

THE UNIVERSITY OF MANITOBA

AN ASSESSMENT OF THE RELATIONSHIPS AMONG NUTRITION KNOWLEDGE,
ATTITUDES AND DIETARY PRACTICES OF COMPETITIVE SWIMMERS IN WINNIPEG

by

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ABSTRACT

In October, 1976, a study was conducted to assess the relationships among nutrition knowledge, attitudes and practices of 101 top level competitive swimmers in Winnipeg. Research instruments included a three-day food record and a group-administered questionnaire. Twenty-two multiple choice questions were used to assess nutrition knowledge and determine a fad score for each respondent. To assess nutrition attitudes, responses to twenty-one statements were arranged on a five point continuum ranging from "strongly agree" to "strongly disagree." Two different measures were used to evaluate dietary practices. An indication of dietary habits during training and before a competition was obtained by responses to six open-ended questions on the questionnaire. A more detailed assessment of dietary practices was obtained from a three-day food record kept by each respondent. Most of the data were statistically analyzed by computer, all tests being conducted at the 5 percent level of significance. Responses to the questions on dietary practices during training and before a competition were tabulated by the author. In general, respondents had a low level of nutrition knowledge; however, certain fad beliefs, considered common to athletes, were not prevalent. Some poor nutrition attitudes were evident. Dietary practices were modified more in preparation for an event than during training. Dietary practices assessed by three-day food records showed generally high intakes of energy and most nutrients. Little relationship was observed between nutrition knowledge and dietary practices. Some significant relationships were observed

between nutrition knowledge and nutrition attitudes. The greatest number of significant relationships were observed between nutrition attitudes and dietary practices. Neither age nor sex were significantly related to measures of knowledge, attitudes or practices.

TABLE OF CONTENTS

	Page
Acknowledgements	i
Abstract	ii
Table of Contents	iv
List of Tables	vi
Introduction	1
Review of Literature	3
Methodology	20
A. The Sample	20
B. Food Record	22
C. Data Collection	23
D. Analysis of Data	24
Results and Discussion	26
Assessment of Nutrition Knowledge and Fad Scores	26
A. Nutrition Knowledge Score	26
B. Fad Score	26
Assessment of Nutrition Attitudes	44
Assessment of Dietary Practices	53
A. Dietary Practices During Training and Before Competition	53
B. Dietary Practices Assessed Using A Three Day Food Record.	61
Source of Nutrition Information	72
Relationships Between Nutrition Knowledge and Dietary Practice Indices	75
Relationships Between Nutrition Attitudes and Dietary Practices	78
Relationships Between Nutrition Knowledge and Nutrition Attitudes	89

	Page
Conclusions	97
Bibliography	100
Appendices	105
A. Competitive Swim Clubs	105
B. Questionnaire	106
C. Three Day Food Record	107
D. Procedure For Data Collection	108
E. Distribution of Nutrition Knowledge Scores by Age of Respondents	109
Distribution of Nutrition Knowledge Scores By Sex of Respondents	109
F. Distribution of Intakes of Kilocalories and Nine Nutrients	110

LIST OF TABLES

Table	Page
I	Distribution of Nutrition Knowledge Scores by Age and Sex of the Respondents 27
II	Distribution of Fad Scores by Age and Sex of the Respondents 28
III	Distribution of Responses to Nutrition Knowledge Questions Relating to Function and Source of Carbohydrate . 29
IV	Distribution of Responses to Nutrition Knowledge Questions Relating to Function and Source of Fat 31
V	Distribution of Responses to Nutrition Knowledge Questions Relating to Function and Source of Protein 32
VI	Distribution of Responses to Nutrition Knowledge Questions Relating to Weight Control 34
VII	Distribution of Responses to Nutrition Knowledge Questions Relating to Function and Source of Vitamins . . . 35
VIII	Distribution of Responses to Nutrition Knowledge Questions Relating to Function and Source of Minerals. . . . 39
IX	Distribution of Responses to Nutrition Knowledge Questions Relating to Water Balance in the Body. 41
X	Distribution of Responses to Nutrition Attitude Statements Relating to Energy-Yielding Nutrients. 45
XI	Distribution of Responses to Nutrition Attitude Statements Relating to Weight Loss. 47
XII	Distribution of Responses to Nutrition Attitude Statements Relating to Vitamins 47
XIII	Distribution of Responses to Nutrition Attitude Statements Relating to Minerals 50
XIV	Distribution of Responses to Nutrition Attitude Statements Relating to Dietary Practices Before Competition. 50
XV	Distribution of Responses to Nutrition Attitude Statements Relating to Organic Foods and Food Additives . . . 51

