 32). The 12-year-old white girls' mean intake of 7.5 mg was, however, more than five times the 12-year-old black girls' mean intake (1.5 mg). The high mean intake of the 12-year-old white girls may be explained by the use of supplements. Neither age nor race was observed to significantly affect the intake of thiamin.

Despite an adequate median intake, five percent of the girls did not receive two-thirds of the 1980 RDA for thiamin. Most of the thiamin-poor diets were observed among the 16-year-old girls (Table 34).

Riboflavin

Riboflavin was the second best supplied nutrient for the girls in the sample; the mean intake was 4 mg. The mean and median intakes of 300 and 146 percent of the 1980 RDA, respectively, suggests again a very large intake of riboflavin by a small percentage of the sample.

Table 35

Percentage of Total Sample Population Receiving

Various Percentages of the 1980 RDA[a]

Nutrients	50	52-66	67-99	100-150	151-300	300
Calories	2	9	37	44	8	0
Protein	1	2	7	41	47	2
Vitamin A	6	5	17	20	34	18
Vitamin D	41	13	21	14	10	1
Thiamin	1	4	21	39	29	7
Riboflavin	2	1	14	37	38	9
Niacin	4	4	33	35	21	4
Pyridoxine	21	31	25	13	7	3
Cobalamin	5	5	24	34	22	11
Ascorbic Acid	9	11	11	13	30	26
Folic Acid	57	14	18	6	5	1
Calcium	19	21	31	23	6	0
Phosphorus	3	6	34	37	20	1
Iron	18	29	30	16	6	1
Magnesium	10	20	40	24	6	0
Zinc	20	25	31	17	6	2
Iodine	41	10	19	12	14	5
Copper	28	24	20	17	11	1
Fluorine	80	13	5	2	0	1

[a]Using the RDA for 11- to 14-year-old females.

Two girls consumed greater than 100 mg of riboflavin. Only 17 percent of the girls received less than 100 percent of the RDA. Of these 17 percent, only two percent consumed less than two-thirds of the RDA (Table 35). Table 35 was designed to show extreme dietary intakes, i.e., those intakes considerably less than 100 percent of the 1980 RDA, and those intakes more than three times the 1980 RDA.

No significant effect of age or race was noted on riboflavin intake. The intake of riboflavin appears to have declined with age in our sample, as the percentage of girls with low intakes occurred among the 16-year-olds of both races. All of the 12-year-old girls met 100 percent of the 1980 RDA for riboflavin. The very high mean intake (477 percent) of the 14-year-old girls (Table 32) suggests that this age group received supplements of riboflavin.

Niacin

Both mean and median intakes of preformed niacin by the girls were greater than recommended levels. The mean and median intakes were 131 and 109 percent of the 1980 RDA, respectively. Only eight percent of the sample did not receive two-thirds of the RDA. Hence, preformed niacin was among the best supplied nutrients for the sample population. In contrast, recent studies (Greger et al., 1978; Lee, 1978) reported low intakes of the vitamin. Since the girls also had more than adequate protein intakes, the actual niacin content of the diet was probably adequate.

No significant effect of age or race was noted on the intake of preformed niacin. The girls who did not meet two-thirds of the RDA

for niacin were predominantly 14-year-old blacks and 16-year-olds of both races (Table 34). The highest mean intake (142 percent of the RDA) was observed among the 14-year-old girls.

Pyridoxine

The mean intake of pyridoxine by the girls (3 mg) was 178 percent of the RDA; the median intake, however, was only 72 percent of the RDA. Pyridoxine was among the most poorly supplied of all the nutrients (Table 34). Fifty-two percent of the girls did not meet two-thirds of the RDA. Such low intakes are in agreement with a recent report on adolescents (Chrisley & Driskell, 1979) in which the mean intake of pyridoxine was only 69 percent of the RDA.

Neither race nor age significantly affected the intake of pyridoxine. The highest percentage of girls who did not meet two-thirds of the RDA for pyridoxine was 14- and 16-year-old blacks (68 and 50 percent, respectively), and 12- and 14-year-old whites (40 and 39 percent, respectively). The high mean intake (406 percent) of pyridoxine among the 14-year-old blacks (Table 30) may be affected by the fact that two girls received over 100 mg of pyridoxine.

Cobalamin

Both the mean and the median intake of cobalamin were in excess of the 1980 RDA. The disparity between the mean and the median is likely to be a reflection of the fact that four girls received greater than 30 ug of cobalamin (i.e., ten times the RDA). Nine percent of the sample failed to receive two-thirds of the RDA.

Ascorbic Acid

If either the mean or median intake were the sole standard of adequacy, the intake of ascorbic acid by the girls in the sample would be more than adequate. The mean intake was 314 percent of the 1980 RDA, while the median was 172 percent, demonstrating that the mean was skewed in the direction of high intakes. Nine percent of the girls received in excess of ten times the RDA. In contrast, 20 percent of the girls did not receive two-thirds of the RDA (Table 34).

The majority of the girls who did not meet two-thirds of the RDA were 14- and 16-year-old blacks (22 and 39 percent of those groups, respectively), and 12- and 14-year-old whites (20 and 25 percent of those age-race groups, respectively). The mean intakes of ascorbic acid were significantly affected by race ($p < .05$), but not by age (Table 29). The mean intake of vitamin C among the white girls (393 percent of the RDA) was almost twice the mean intake of the black girls (218 percent of the RDA).

Folic Acid

The consumption of folic acid by the girls in the sample was poor. Both measures of central tendency for folic acid were less than two-thirds of the RDA. Over 70 percent of the sample did not meet two-thirds of the 1980 RDA. Folic acid was ranked first among the vitamins most commonly lacking in the sample population.

No significant effect of race or age on folic acid was observed. The highest percentage of girls who did not meet the RDA were

14-year-old blacks and 16-year-old whites. The mean intake of folic acid was highest among the 14-year-old girls. Both of the girls who received 1000 or more mg of folic acid were 14 years of age.

Calcium

The mean and median intakes of calcium were 999 and 891 mg, respectively. Forty percent of the girls did not consume two-thirds of the 1980 RDA.

The majority of the girls who did not receive adequate amounts of calcium were black (Table 34). The mean nutrient intake of calcium among blacks was 70 percent of the RDA; for whites, the mean intake was 94 percent of the RDA. Fifty-two percent of the blacks and 28 percent of the whites did not meet two-thirds of the RDA for calcium. The effect of race was significant at the ($p < .001$) level; age did not significantly affect the intake of calcium among the subjects in the sample population.

Phosphorus

In contrast to the intake of calcium, both the mean and the median intake of phosphorus were above the 1980 RDA. The mean and median intakes were 1373 and 1259 mg, respectively. Phosphorus was one of the five best supplied nutrients in the sample, as only nine percent of the girls did not meet two-thirds of the RDA. Almost all the girls who did not receive two-thirds of the RDA were black. Hence, race significantly ($p < .001$) affected the consumption of phosphorus but the girls' ages did not.

Iron

The dietary intake of iron among the 195 girls was low, as both the mean (16 mg) and the median (12 mg) were less than 100 percent of the RDA. The difference between the mean intake of 91 percent and the median of 68 percent of the RDA was probably affected by the fact that two girls received ten times the RDA; both girls were 14 years of age. Despite the disparity in means due to age, neither age nor race significantly affected the intake of iron. Forty-seven percent of the sample did not meet two-thirds of the 1980 RDA for iron.

Magnesium

The mean intake (266 mg) and median intake (250 mg) of magnesium by the girls in the sample were below recommended levels. The majority of the girls who did not receive two-thirds of the RDA for magnesium were black (63 percent). The difference in magnesium intake by race was significant ($p < .001$). The mean intake of magnesium among blacks was also low (Table 30). No significant difference in magnesium consumption by age was observed.

Zinc

The mean dietary intake of zinc by the girls in the sample (13 mg) was low, as the mean intake (87 percent) and the median intake (70 percent) were both less than 100 percent of the 1980 RDA. The mean intake of zinc among black girls was 68 percent of the 1980 RDA, while for the white girls, the mean intake was 108 percent of the RDA; this difference was significant at the ($p < .01$) level. No

significant effect of age on zinc intake was observed. Forty-six percent of the sample did not receive two-thirds of the RDA for zinc.