Table	Page
XVI	Percent of Respondents Who Either Avoided or Consumed Certain Foods, or Took Supplements During Training and Before a Major Competition 55
XVII	Number of Times a Food Category was Avoided or Consumed During Training and Before a Major Competition 56
XVIII	Number of Times Supplements Were Taken During Training and Before a Major Competition 60
XIX	Three-Day Mean Daily Intake of Kilocalories and Nine Nutrients by Age and Sex of Respondents Compared to the Recommended Daily Intake in the C.D.S. 62
XX	Comparison of the Three Day Mean Daily Intake of Winnipeg Swimmers (13-19) Years of Age with the Mean Daily Intake of a Similar Age and Sex Group in the Nutrition Canada Survey. 63
XXI	Percentage of Respondents by Age and Sex who Met or Did Not Meet the C.D.S. for Kilocalories and Nine Nutrients 65
XXII	Distribution of Respondents According to Source of Nutrition Information 73
XXIII	Relationship Between Nutrition Knowledge Score and Response to the Dietary Practice Question: "During training do you take supplements?" 76
XXIV	Relationship Between Response to the Attitude Statement: "I feel a well-balanced diet, without additional supplements, is a good diet for top performance" and Response to the Dietary Practice Question: "During training do you take supplements?" 79
XXV	Relationship Between Response to the Attitude Statement: "I sometimes take vitamin E supplements to improve performance" and Response to the Dietary Practice Question: "During training do you take supplements?" 80
XXVI	Relationship Between Response to the Attitude Statement: "I feel a well-balanced diet, without additional supplements, is a good diet for top performance" and Response to the Dietary Practice Question: "Before a major competition do you take supplements?" 81

Table	Page
XXVII	Relationship Between Response to the Attitude Statement: "I believe the higher the carbohydrate content of my diet before a major event, the better my performance" and Response to the Dietary Practice Question: "Before a major competition do you eat anything special?" 82
XXVIII	Relationship Between Response to the Attitude Statement: "I like to restrict my intake of fatty foods when I am in training" and Response to the Dietary Practice Question: "Before a major competition do you avoid certain foods?" 83
XXIX	Relationship Between Response to the Attitude Statement: "I like to restrict my intake of fatty foods when I am in training" and Response to the Dietary Practice Question: "Before a major competition do you take supplements?" 84
XXX	Relationship Between Response to the Attitude Statement: "I believe a swimmer's body can adjust to taking in less water than is lost in sweat each day" and Response to the Dietary Practice Question: "During training do you take supplements?" 85
XXXI	Relationship Between Response to the Attitude Statement: "If I wanted to lose weight, a loss of six pounds per week is a safe loss" and Dietary Practice Score 87
XXXII	Relationship Between Response to the Attitude Statement: "Drinking milk the day of an event decreases my performance" and Dietary Practice Score 88
XXXIII	Relationship Between Nutrition Knowledge Score and Response to the Attitude Statement: "I like to restrict my intake of fatty food when I am in training." . 90
XXXIV	Relationship Between Nutrition Knowledge Score and Response to the Attitude Statement: "I feel a well balanced diet, without additional supplements, is a good diet for top performance." 91
XXXV	Relationship Between Nutrition Knowledge Score and Response to the Attitude Statement: "I sometimes take vitamin C supplements to improve performance." 92
XXXVI	Relationship Between Nutrition Knowledge Score and Response to the Attitude Statement: "I take vitamin supplements just in case I do not get all the nutrients I need from my meals." 93

Table		Page
XXXVII	Relationship Between Nutrition Knowledge Score and Response to the Attitude Statement: "I sometimes take vitamin E supplements to improve performance."	94
XXXVIII	Relationship Between Nutrition Knowledge Score and Response to the Attitude Statement: "I sometimes take vitamin B supplements for added energy."	95

INTRODUCTION

Knowledge about food and nutrition is valuable only to the extent to which it is applied. Although nutrition educators like to think that those who know the basic concepts and principles of nutrition also apply this knowledge, research indicates this is not always the case. Evidence of a positive relationship between knowledge and practice is limited and conflicting (Young et al., 1956; Eppright et al., 1970; Woolcott, 1971; Schwartz, 1975; Thompson and Schwartz, 1975; Carruth et al., 1977). Few practices are altered because of knowledge alone. Dwyer et al., (1970) have concluded that

Food habits are affected and altered by such a myriad of factors that it is little wonder that the effects of nutrition knowledge or education seem to be relatively slight. Nutritional considerations (in the sense of knowledge of scientifically correct information on nutrition or interest in the nutritional value of foods) have never played the major role in determining the dietary habits of the American people.

Since the goal of nutrition educators is to influence a positive change in an individual's food habits, the effect of factors other than knowledge, on practice, have been studied. Recently, research has focused on assessing the relationship between attitudes and practice (Jalso et al., 1965; Eppright et al., 1970, Schwartz, 1975; Carruth et al., 1977). Results of these studies have indicated that attitudes are influential in changing one's behavior. However, if attitudes must be altered to effect a positive change in behavior, the problem becomes more complex. Giffit et al., (1972) have suggested that the potential for changing an attitude is affected by the complexity

of three components contributing to the formation of attitudes: cognition, affect and action. In addition, the authors suggest that the motivational support for an attitude is a factor affecting the susceptibility of the attitude to change. Dillehay, cited by Giffit et al., (1972) has suggested that only when attitudes are based mainly on knowledge can information alone cause a change in the attitude.

Although few studies have examined the relationships among nutrition knowledge, attitudes and practices of adolescents, the Nutrition Canada Survey (1975) has shown that this age group consume nutritionally inadequate diets. In addition, it is interesting to note that little research has been conducted on the adolescent athlete despite the suggestion by Durnin (1967) that "in no other area of nutrition are faddism and misconceptions more prevalent than in athletics." Therefore, further study of the factors influencing the dietary habits of adolescent athletes seems warranted.

The objectives of the present study were:

- 1) To assess the nutrition knowledge of competitive swimmers
- 2) To assess the nutrition attitudes of competitive swimmers
- 3) To assess the dietary practices of competitive swimmers
- 4) To determine the relationships among nutrition knowledge, attitudes and practices of competitive swimmers
- 5) To determine the athletes' main source of nutrition information.

It was hypothesized that:

- 1) Knowledge of nutrition is not related to dietary practices
- 2) Attitudes toward nutrition are related to dietary practices
- 3) Knowledge of nutrition is related to attitudes toward nutrition.

REVIEW OF LITERATURE

Food habits, like other forms of human behavior, are the result of numerous psycho-social influences (Jenner, 1973). For this reason, it is often difficult to change an individual's food intake pattern. Nevertheless, the goal of nutrition education is to create a positive change in an individual's food habits (Giffit et al., 1972).

Traditionally, nutrition education programs have focused on increasing nutrition knowledge with the hope that this knowledge would be reflected in better food practices. However, a review of the literature indicates that this is not always the case. Therefore, more recent attention has focused on other factors, such as attitudes, that might influence a change in dietary habits. The following review will elaborate on the more significant studies which have examined the relationships among nutrition knowledge, attitudes and dietary practices.

RELATIONSHIPS BETWEEN NUTRITION KNOWLEDGE AND DIETARY PRACTICES

Since knowledge about nutrition is of little value unless it is applied, the relationship of knowledge to practice is of key importance and has been the focus of various research studies. Some researchers have observed a relationship between these two variables. For instance, Woolcott (1971) has reviewed a number of studies where the nutrition knowledge and practices of homemakers were assessed. In general, knowledge of nutrition was found to have some effect on dietary practices; however, the relationship was often not strong.

In her research, Woolcott (1971) found a significant relationship between nutrition knowledge and one measure of dietary practice after surveying 129 homemakers in an isolated Manitoba community. The significant ($P < 0.05$) relationship was observed between nutrition knowledge (assessed by responses to sixteen multiple-choice questions and nine "agree--disagree" statements) and dietary practices (determined by scores on a twenty-four hour recall). No significant relationship was found between nutrition knowledge and another measure of practice, that of constructing a hypothetical meal plan.

Young et al., (1956) studied the nutrition knowledge and practices of 646 homemakers in Rochester and Syracuse, New York. Using an open-ended questionnaire administered by personal interview, a general assessment of nutrition knowledge was based on the number of food groups the homemaker could give a nutritionally correct reason for including in the diet. A correct reason could be either a function of that food group or a nutrient for which the food group is known. Some indication of dietary practices was obtained by asking

about foods served in the previous twenty-four hours and about foods either purchased or used in the previous week. The authors observed that the homemakers with higher knowledge seemed to do better on both measures of feeding practices; however, dietary habits were much better than nutrition knowledge would indicate.