Iodine

The intake of iodine by the sample was poor, as both the mean (145 ug) and median (95 ug) intakes of the trace mineral were below 100 percent of the 1980 RDA. Approximately 50 percent of the girls did not receive two-thirds of the RDA for iodine. The number of girls who did not meet two-thirds of the RDA for iodine was similar in both races and the three ages. Neither age nor race significantly affected the intake of iodine.

Copper

The intake of copper was also low, as the mean (2 mg) and the median (1 mg) were less than 100 percent of the 1980 RDA. For copper, however, the mean intake and the percentage of girls with low intakes (Tables 29 and 34) were significantly different ($p \leq .001$) between the two races. Sixty-four percent of black girls and 37 percent of white girls did not receive two-thirds of the RDA. No effect of age was observed on the dietary intake of copper.

Fluorine

Fluorine consumption by the sample was low. The mean and median intakes were less than 50 percent of the lower limit of the suggested range of intake in the 1980 RDA. Ninety-eight percent of the girls did not receive two-thirds of the lower limit recommended. Race

significantly affected the intake of fluorine ($p < .01$), but age did not. The black girls' mean intake (25 percent) was lower than the white girls' mean intake (39 percent); more black girls than white girls did not meet two-thirds of the suggested range of intake.

Hypotheses

The chi-square test of independence was used to measure the effect of age and race on the knowledge and attitudes of the subjects about health care and diet during pregnancy. Analysis of variance measured the effect of age, race, and age/race interaction on pyridoxine status and dietary intake. Correlation analysis was used to determine the relationship between knowledge of health care and diet during pregnancy, per capita income, age, race, and dietary adequacy.

Two directional hypotheses and the results were as follows:

1. The adequacy of dietary intake among female adolescents would be positively correlated with their knowledge of health care and nutrition during pregnancy. The hypothesis was rejected.
2. Knowledge of nutrition and health care during pregnancy would increase with increasing age and per capita income. The hypothesis was accepted.

Age significantly ($p < .01$) affected knowledge about frequency of prenatal care and dietary intake during pregnancy. Race had a significant effect ($p < .001$) on knowledge regarding frequency of prenatal visits, dietary intake during pregnancy, as well as exercise and the effect of maternal age on the outcome of pregnancy.

The overall adequacy of the diets was significantly affected by per capita income ($p < .01$) and race ($p < .001$). No significant relationship was found between dietary adequacy and knowledge of health care during pregnancy.

CHAPTER V

DISCUSSION

An investigation was made of the knowledge and attitudes of adolescent females involving health care and diet during pregnancy. The pyridoxine status and dietary intake of the adolescents were also examined. Statistical analyses were done to ascertain if age or race affected the knowledge and attitudes regarding health care during pregnancy, pyridixone status, and levels of dietary intake.

Knowledge of Health Care During Pregnancy

Poor dietary intake is known to affect the outcome of pregnancy, as well as the health of the mother (Committee on Maternal Nutrition, 1970; Gormican et al., 1980; Heald & Jacobson, 1980; Jacobson, 1977; Kaminetzky et al., 1973; Kaminetzky & Baker, 1977; Metcoff et al., 1981; Roeder & Chow, 1972). Knowledge about weight gain during pregnancy among the subjects was poor; only 15 percent of the girls identified the recommended range of 21 to 30 pounds (Table 3). Twenty-two to 30 pounds is the suggested range as it is associated with an improved course and outcome of pregnancy (Committee on Maternal Nutrition, 1970; Worthington-Roberts et al., 1981). About one-fourth of the subjects thought a gain of zero to ten pounds was recommended. Low birth weights are frequently attributed to insufficient maternal weight gain; low-birth-weight children have a

significantly greater rate of congenital abnormalities and perinatal mortality (Committee on Maternal Nutrition, 1970; Hurley, 1980; Worthington-Roberts et al., 1981).

The effect of smoking on birth weight is inversely proportional to the number of cigarettes smoked (Beal, 1980). The majority of the subjects were nonsmokers (78 percent). Among the 22 percent who said they smoked, 91 percent stated they would smoke less during pregnancy. Thus, almost all of the girls who smoked were aware of the potential problems of cigarette smoking.

The effect of caffeine during pregnancy has been investigated recently by several research groups (Workshop on Caffeine, 1979; Second International Workshop on Caffeine, 1980; Third International Workshop on Caffeine, 1981; Weathersbee, Olsen, & Lodge, 1977); it may be teratogenic. Weathersbee et al. (1977) reported that spontaneous abortions, stillbirths, and premature deliveries were more common among women who received more than 600 mg of caffeine daily than women who received less caffeine. The increase in spontaneous abortions and stillbirths may be because caffeine decreases both thirst and appetite (Second International Workshop on Caffeine, 1980). Over 90 percent of the girls responded that caffeine intake during pregnancy should be decreased. Thus, their belief that caffeine intake should be restricted was consistent with the recommendation of restricting caffeine because of its potential in the reduction of food and water intake (Second International Workshop on Caffeine, 1980).

Due to the potentially damaging effect of many medications on the fetus, medications are usually restricted during pregnancy. Eighty percent of the subjects noted that there are "drugs" which should be avoided during pregnancy. The word "medication" was changed to the simpler word drug so as to be understood by all. As mentioned earlier, the girls felt that drugs meant hard drugs such as marijuana and cocaine. Hence, it is not known whether the subjects were aware of the need to avoid medications during pregnancy without prior approval of the physician.

The consumption of alcoholic beverages during pregnancy has received considerable attention in the professional literature in the past few years. Most researchers agree it is wiser to avoid alcohol during pregnancy in order to reduce the possible risk of damage to the fetus (Beagle, 1981; Streissguth, Landesman-Dwyer, Martin, & Smith, 1980). All but one of the subjects felt that alcohol should be restricted during pregnancy.

Maternal age influences both infant mortality rates and infant birth weight (Beal, 1980). Mothers under 15 years of age experience toxemia more frequently than do older mothers (Claman & Bell, 1964; Marino & King, 1980; Osofsky et al., 1971; Truswell & Darton-Hill, 1981; USDHEW, 1978; Worthington-Roberts et al., 1981). Almost 60 percent of the subjects answered that age does affect the outcome of pregnancy (Table 24). Among those who felt that maternal age was important, most stated reasons based on maturity such as ability to properly care for a child. Although the subjects felt that maturity was important in caring for children, less than five percent of the

subjects did not feel that pregnancy among very young and very old women was a risk to the health of both mother and child.

Children born to women in their twenties consistently have the best birth weights (Beal, 1980); hence, the years of 20 to 29 are considered ideal for childbearing. Seventy-six percent of the girls felt that there was an ideal age for pregnancy. Thus, the majority of the subjects felt that there is an ideal time in the life span of a woman when the outcome of pregnancy is best.

Knowledge and Use of Contraception

Due to the increase in sexual activity among American adolescents since 1960, the knowledge and attitudes of adolescents regarding contraception have been examined by numerous research groups (Eleven Million Teenagers, 1976; Gordon, Scales, & Everly, 1979; McGanity et al., 1969; Ryan & Sweeney, 1980; Teenage Pregnancy, 1981; Zelnick & Kantner, 1977). Actual knowledge about contraception among teenagers is considered by most authors to be poor (Eleven Million Teenagers, 1976; Gordon et al., 1979; McGanity et al., 1969; Teenage Pregnancy, 1981). More than 65 percent of the subjects stated they did not know if birth control were available to them locally without a hassle (Table 9). Gordon et al. (1979) and the Guttmacher Institute (1976, 1981) also observed that adolescents frequently are ignorant about how and where to obtain birth control.

Ryan and Sweeney (1980) measured the knowledge and attitudes of gravid black adolescents in Memphis. These researchers reported several unusual findings:

1. Ninety-four percent of the subjects were knowledgeable about birth control; i.e., they could explain how to use two birth control methods.
2. Seventy-six percent of the girls received formal instruction about contraception.
3. Sixty-three percent of the subjects intentionally did not use contraception.

Their findings are unusual because of the knowledge of birth control and the amount of formalized instruction on contraception reported by the majority of the girls. A nationwide study (Zelnick & Kantner, 1977) reported, in contrast, that close to one-third of the 15- to 17-year-old girls had received a course in sex education which included contraception.

Sixty-one percent of the subjects in this study admitted they knew little or nothing about contraception. Only 39 percent felt they had adequate information about birth control. These results are in contrast to Ryan and Sweeney who reported that over three-fourths of their subjects had received formal instruction on birth control. Yet, the results are in agreement with a recent publication of the Guttmacher Institute (Teenage Pregnancy, 1981) in which many of the adolescent females were ignorant about contraception.