A detailed study conducted by Eppright et al., (1970) assessed the relationship between the nutrition knowledge and practices of mothers of preschool children in twelve North Central states. Trained interviewers administered a test of nutrition knowledge consisting of thirty-five true--false questions. In order to assess dietary practices, each mother was asked to keep a three-day food record for her child. (The discussion of the results was limited to simple correlation coefficients greater than .058 since this value is significant at the one percent level for a sample of 2000). An overall nutrition score based on the total nutrient intake (food plus supplements) was obtained for each child from the mean percentiles of calories and nutrients. This score was positively correlated and significant with scores on nutrition knowledge (.070). Furthermore, low nutrition knowledge scores were noticed in mothers of children in the lowest ten percentile group according to total intake of each nutrient, except protein and phosphorus.

Test scores on the knowledge test and the nutritive value of the diets without supplements also were compared. The nutrition knowledge scores of the mothers were significantly and positively correlated with the ascorbic acid, niacin (equivalent), phosphorus, protein,

riboflavin, calcium and caloric value of the food consumed. In a summary of the study, the authors concluded that nutrition knowledge scores were generally positively correlated with intake of food energy and nutrients.

Contrary to these researchers, others (Thompson and Schwartz, 1975; Schwartz, 1975; Carruth et al., 1977) have found no significant relationship between nutrition knowledge and practice. For instance, Thompson and Schwartz (1975) surveyed 366 grade eight secondary school students in Vancouver, British Columbia. Mean percentage scores in the questionnaire designed to assess nutrition knowledge and practice were 66 percent and 81 percent, respectively. No significant correlation was found between these two variables.

Similarly, Schwartz (1975) observed no significant relationship between the nutrition knowledge and practices of 313 female Ohio high school graduates who were surveyed four years after graduation. Nutrition knowledge was assessed by a thirty statement true--false questionnaire. Nutrition practices were determined by comparing food consumed using a three-day food record with foods recommended in the Basic Four Food Guide. No significant correlation was found between nutrition knowledge and practice.

A more recent assessment of the relationship between knowledge and practice has been conducted by Carruth et al., (1977). A disguised-participant-observer design was used in the five-week study to examine the nutrition behavior of Nutrition Education Assistants (NEAS) in Missouri. Each of the NEAS in the experimental group (N = 9)

was matched with two other NEAS in the state on factors assumed to influence knowledge, attitudes and nutrition-related behaviors. The matched NEAS comprised the control group (N = 18). The knowledge questionnaire assessed weight modification concepts of the respondents before and after training. Nutrition-related behavior was defined as one of three variables: 1) requests for free nutrition literature, 2) verbal statements relating to good nutrition practices, or 3) observed good nutrition practices.

The authors observed that a gain in nutrition knowledge was not significantly associated with an individual's initiative to request literature. Furthermore, since pre-test scores on the nutrition knowledge test correlated with both observed and verbal behaviors, ($r = .74$ and $r = .64$ respectively), and post-test results were associated with only verbal behavior ($r = .63$), the authors suggested that increasing knowledge was reflected in increasing the NEAS' verbalization about nutrition but did not significantly improve practices.

A review of the literature suggests that nutrition knowledge does not always influence dietary practices. Similar conclusions have been observed in some studies where nutrition education programs have attempted to change behavior.

Milton (1972) has reviewed a number of studies which have examined the effects of nutrition education on knowledge and practice. Although nutrition education has some influence on these variables, sometimes the effect is less than expected.

Bell and Lamb (1973) studied the influence of a six-week

nutrition education program on modifying the nutrition knowledge and practices of 1464 fifth-grade students in five states in United States. Food consumption was determined by measuring plate wastes in the school lunch program for a period of five days before the teaching took place for the experimental and control groups, and five days after, for the experimental group and the non-teaching period for the control group. Knowledge was assessed using a fifteen item objective test which also included questions on application of this knowledge. Although the experimental group achieved a significantly ($P < 0.001$) higher score on the written nutrition test than the control group, there was only a slight improvement in the dietary practices of the experimental group.

To determine if a nutrition education program would cause changes in food habits, Head (1974) evaluated a five-month nutrition education program for fifth, seventh and tenth grade students in North Carolina. Approximately 4700 students formed the control and experimental groups. Four fifth-grade, four seventh-grade and four tenth-grade classes, with an average class size of twenty-six, were given nutrition education. Nutrition knowledge, measured by cognitive tests, was significantly ($P = .05$) greater among those having had nutrition education for only the four fifth-grade classes and one seventh-grade class.