The sample population had little knowledge about specific methods of birth control (Tables 12, 13, 14). Forty-three percent of the subjects could not list one method of contraception; 61 percent did not know the effectiveness of one method of birth control. The lack of knowledge observed is in agreement with McGanity et al. (1969), but

is different from the more recent work of Ryan and Sweeney (1980). It is possible that the difference in results may be due to the ages and races of the subjects. The samples from both McGanity et al. (1969) and Ryan and Sweeney (1980) were over 70 percent black and predominantly between 15 and 17 years of age. The sample population, in contrast, was 55 percent white and principally less than 15 years of age (81 percent).

The two correct most frequently listed methods of contraception by the subjects were oral contraceptives and the condom; oral contraceptives were listed by more girls (15 percent) than any other method (Table 14). The frequent listing of the pill is in contrast to the study by Zelnick and Kantner (1980) who reported that the pill was no longer a popular method among adolescents. A recent publication (Teenage Pregnancy, 1981) suggests that teenagers are aware of the hazards associated with the pill, and subsequently are not using it as frequently as they once did. Although it is possible that the subjects knew about the effectiveness of the pill, they may prefer using other methods of contraception.

The increasing number of teenage pregnancies (Zelnick & Kantner, 1980) is a great concern to health professionals and parents of adolescents. Why do teenagers not practice birth control? Several researchers (Chilman, 1980; Eleven Million Teenagers, 1976; Finkel & Finkel, 1975; Goldsmith, Gabrielson, Matthews, & Potts, 1971; Teenage Pregnancy, 1981; Zelnick & Kantner, 1980) have endeavored to discern why. Goldsmith et al. (1971) reported that most of the

subjects felt they could not get pregnant, or that birth control was difficult to obtain. Shah et al. (1979) also noted that the majority of their subjects believed they could not get pregnant.

The major reasons for not using contraception by the subjects (e.g., believe they cannot get pregnant) are similar to those reported by Goldsmith et al. (1971) and Shah et al. (1979). Approximately 75 percent of the sample subjects apparently did not think about getting pregnant; the majority felt they could not get pregnant. The third major reason for not using birth control as listed by the subjects was fear of parental knowledge of their sexual activity. The Guttmacher Institute (Eleven Million Teenagers, 1976) also reported that many girls delay visiting a clinic to obtain contraception because of fear that their families would be informed of their visit.

Two-thirds of the subjects stated that many teenagers feel they do not engage in sexual relations often enough to use a birth control method. Frequency of sexual activity, i.e., occasional sexual episodes, has been noted by several authors (Shah et al., 1979; Teenage Pregnancy, 1981; Zelnick & Kantner, 1977) as a reason for not using birth control. Sixty-two percent of the sample stated that adolescents do not know enough about contraception or where to obtain information about contraception. Twenty-six percent of the sample responded that many adolescents do not know where to obtain contraceptive devices. Shah et al. (1979) noted that one-third of their sample thought birth control was unavailable to them. A study performed on male adolescents reported that over 50 percent of the sample stated that birth control was difficult for teenagers to obtain (Finkel & Finkel, 1975).

Many reasons for intentional nonuse of birth control have been discussed in the literature. Adolescents have commonly reported that their partner disliked using birth control (Eleven Million Teenagers, 1976) because of moral or medical reasons (Teenage Pregnancy, 1981; Goldsmith et al., 1971), or because they felt contraception is not natural (Goldsmith et al., 1971). The partner's dislike of contraception was noted more often by 12-year-olds than by any other age group.

The major source of contraceptive knowledge among the sample population was school or class (Table 17). Sixty-one percent of the sample wrote that they had received formal instruction regarding contraception. Ryan and Sweeney (1980) also reported that 76 percent of their sample had contraceptive instruction at school. The second major source of knowledge about contraception was parents (54 percent). Finkel and Finkel (1975) reported that the father was the fourth major source of birth control information. The difference in gender of parent may be attributed to the gender of the sample, regionality, or changes in methods of sex education. Parents were also named by the subjects frequently when two sources of birth control information were listed.

Attitudes Regarding Health Care During Pregnancy

Awareness of the timing and frequency of prenatal care among the subjects was good. Greater than three-fourths of the subjects expressed interest in receiving medical care early in pregnancy (Table 19). McGanity et al. (1969) reported that their subjects recognized the need for prenatal care; however, according to the national report of

the U.S. Department of Health, Education, and Welfare (1978), teenagers do not seek medical care early in pregnancy.

Only three percent of the girls said they would receive prenatal care according to the doctor's recommendation (Table 20). Sixty-two percent of the subjects stated they would visit a doctor once or twice a month. McGanity et al. (1969) observed that although their subjects acknowledged the importance of medical care, 41 percent of the subjects in their study received medical care less than or equal to three times before delivery.

Almost 80 percent of the girls responded that they would be willing to learn about the effect of diet on their health and the health of the baby (Table 22). Although no study was found which reported an interest by adolescents in maternal nutrition, the interest demonstrated by the girls in this study suggests that a course in maternal nutrition should be available to adolescents, perhaps in the junior and senior high school curriculum.

Although the Committee on Maternal Nutrition of the National Research Council (1970) has not recommended any specific level of exercise during pregnancy, regular physical activity is considered beneficial in the prevention of constipation during pregnancy (Krause & Mahan, 1979). Fifty-two percent of the girls stated that a pregnant woman should exercise more than a nonpregnant woman (Table 21). Forty-eight percent felt that a pregnant woman should either decrease or not change the level of exercise.

Due to the increased recommended dietary allowances for pregnancy, pregnant women are expected to eat more (Krause & Mahan, 1979).

Only one-half of the girls answered correctly that pregnant women are expected to eat more during pregnancy. Thus, their awareness of the increased nutrient needs during pregnancy was poor.

In addition, the intake of vitamin D, folic acid, and the trace minerals by the sample was low. Therefore, the combined ignorance about increased nutrient needs and the poor quality of the diets suggests a possible relationship between miscarriages, infant mortality, and diet. Since many girls are not aware of their pregnancy in the first trimester when the growing embryo is most sensitive to nutrient deficiencies, the lack of knowledge about nutrient needs during pregnancy and the poor quality of the girls' diets are of concern.

Pyridoxine Assessment

The percent stimulation of alanine aminotransferase was performed by the method of Tonhazy et al. (1950) as modified by Heddle et al. (1963). The assessment of pyridoxine nutriture in the laboratory is difficult, as no method has been developed which consistently provides reproducible results (Chrisley & Driskell, 1979; Sauberlich, Skala, & Dowdy, 1974). The measurement of alanine aminotransferase, or glutamic pyruvate transaminase as it was formerly called, is based on the fact that this enzyme contains pyridoxal phosphate (Sauberlich et al., 1974). Red blood cell transaminase activities are thought by some to be a sensitive index of long-term pyridoxine status (Cinnamon & Beaton, 1970). The measurement of the activity of the enzyme, however, is considered by several authors to be less than

desirable because of the wide normal range (0-27 percent) seen in healthy individuals (Babcock, Brush, & Sostman, 1960; Sauberlich et al., 1972, 1974).

The pyridoxine status of the sample was fair to good, depending on the criteria used for adequacy (Tables 26, 27, 28). Woodring and Storvick (1970) reported that healthy individuals (women) had percent stimulations of zero to 15. According to the standard of Woodring and Storvick, between 64 and 70 percent of the sample had normal levels of stimulation. Thus, between 30 and 36 percent of the girls were observed to have lower than normal pyridoxine status. Sauberlich et al. (1972, 1974) reported that healthy individuals had percent stimulations of less than 25. When an average of the Sauberlich et al., and the Woodring and Storvich data was made, i.e., 20 percent stimulation as a standard, between 11 and 21 percent of the subjects were deficient.

Few studies (Baker et al., 1967; Chrisley & Driskell, 1979; Schuster et al., 1981) have been performed on the pyridoxine status of adolescents. Schuster et al. (1981), in Florida, recently reported a mean percent stimulation of alanine aminotransferase of 37 percent. Sixty-eight percent of the gravid sample was deficient according to either of the criteria mentioned above. An earlier study of New York City school children reported low serum pyridoxine levels in children 10 to 13 years of age (Baker et al., 1967). Chrisley and Driskell, however, noted no deficiencies among 29 young women 19 to 22 years of age.

Schuster et al. (1981) and Baker et al. (1967) both noted low or unacceptable pyridoxine levels among adolescents. The results are in agreement with their findings, but are in contrast to the data of Chrisley and Driskell (1979). It is possible that the more elevated stimulations reported in Florida were reflected by the nature of the sample, i.e., pregnant. The increase in deficiencies with age may be the result of poorer eating habits among high school students. The reasons for the increase in deficiencies as measured by percent stimulation among whites are unknown. It is possible that black girls balanced their protein intake with their pyridoxine intake better than the white girls; there were, however, more blacks (53 percent) low in pyridoxine than whites (37 percent). Several authors have noted high levels of protein consumption (Chopra et al., 1978; Chrisley & Driskell, 1979) with a concomitant lack or imbalance of pyridoxine (Chrisley & Driskell, 1979; Pao & Mickle, 1981).

Dietary Intake

The overall adequacy of the subjects' diets was poor (Tables 30 through 35). The mean and median intakes of vitamin D, folic acid, calcium, iron, magnesium, zinc, iodine, copper, and fluorine were less than the 1980 RDA. More than 25 percent of the subjects did not receive two-thirds of the RDA for vitamin A, pyridoxine, folic acid, calcium, iron, zinc, iodine, copper, and fluorine. The four best supplied nutrients among the sample population were protein, riboflavin, thiamin, and niacin, in that order.

The mean and median intakes of calories were equal to or slightly greater than the 1980 RDA (Table 30). Eleven percent of the subjects did not receive two-thirds of the RDA for calories. This is in contrast to the recent reports from Alabama (Prothro et al., 1976) and Kentucky (Lee, 1978) which stated that up to 52 percent of the sample did not meet two-thirds of the RDA, but is similar to an earlier study (Hampton et al., 1967) which reported that 11 percent of their sample did not receive two-thirds of the RDA for calories. The mean and median intakes were similar to those mentioned by Hodges and Krehl (1965).

The mean and median intakes of protein by the subjects were greater than the 1980 RDA. Protein was the best supplied of all the nutrients analyzed, as only two percent of the girls did not receive two-thirds of the RDA (Table 34). Hodges and Krehl (1965) and Chopra et al. (1978) reported that protein intake among adolescents was more than adequate.

Both measures of central tendency for vitamin A were in excess of 150 percent of the RDA. Eighteen percent of the sample (Table 35) received in excess of 300 percent of the RDA. It is likely that most, if not all, of these girls either received a supplement or consumed one or more fortified products. No study was found in the literature which reported such high intakes of vitamin A.

Ten percent of the subjects did not meet two-thirds of the 1980 RDA for vitamin A. Hampton et al. (1967) reported that 16 percent of the students in their study did not receive two-thirds of the RDA. The results are, however, in direct contrast to the more recent

research of Prothro et al. (1976) and Schorr et al. (1972) in which 51 and 67 percent of the girls, respectively, did not receive two-thirds of the RDA.

The mean and median intakes of vitamin D were less than or equal to 75 percent of the 1980 RDA. Over 50 percent of the sample did not meet two-thirds of the RDA for vitamin D; it was the third worst supplied nutrient. No study was found in the literature which examined the vitamin D intake of adolescents.

The intake of thiamin by the subjects was good, as judged by measures of central tendency and the five percent of the girls who did not receive two-thirds of the RDA (Tables 30 and 34). The mean intake of 364 percent of the RDA reflected to some extent the fact that three girls received thiamin supplements; one girl received over 200 times the 1980 RDA. No study was found in the literature which reported such excessive intakes of thiamin.

Only five percent of the subjects did not meet the RDA for thiamin. Hampton et al. (1967) reported that six percent of the girls in their study did not receive two-thirds of the RDA. In direct contrast, Lee (1978) reported that 50 percent of his sample did not meet two-thirds of the RDA.

Both the mean and median intakes of riboflavin were greater than 140 percent of the 1980 RDA. Like thiamin and vitamin A, a small percentage of the sample consumed large amounts of riboflavin; no study was found which reported such high intakes of riboflavin. In contrast, only two percent of the girls did not meet two-thirds of the RDA. Riboflavin was the second best supplied nutrient.

As only three percent of the subjects' diets were low in riboflavin, these observations are more favorable than the most recent studies by Lee (1978), Lopez et al. (1980), and Prothro et al. (1976) who reported 24 to 27 percent of their samples received less than two-thirds of the RDA. The results are in agreement with all three dietary studies performed on adolescents in the 1960's (Dibble et al., 1965; Hodges & Krehl, 1965; Morse et al., 1965) in which riboflavin intake was excellent.

The intake of preformed niacin was good, as judged by mean and median intakes greater than the 1980 RDA (Table 30). Eight percent of the girls did not meet two-thirds of the RDA for niacin; hence, preformed niacin was relatively well supplied. The high intake of niacin is in contrast to the studies of Greger et al. (1978), Lee (1978), and Prothro et al. (1976), in which 30 to 49 percent of the girls did not meet two-thirds of the RDA for niacin.

Pyridoxine was one of the worst supplied nutrients by the sample population; the median intake was only 72 percent of the 1980 RDA. The low intake of pyridoxine is similar to a recent study by Chrisley and Driskell (1979) in which the mean intake was 79 percent of the RDA. Fifty-two percent of the subjects did not receive two-thirds of the RDA. Pao and Mickle (1981) reported an almost identical figure of 51 percent of the entire sample which did not meet 70 percent of the RDA. For the adolescents in the same study, 47 percent of the 12- and 14-year-olds and two-thirds of the 15- to 18-year-olds did not receive 67 percent of the RDA.

The intake of cobalamin among the sample population was good, as both the mean and the median intakes were in excess of the RDA. Nine percent of the girls did not meet two-thirds of the RDA. In contrast, Prothro et al. (1976) reported that 63 percent of their sample of 17 students did not meet two-thirds of the RDA.

Both the mean and the median intakes of ascorbic acid were in excess of 150 percent of the 1980 RDA. The mean intake of 314 percent of the RDA was greater than the median due to the nine percent of the girls who received in excess of ten times the RDA. Despite such an elevated mean intake, 20 percent of the girls did not meet two-thirds of the RDA for vitamin C. Several recent studies (Greger et al., 1978; Prothro et al., 1976; Schorr et al., 1972) also reported 22 to 26 percent of the sample did not consume two-thirds of the RDA.

The intake of folic acid by the subjects was poor, as the median was less than 50 percent of the RDA; over 70 percent of the girls did not consume two-thirds of the RDA. Although no study was found which examined the folate intake of nongravid adolescents, folic acid was more lacking than any other nutrient among pregnant adolescents (Baker et al., 1975; Kaminetzky & Baker, 1977).

The two measures of central tendency for the intake of calcium were less than the 1980 RDA. Forty percent of the subjects did not meet two-thirds of the RDA for calcium. The dietary lack of calcium among adolescents has been reported by several research groups (Greger et al., 1978; Hampton et al., 1967; Lopez et al., 1980; Pao & Mickle, 1981). Hampton et al. (1967) reported that 49 percent of their sample did not meet two-thirds of the RDA. Greger et al. (1978)

reported that more than 50 percent of the sample received over two-thirds of the RDA for calcium.

Phosphorus was plentiful in the diets of the sample population. The mean and median intakes were greater than the RDA (Table 30); nine percent of the girls did not consume two-thirds of the recommended allowance. Pao and Mickle (1981) observed similar results. Eight percent of their sample did not receive 70 percent of the RDA; the mean intake of phosphorus by their adolescent females was also close to 100 percent of the RDA.

High phosphorus, low calcium diets impair the absorption of calcium. In addition, high protein intakes are known to increase loss of calcium from bone. The majority of girls in the sample consumed levels of protein and phosphorus greater than 100 percent of the RDA; the calcium level, however, was less than two-thirds of the RDA for 40 percent of the sample. The imbalance observed in the levels of dietary protein, phosphorus, and calcium among the sample population is of concern, for if the imbalance were to continue for an extended period of time, the bone health of the subjects would deteriorate.

The intake of iron by the subjects was low (Table 30), as the median was slightly over two-thirds of the RDA. The lack of iron observed is in agreement with several authors (Greger et al., 1978; Hampton et al., 1967; Lee et al., 1978; Prothro et al., 1976; Schorr et al., 1972), but is higher than any of the studies reported in the literature. Greger et al. (1978) reported that 55 percent did not meet two-thirds of the RDA, while Schorr et al. (1972) observed that

75 percent of the sample did not receive two-thirds of the RDA for iron. The percentage of black girls who did not meet two-thirds of the RDA was greater than the percentage of white girls. Lee (1978) also reported inadequate dietary intakes of iron among black teenagers.

Magnesium was not readily available in the diets of the subjects, since both measures of central tendency were less than the 1980 RDA. Pao and Mickle (1981) reported in their discussion of the 1978 Nationwide Food Consumption Survey, that mean intakes of magnesium for the entire sample and adolescent females were below the RDA. In the same study, 39 percent of the entire sample did not meet 70 percent of the RDA; 20 percent of the girls in the sample population did not meet two-thirds of the RDA.

The intake of zinc by the subjects was low, as the mean and median were both below recommended levels. Forty-six percent of the sample did not receive two-thirds of the 1980 RDA. The dietary lack of zinc is similar to the work of Greger et al. (1978) who reported that over 35 percent of their sample did not meet two-thirds of the RDA. The majority of the girls (55 percent) whose diets were low in zinc were black.

The intake of iodine, copper, and fluorine was very low. The median intakes of iodine, copper, and fluorine were less than two-thirds of the 1980 RDA. The median intake of fluorine was less than one-fourth of the 1980 RDA. The significance of these low intakes is not clear, as no study could be found which reported the intake of

these trace minerals by adolescents. For all these nutrients, future studies are needed to ascertain if these inadequate intakes are common. The intake of iodine and fluorine requires examination to investigate if the dietary intake is valid, i.e., if it includes the iodine intake from condiments and the fluorine received from water. The actual amount of iodine and fluorine received due to the use of iodized salt and water, respectively, could be greater than or equal to the 1980 RDA.

The intake of micronutrients by the subjects was very low, and further investigation is needed to determine why it occurred. The low intake may have been the result of a poor diet, or it may have resulted from a lack of knowledge about the micronutrient content of our vastly growing and changing food supply.

The overall adequacy of the diets among the sample was far from adequate. No subject met the 1980 RDA for all 19 nutrients measured. The criteria were as follows: (1) excellent described a diet which met or exceeded 100 percent of the RDA for all nutrients, (2) good referred to a diet which met at least two-thirds of the RDA for all nutrients, (3) fair denoted a diet in which only one nutrient did not meet two-thirds of the RDA, and (4) poor described a diet in which more than one nutrient did not meet two-thirds of the RDA. On the basis of these criteria, not one girl had an excellent diet. Two subjects met 67 percent of the RDA for all 19 nutrients. Thus, the diets of only two girls were classified as good. Eighty-nine percent of the sample did not meet two-thirds of the RDA for two or more nutrients. The majority of the girls had poor diets.

It must be acknowledged that the negative relationship between race and dietary adequacy, i.e., the poor quality of the black girls' diets, may have been the result of the markedly lower median per capita income of the black girls in all three age groups compared to their white counterparts. Thus, in all cases where the intake of a nutrient was significantly affected by race, the variable affecting dietary intake may have been income.

CHAPTER VI

SUMMARY AND RECOMMENDATIONS

Summary

The major objectives of this study were to measure the knowledge and attitudes of nongravid female adolescents about health care and nutrition during pregnancy, and to examine both their pyridoxine status and their dietary intake. The knowledge and use of contraception by the subjects were also examined.

The study population was drawn from Guilford County, North Carolina. Fifty-five percent of the girls were white, 45 percent were black. Forty-two percent of the subjects were 12 years of age, 39 percent were 14 years of age, and 19 percent were 16 years of age.

A questionnaire was developed to measure the girls' knowledge and attitudes regarding diet and health care during pregnancy, as well as to examine their use and knowledge of birth control. Seven questions addressed knowledge about the use of alcohol, caffeine, and drugs during pregnancy, and the effect of maternal age on the outcome of pregnancy. Six questions examined actual knowledge of contraception and the reasons for both use and nonuse of birth control by teenagers. Six questions addressed attitudes of adolescents regarding health care and nutrition during pregnancy, such as timing and frequency of prenatal care and the amount of food to be consumed during pregnancy.

Dietary intake data were obtained by two 24-hour recalls. Trained interviewers from the Department of Foods, Nutrition and Food Service Management interviewed the subject for the dietary intake data, and the parent or guardian for the socioenvironmental data. Pyridoxine status was assessed by the measurement of percent stimulation of alanine aminotransferase.

The chi-square test of independence was used to measure the effect of age and race on the knowledge and attitudes of the subjects about health care and diet during pregnancy. Analysis of variance measured the effect of age, race, and age/race interaction on both pyridoxine status and dietary intake. Correlation analysis was used to determine the relationship between knowledge of health care and diet during pregnancy, per capita income, age, race, and dietary adequacy.

Two directional hypotheses were tested. The hypotheses and the results were as follows:

1. The adequacy of dietary intake among female adolescents would be positively correlated with their knowledge of health care and nutrition during pregnancy. The hypothesis was rejected.
2. Knowledge of nutrition and health care during pregnancy would increase with increasing age and per capita income. The hypothesis was accepted.

Greater than 75 percent of the sample said they would seek prenatal care early in pregnancy. Only 15 percent of the subjects knew the recommended weight gain for pregnancy. Over one-half of the

girls stated that pregnant women should eat more during pregnancy. Eighty percent of the subjects were nonsmokers; almost all of the smokers said they would smoke less if they were pregnant. Over 80 percent responded that pregnant women should restrict use of caffeine, medications, and alochol during pregnancy.

Age significantly ($p < .01$) affected knowledge about frequency of prenatal care and dietary intake during pregnancy. Race had a significant effect ($p < .001$) on knowledge regarding frequency of prenatal visits, dietary intake during pregnancy, as well as exercise and the effect of maternal age on the outcome of pregnancy.

Sixty percent of the sample could not list one method of contraception correctly, i.e., its actual effectiveness. Knowledge of birth control methods was significantly affected by the age of the subjects ($p < .001$). The 16-year-old girls knew more than the 12- and 14-year-olds. Use of birth control and sources of birth control were significantly affected by both age ($p < .05$) and race ($p < .05$).

The pyridoxine status of the girls was fair. Ten percent of the sample had a stimulation of alanine aminotransferase greater than 20 percent. Pyridoxine status was better among blacks than whites, and better among the 12-year-olds than any other age group.

The mean and median intakes of nine nutrients by the total sample were greater than or equal to the 1980 RDA. The nine nutrients were calories, protein, phosphorus, vitamin A, thiamin, riboflavin, niacin, cobalamin, and vitamin C. Protein, riboflavin, thiamin, and niacin were the best supplied nutrients.

Fluorine, folic acid, vitamin D, pyridoxine, copper, and iodine were lacking in the diets of over 50 percent of the subjects. The overall adequacy of the diets was significantly affected by per capita income ($p < .01$) and race ($p < .001$). No significant relationship was found between dietary adequacy and knowledge of health care during pregnancy.

Recommendations

Since the dietary intakes by the sample population were predominantly poor in quality, and since the majority of the subjects' knowledge of proper diet and weight gain during pregnancy was poor, it is recommended that maternal nutrition classes be taught to all junior and senior high students. As the majority of subjects knew little about contraception, it is suggested that all adolescents be instructed about how and where to obtain birth control, as well as the names and effectiveness of all the major methods. Such education is recommended to prevent children who are neither physiologically nor emotionally mature from bearing children until they are ready to do so.

Recommendations for Future Research

As a result of the answers by the subjects regarding nutrition and health care during pregnancy, their pyridoxine status, and dietary intakes, the following recommendations are suggested for future study:

1. Future research should focus on improvement of currently available techniques for the assessment of pyridoxine and several other nutrients. New techniques should be simple to perform and reliable.
2. Future research involving adolescent knowledge of nutrition and health care during pregnancy should be designed to provide a better indication of actual knowledge rather than categorical responses.
3. The very low intake of micronutrients by the sample requires further investigation to determine if this low intake is common, and if so, if there is clinical evidence of deficiency. If deficiencies do exist, then strategies need to be developed and implemented which would increase the availability of these nutrients in the food supply.
4. The imbalance in the level of calcium, vitamin D, fluorine, phosphorus, and protein is of concern. Future research should examine if this imbalance is common, why, and how to prevent it. Longitudinal studies on diet and bone density would show the effect of such a diet on bone status, and subsequent risk of developing osteoporosis.

REFERENCE NOTES

[1]The Nutritional Health of Adolescent Females was supported by the Cooperative State Research Service of the United States Department of Agriculture. North Carolina was one of eight participating states.

[2]The analysis of percent stimulation was performed by Ms. Shih Min Wu, Research Technician, North Carolina Agricultural Research Service, School of Home Economics, University of North Carolina at Greensboro.

[3]The Nutritional Analysis System is a computer data system of the Department of Experimental Statistics of Louisiana State University, Baton Rouge, Louisiana.

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APPENDIX A

COMPENDIUM OF STUDIES ON THE NUTRITIONAL STATUS OF FEMALE ADOLESCENTS

Compendium of Studies on the Nutritional

Status of Female Adolescents

Authors	Subjects	Significant Nutritional Findings
Dibble et al., 1965	404 junior high students (New York)	1. Ten percent of the girls were low in thiamin. 2. All students had excellent riboflavin status. 3. Fifteen percent had poor serum vitamin C levels.
Edwards et al., 1964	620 students from grades 7, 9, 10, and 12 (North Carolina)	1. Consumption of vegetable group poor. 2. Dairy foods omitted by 14 percent of students. 3. Fruits were not commonly consumed.
Greger et al., 1978	367 girls from grades 6-8 (Indiana)	1. Vitamin A lacking, less than two-thirds of the RDA in 35 percent of the girls in fall, 50 percent in spring.
Hampton, et al., 1967	127-184 teenagers (California)	1. For girls, calcium and iron were most lacking. 2. Fifteen percent did not meet the RDA for vitamin A.
Hinton et al., 1963	140 girls, 12-14 years of age (Iowa)	1. Best diets found in stable, adjusted girls from highest income families.
Hodges and Krehl, 1965	2045 students, grades 9-12 (Iowa)	1. Protein and riboflavin intake more than adequate. 2. Breakfast omitted frequently. 3. Twelve girls had hemoglobin levels less than 12 g/dl.

Authors	Subjects	Significant Nutritional Findings
Huenemann et al., 1966	1000 teenagers, one entire grade of high school (California)	1. Students thought their diets were acceptable. 2. All students were interested in body conformation.
Koh, 1980	46 girls, 12-17 years, low-income blacks (Mississippi)	1. Very low riboflavin levels in urine. 2. Thiamin levels in urine low.
Lee, 1978	72 girls, 46 boys, 12-19 years (Kentucky)	1. Nineteen percent of black and 12 percent of white girls received less than two-thirds of the RDA for protein. 2. Thiamin and riboflavin seriously lacking among the girls. 3. Also low--calcium, ascorbic acid, iron, calcium, and vitamin A.
Lopez et al., 1980	210 adolescents, 13-19 years (New York City)	1. Twenty-seven percent of the girls not on supplements were deficient in riboflavin as assessed by enzyme assay (EGR).
Marino and King, 1980	Compendium article	1. Nutrients likely to be low: calcium, iron, zinc, ascorbic acid, pyridoxine, folate, and vitamin A.
Morse et al., 1965	401 students, grades 7-9 (Vermont)	1. Six percent of the girls were deficient in thiamin as assessed by enzyme assay (TK).

Authors	Subjects	Significant Nutritional Findings
Prothro et al., 1976	102 adolescents, ages 12-18 (Alabama)	1. Thiamin, riboflavin, ascorbic acid, and vitamin A definitely lacking. 2. Calcium and iron--very poor intakes. 3. Serum folate was low.
Spindler and Acker, 1963	15-17 years of age (Illinois)	1. Many teenagers are too busy to eat. 2. Parents should provide good food to teens. 3. Teenagers think they know what to eat. 4. Calcium and ascorbic acid appear to be low due to foods consumed by food groups.

APPENDIX B

QUESTIONNAIRE

A Healthy Pregnancy

I. An important part of providing health care during pregnancy is determining what you want. The following questions are about the health care you think you would want during a future pregnancy.

A. If you were pregnant, at what time in your pregnancy would you first go see a doctor?_____
_____

B. If you were pregnant, how often would you see a doctor?
_____

C. If meetings were available which discussed how the food you eat affects the health of you and your baby, would you attend? (Check one, please)

_____Yes
_____Maybe
_____No

D. How much weight should a woman gain during pregnancy? (Check one, please)

_____ 1-10 pounds
_____11-20 pounds
_____21-30 pounds
_____Other (How much?)_____

E. Should a pregnant woman eat more, less, or not change her diet during pregnancy? (Check one, please)

_____More
_____Less
_____Not Change

F. Should a pregnant woman exercise more, less, or not change the time she spends exercising? (Check one, please)

_____More
_____Less
_____Not Change

G. Should a pregnant woman drink more, less, or not change the amount of beverages with caffeine (Coke, tea, coffee)? (Check one, please)

_____More _____Less _____Not Change

H. If you became pregnant, would you smoke more, less, or not change your smoking habits? (Check one, please)

_____More
_____Less
_____Not Change
_____Does not apply to me

I. Are there any drugs which a pregnant woman should not take?

_____Yes (Please specify)_____
_____No

J. Should a pregnant woman drink more, less, or not change the amount of alcoholic beverages she consumes? (Check one, please)

_____More
_____Less
_____Not Change

K. In order to have a healthy baby, do you think the age of the mother at the time of pregnancy would have any effect? (Check one, please)

_____Yes (Please specify)_____
_____No

L. Do you think there is a best or ideal age to become pregnant? (Check one, please)

_____Yes (Why?)_____
_____No (Why?)_____

M. Would you change your current diet if you became pregnant? (Check one, please)

_____Yes (Why?)_____
_____No (Why?)_____

N. What foods, if any, would <u>you</u> eat to help your baby develop?

_____
_____

II. The following section was made up by teenagers who are concerned about the growing number of unwanted pregnancies. The purpose of these questions is to find out how teenagers feel about sex and birth control.

Please answer every question honestly. All answers are STRICTLY CONFIDENTIAL. Your information will be combined with the many others in the study.

People work at different rates, so take as much time as you need. When you are finished with the questionnaire, place it in the envelope and return it to the interviewer.

Thank you for your cooperation.

A. Is birth control available to teenagers in your area without lots of hassle? (Check one, please)

_____Yes
_____No
_____I don't know

B. How much do you feel you know about birth control? (Check one, please)

_____Enough
_____Not Enough
_____Nothing

C. A lot of teenage girls are getting pregnant today even though there is a lot of birth control around. Why do you feel they don't use birth control? (Please check <u>all</u> of the reasons you think are important.)

_____They are afraid their parents will find out.
_____They feel that it makes sex seem too planned.
_____They think they don't have sex often enough to use birth control.
_____They don't know enough about birth control.
_____They would rather take a chance on getting pregnant than hassle with birth control.
_____They feel birth control is too expensive.
_____They think birth control is bad for their health.
_____Their partners don't like to use birth control.
_____They feel it is unnatural.
_____They just don't think about getting pregnant.
_____They think they can't get pregnant.
_____Other (Please give reason.)_____
_____

C. (Continued) Please go back and place a second check mark next to the reason you think is most important.

D. If you have ever used birth control, what made you decide to use it?

_____My family would be upset if I got pregnant.
_____I haven't finished my education.
_____I couldn't support a baby.
_____I'm too young to be a good parent.
_____I couldn't handle an abortion.
_____I want to do a lot of things before I settle down.
_____Society would look down on me.
_____I don't want to have any children.
_____It costs too much to rear a child.
_____Having a baby would interfere with my plans.
_____Other (Please give reason.)_____
_____

_____This question does not apply to me.

E. From how many sources did you find out about birth control? (Please check as many as apply to you.)

_____A Class in School
_____Friends
_____Clinic or Planned Parenthood
_____My Parents
_____Drug Store
_____My Church
_____An Adult
_____Magazines
_____Books
_____(From)_____

(Please go back and place two check marks next to the most important source of information for you.)

F. Please describe every method of birth control you have ever heard of, whether or not you would ever use it yourself.

		Effectiveness			
		E	G	F	U
1.	_____	_	_	_	_
2.	_____	_	_	_	_
3.	_____	_	_	_	_
4.	_____	_	_	_	_
5.	_____	_	_	_	_
6.	_____	_	_	_	_

G. Now go back to the methods listed on the last page, and mark how good you believe each method is in preventing pregnancy. Use the following scale:

E = Excellent	This means that virtually no pregnancies will occur while that method is being used.
G = Good	This means that there is some small chance of pregnancy while that method is being used.
F = Fair	This means that there is a definite chance of pregnancy while the method is being used; but the method is better in preventing pregnancies than using no method at all.
U = Useless	This means that there is the same chance of pregnancy occurring as if nothing were being used.

Please tell us which of the methods you have listed are excellent (E), good (G), fair (F), or useless (U).

APPENDIX C

FOOD RECALL

Food Recall

Subject No._____
Date_____

1. How many days each week do you usually eat something before breakfast? (Circle one.) 0 1 2 3 4 5 6 7

2. Where do you usually eat if you eat something prior to breakfast?

   1. Home
   2. School Cafeteria
   3. Fast-Food Restaurant or Grocery
   4. Other Restaurant (Not Fast-Food Type)
   5. Vending Machine or School Snack Bar Other than Cafeteria
   6. A Friend's or Relative's Home
   7. Other (Please Specify)_____

3. Where did you eat if you ate something prior to breakfast yesterday? _____

4. What did you eat and/or drink prior to breakfast yesterday?

A. Food/Drinks	B. Amount in Household Units	C. Freq. of Units	D. Nas Id	E. Wt in Grams

5. From the above question, record the frequency of each food group consumed. Record to half of a serving.

A. Meat Equivalents	___	___
B. Dairy Products	___	___
C. Vegetables	___	___
D. Fruits	___	___
E. Breads and Cereals	___	___
F. Fats	___	___
G. Simple Sugars	___	___
H. Sodas	___	___
I. Instant Breakfast (Includes Granola Bars)	___	___
J. Alcoholic Beverages	___	___

6. How many days each week do you usually eat something for breakfast? (Circle one.) 0 1 2 3 4 5 6 7

7. Where do you usually eat if you eat something for breakfast?

   1. Home
   2. School cafeteria
   3. Fast-food restaurant or grocery
   4. Other restaurant (not fast-food type)
   5. Vending machine or school snack bar other than cafeteria
   6. A friend's or relative's home
   7. Other (Please specify)_____

8. Where did you eat if you ate breakfast yesterday?_____

9. What did you eat and/or drink for breakfast yesterday?

A. Food/Drinks	B. Amount in Household Units	C. Freq of Units	D. Nas Id	E. Wt in Grams

10. From the above question, record the frequency of each food group consumed. Record to half of a serving.

A.	Meat Equivalents	___ ___
B.	Dairy Products	___ ___
C.	Vegetables	___ ___
D.	Fruits	___ ___
E.	Breads and Cereals	___ ___
F.	Fats	___ ___
G.	Simple Sugars	___ ___
H.	Sodas	___ ___
I.	Instant Breakfast (Includes Granola Bars)	___ ___
J.	Alcoholic Beverages	___ ___

11. How many days each week do you usually eat something between breakfast and lunch? (Select one.) 0 1 2 3 4 5 6 7

12. Where do you usually obtain the items eaten? (Select one.)

    1. Home
    2. School cafeteria
    3. Fast-food restaurant or grocery
    4. Other restaurant (not fast-food type)
    5. Vending machine or school snack bar other than cafeteria
    6. A friend's or relative's home
    7. Other (Please specify)_____

13. Where did you eat if you ate something at this time yesterday?

    _____

14. What did you eat and/or drink between breakfast and lunch yesterday?

A. Food/Drinks	B. Amount in Household Units	C. Freq of Units	D. Nas Id	E. Wt in Grams

15. From the above question, record the frequency of each food group consumed. Record to half of a serving.

    A. Meat Equivalents ___ ___
    B. Dairy Products ___ ___
    C. Vegetables ___ ___
    D. Fruits ___ ___
    E. Breads and Cereals ___ ___
    F. Fats ___ ___
    G. Simple Sugars ___ ___
    H. Sodas ___ ___
    I. Instant Breakfast (Includes Granola Bars) ___ ___
    J. Alcoholic Beverages ___ ___

16. How many days each week do you usually eat or drink something for lunch? (Circle one.) 0 1 2 3 4 5 6 7

17. Where do you usually obtain what you eat for lunch? (Select one.)

    1. Home
    2. School cafeteria
    3. Fast-food restaurant or grocery
    4. Other restaurant (not fast-food type)
    5. Vending machine or school snack bar other than cafeteria
    6. A friend's or relative's home
    7. Other (Please specify)_____

18. Where did you eat if you ate lunch yesterday?_____

19. What did you eat and/or drink for lunch yesterday?

A. Food/Drinks	B. Amount in Household Units	C. Freq of Units	D. Nas Id	E. Wt in Grams

20. From the above question, record the frequency of each food group consumed. Record to half of a serving.

A. Meat Equivalents	___	___
B. Dairy Products	___	___
C. Vegetables	___	___
D. Fruits	___	___
E. Breads and Cereals	___	___
F. Fats	___	___
G. Simple Sugars	___	___
H. Sodas	___	___
I. Instant Breakfast (Includes Granola Bars)	___	___
J. Alcoholic Beverages	___	___

21. How many days each week do you usually eat something between noon and the evening meal? (Circle one.) 0 1 2 3 4 5 6 7

22. Where do you usually obtain the items eaten? (Select one.)

1. Home
2. School cafeteria
3. Fast-food restaurant or grocery
4. Other restaurant (not fast-food type)
5. Vending machine or school snack bar other than cafeteria
6. A friend's or relative's home
7. Other (Please specify)_____

23. Where did you eat if you ate something yesterday at this time?

_____

24. What did you eat and/or drink for an afternoon snack yesterday?

A. Food/Drinks	B. Amount in Household Units	C. Freq of Units	D. Nas Id	E. Wt in Grams

25. From the above question, record the frequency of each food group consumed. Record to half of a serving.

A. Meat Equivalents	___	___
B. Dairy Products	___	___
C. Vegetables	___	___
D. Fruits	___	___
E. Breads and Cereals	___	___
F. Fats	___	___
G. Simple Sugars	___	___
H. Sodas	___	___
I. Instant Breakfast (Includes Granola Bars)	___	___
J. Alcoholic Beverages	___	___

26. How many days each week do you usually eat an evening meal? (Circle one.) 0 1 2 3 4 5 6 7

27. Where do you usually eat if you eat an evening meal? (Select one.)

1. Home
2. School cafeteria
3. Fast-food restaurant or grocery
4. Other restaurant (not fast-food type)
5. Vending machine or school snack bar other than cafeteria
6. A friend's or relative's home
7. Other (Please specify)_____

28. Where did you eat if you ate an evening meal yesterday?_____

29. What did you eat and/or drink for an evening meal yesterday?

A. Food/Drinks	B. Amount in Household Units	C. Freq of Units	D. Nas Id	E. Wt in Grams

30. From the above question, record the frequency of each food group consumed. Record to half of a serving.

A.	Meat Equivalents	___ ___
B.	Dairy Products	___ ___
C.	Vegetables	___ ___
D.	Fruits	___ ___
E.	Breads and Cereals	___ ___
F.	Fats	___ ___
G.	Simple Sugars	___ ___
H.	Sodas	___ ___
I.	Instant Breakfast (Includes Granola Bars)	___ ___
J.	Alcoholic Beverages	___ ___

31. How many days each week do you usually eat something between the evening meal and the time you go to bed? (Select one.)
0 1 2 3 4 5 6 7

32. Where do you most frequently obtain what you eat? (Select one.)

1. Home
2. School cafeteria
3. Fast-food restaurant or grocery
4. Other restaurant (not fast-food type)
5. Vending machine or school snack bar other than cafeteria
6. A friend's or relative's home
7. Other (Please specify)_____

33. Where did you eat if you ate something yesterday at this time?

_____

34. What did you eat and/or drink for an evening snack yesterday?

A. Food/Drinks	B. Amount in Household Units	C. Freq of Units	D. Nas Id	E. Wt in Grams

35. From the above question, record the frequency of each food group consumed. Record to half of a serving.

A.	Meat Equivalents	___ ___
B.	Dairy Products	___ ___
C.	Vegetables	___ ___
D.	Fruits	___ ___
E.	Breads and Cereals	___ ___
F.	Fats	___ ___
G.	Simple Sugars	___ ___
H.	Sodas	___ ___
I.	Instant Breakfast (Includes Granola Bars)	___ ___

36. How many times per week do you usually take nutritional supplements such as vitamins, minerals, or protein in addition to the foods you eat? 0 1 2 3 4 5 6 7

37. If you take supplements, who recommended that you take the supplements?

1. Physician
2. Mother
3. Father
4. Self
5. Girlfriend(s)
6. Boyfriend(s)
7. Media

38. What supplements did you take yesterday, how many capsules or tablets, and what time were they taken?

(Be sure if the supplement is a single nutrient that the concentration in each tablet is obtained. Under column E below, record the meal code or snack code corresponding to the time period when the supplement was consumed.)

A. Vitamin/Mineral Supplement	B. CCNC of Tablet	C. Freq	D. Nas Id	E. Time of Day

39. When you eat snacks, do you eat or drink them: (Answer each item by recording Often = 3, Never = 1, Sometimes = 2 in blanks 31-35)

    A. Because you are hungry?
    B. To be social or as part of a social activity?
    C. Just to have something to do?
    D. Because you see something that looks good?
    E. To gain weight?
    F. Any other reason volunteered _____
    (Do not code.)

40. Are you presently on a vegetarian diet? Yes = 1 No = 2

41. As a vegetarian, do you eat: Yes = 1 No = 2

    A. Eggs?_____
    B. Milk?_____
    C. Cheese?___
    D. Fish?_____

42. Are you a vegetarian for (Circle one.)

    1. Religious reasons
    2. Humanitarian reasons
    3. Dislike
    4. Economic reasons
    5. Health reasons
    6. Lifestyle

43. How long have you been a vegetarian? (Specify time in months.)

    _____

44. Have you ever been on a weight-reduction diet? Yes = 1 No = 2

    If answer is "no," skip to #49.
    ---

45. If yes, was it recommended or decided on primarily by (select one)?

    1. Physician
    2. Mother
    3. Father
    4. Self
    5. Girlfriend(s)
    6. Boyfriend(s)
    7. Media

46. Have you been on a weight-reduction diet within the past year? Yes = 1 No = 2

47. How many times each year do you go on a weight-reduction diet?

    ___ ___ ___

48. How long does the diet usually last? (Select one.)

1. Less than one month.
2. One to three months.
3. Four to six months.
4. More than six months.

49. Have you ever been on a diet to try to gain weight? ___
Yes = 1 No = 2

If answer is "no," skip to #52.
---

50. Have you tried to gain weight within the past year? ___
Yes = 1 No = 2

51. If yes, was it recommended or decided on primarily by (select one):

1. Physician
2. Mother
3. Father
4. Self
5. Girlfriend(s)
6. Boyfriend(s)
7. Media

52. Are you presently trying to _____ weight?
Gain = 1 Lose = 2 Neither = 3

53. Do you think your weight is now (circle one):
Too Heavy = 3 Too Light = 1 About Right = 2

54. Do you add salt to your food at the table? (Circle one.)

Almost always and before tasting = 4
Sometimes = 3
Almost always but only after tasting = 2
Almost never = 1

55. Do you like very salty foods such as salted nuts, potato chips?
Yes = 1 No = 2

56. Who prepares breakfast if your family usually (at least four times each week) has a prepared meal? (Select one.)

0. Meal is not prepared at least four times each week.
1. Mother
2. Father
3. Grandmother, aunt, or other female relative
4. Yourself
5. Other children in the family
6. Mother prepares for the family and the father prepares his own.
7. Each person prepares his/her own
8. Varies from day-to-day
9. Other (specify)_____

57. If breakfast is prepared at least four times each week, does your family usually eat breakfast:

    0. Breakfast is not prepared at least four times each week.
    1. Separately
    2. All together
    3. Children together and adults together (but not with children)
    4. Varies from day-to-day
    5. Separately Monday to Friday and all together on Saturday and Sunday
    6. Other (specify)_____

58. Is an evening meal regularly prepared at least four times a week in your home? _____ 1 = Yes 2 = No

59. If so, who most frequently prepares the meal? (select one.)

    0. Meal is not prepared at least four times each week.
    1. Mother
    2. Father
    3. Grandmother, aunt, or other female relative
    4. Yourself
    5. Other children in the family
    6. Mother prepares for the family and the father prepares his own
    7. Each person prepares his/her own
    8. Varies from day-to-day
    9. Other (specify)_____

60. How many days each week do you usually eat your evening meal with most of your family? 0 1 2 3 4 5 6 7

61. How many days each week do you usually eat your evening meal away from home? 0 1 2 3 4 5 6 7

62. When you do not eat the evening meal at home, where do you eat most frequently?

    1. Always eat at home
    2. Fast-food restaurant or grocery
    3. Other restaurant (not fast-food type)
    4. Vending machine
    5. A friend's or relative's home
    6. Other (specify)_____

63. If your family has an evening meal provided at least four times a week, does it usually eat: (select one)

    0. Evening meal is not prepared at least four times each week
    1. Separately
    2. All together
    3. Children together and adults together (but not with children)
    4. Varies from day-to-day
    5. Separately Monday to Friday and all together on Saturday and Sunday
    6. Other (specify)_____

64. Who does most of the grocery shopping in your family? (Select one.)

    1. Male head of family
    2. Female head of family
    3. Male and female heads together
    4. Whole family
    5. The respondent
    6. One of the children other than the respondent
    7. Other (specify)_____

65. Who makes the majority of decisions about the groceries to buy? (Select one.)

    1. Male head of family
    2. Female head of family
    3. Male and female heads together
    4. Whole family
    5. Children
    6. Other (specify)_____

66. How often do you help to make decisions about what groceries your family buys?

    1. Never
    2. Sometimes
    3. Always

The following information needs to be answered by the interviewer.

A. Subject's age category (circle one) 12 14 16 Years

B. Yesterday was (circle one) SU M TU W TH F SA

C. Is this recall being taken on the day blood is drawn? (Please circle.) Yes = 1 No = 2

APPENDIX D

CONSENT FOR PARTICIPATION

Consent for Participation

I have received an explanation of the nutrition study to be conducted at the University of North Carolina at Greensboro as part of the Southern Regional Nutrition Project: Nutritional Health of Adolescent Females (S-150). The project will be directed by Michael Liebman, faculty member of the Department of Food, Nutrition and Food Service Management in the School of Home Economics.

The study objectives are (1) to assess the nutritional health of adolescent females in the Southern Region, and (2) to relate the nutritional health of adolescent females to socioeconomic factors, food habits, nutrition knowledge, behavioral characteristics, physiological development, and other appropriate factors.

I understand that I will be asked to answer questions about socioeconomic backgrounds (such as education, occupation of parents, etc.), food habits, overall health, and lifestyle. I understand that I will be asked to take tests which are designed to assess my personality and attitudes. I am also aware that I will be asked to donate a urine sample and a blood sample after a short period of fasting. The blood sample will be taken by a qualified blood drawer.

The potential risks of this study (such as fainting, bruising, or infection from the blood drawing; and stress during the interviews and tests) have been explained to me. I understand that I will receive $10.00 for being a subject in this study, payable at the end of my participation.

I understand that I am free to withdraw from the study at any time. I understand that all information will be considered private, will be treated confidentially, and will not be revealed so as to cause embarrassment. Dr. Liebman or one of the other members of the research staff will be free to answer any questions I may have regarding this study.

Understanding the above, I agree to participate.

_____
Signature, Subject

Understanding the above, I agree to my daughter's participation.

_____
Signature, Parent

_____ _____
Date Signature, Interviewer

_____
Social Security Number

APPENDIX E

SELF-REPORTED KNOWLEDGE OF BIRTH CONTROL

Self-Reported Knowledge of Birth Control

Methods	Knowledge of Birth Control	Listed Incorrectly[a]	Listed Correctly[b]
Oral Contraceptives	Nothing	5	2
	Not Enough	45	6
	Enough	39	22
Condom	Nothing	3	1
	Not Enough	16	12
	Enough	25	17
Foams, Jellies	Nothing	0	0
	Not Enough	6	8
	Enough	11	16
Diaphragm	Nothing	0	0
	Not Enough	5	9
	Enough	8	15
IUD	Nothing	1	0
	Not Enough	6	0
	Enough	15	5
Surgery	Nothing	0	1
	Not Enough	1	9
	Enough	3	14
Rhythm	Nothing	0	0
	Not Enough	1	0
	Enough	3	3
Withdrawal	Nothing	0	0
	Not Enough	0	0
	Enough	5	1

Note. The figures listed above are numbers of subjects.

[a]Listed incorrectly denotes a subject who incorrectly listed the efficiency of that method in preventing pregnancy.

[b]Listed correctly denotes a subject who correctly listed the efficiency of that method in preventing pregnancy.