Dietary practices were assessed by a three-day food record where foods consumed were scored using the Basic Four Food Guide. Diets improved significantly ($P = .05$) for only the seventh-grade students who received nutrition education.

The authors suggested that the improvement in the diets of the fifth grade nutrition education groups may have been masked since both the control and experimental groups showed greatly improved diets.

Plate waste, for one meal, was used as an indicator of practice change and was found significantly ($P = .05$) decreased for only the four fifth-grade classes in the experimental group. In general, the authors observed that the amount of change decreased progressively at higher grade levels.

From the studies reviewed, it would appear that evidence of a positive relationship between knowledge and practice is limited. Level of nutrition knowledge does not seem to be indicative of, or necessarily sufficient to change level of practice. Although nutrition educators would like to think that those who know the basic concepts and principles of nutrition apply this knowledge in their food choices on a daily basis, research indicates that this is not always the case.

The evidence that change rarely occurs because of knowledge alone has caused researchers to investigate the relationship between other variables, such as attitudes, on behavior. It is thought that attitudes may comprise a stronger motivating force than knowledge in directing man's behavior.

RELATIONSHIPS BETWEEN NUTRITION ATTITUDES AND DIETARY PRACTICES

Rosenberg et al., (1960) have defined attitudes as "predispositions to respond in a particular way toward a specified class of objects." Because of the very nature of attitudes as predispositions, it is difficult to devise accurate measurement techniques. Instead, attitudes are inferred from the way we react to particular stimuli and involve three types of responses: cognition, affect and behavior. That is, every attitude is the result of some information which is evaluated by a person, undergoes some emotional reasoning and is acted upon. These three factors are interdependent. The complexity of each aspect affects the potential for changing the attitude (Giffit et al., 1972).

Although Travers (1967) has suggested that expressed attitudes bear little relation to behavior and concludes that "we don't always do what is best for us," Giffit et al., (1972) have suggested that attitudes direct man's behavior by establishing a framework on which to base decisions. Research has attempted to assess whether or not attitudes are in fact related to behavior. The discussion which follows will review several studies which have examined the nature of the relationship between nutrition attitudes and dietary practices.

In the study by Eppright et al., (1970) cited previously, mothers of preschool children responded to attitude statements on meal planning, food preparation, nutrition and permissiveness in feeding children. Possible responses were "agree or disagree" and "favorable or unfavorable." The overall nutrition score (diet with supplements)

was significantly (and positively) correlated with scores on attitudes toward nutrition (.087), food preparation (.081) and meal planning (.067). A significant, but negative, relationship was observed between the nutrition score and permissiveness (-.123). It should be noted that since the sample size was 2000, a simple correlation coefficient of .058 is significant at the one percent level. The authors concluded that there was a tendency for the quality of the diet to improve when mothers had certain favorable attitudes toward child feeding.

Scores on the attitude test and the nutritive value of the diets without supplements were also compared. Attitudes toward meal planning, food preparation and nutrition were, in most cases, positively correlated with intakes of food energy and nutrients. However, permissiveness was the attitude most significantly, but negatively, related to the nutritive value of the food eaten. In general, the authors concluded that attitudes toward meal planning, food preparation, nutrition and permissiveness in feeding children were factors influencing the nutritive quality of the children's diets with or without supplementation. Of the attitudes, the most influential, but negative, was permissiveness.

Similar conclusions were made by Schwartz (1975), whose study has been described previously. Using a mail questionnaire, respondents indicated agreement or disagreement to eleven statements reflecting attitudes toward nutrition and eating habits, eight about meal planning, and eleven about food preparation. A three-day food record was kept

as a measure of dietary practices. Mean scores were calculated for individual attitude statements and for each food group in the Basic Four Food Guide. Significant correlation coefficients were observed between some nutritional attitudes and practices.

Jalso et al., (1965) surveyed 340 subjects in New York State representing a variety of ages, incomes and educational backgrounds. A group-administered nutritional opinion questionnaire consisting of thirty statements was devised to distinguish between "faddist" and "non faddist" individuals. A questionnaire on nutrition practices assessed the use of food supplements, health foods, methods of weight control, special diets and avoidance of certain foods. A significant ($P < 0.01$) correlation was found between scores on nutrition opinions and practices.

These results are similar to those of Carruth et al., (1977) whose study has been cited previously. Nutrition attitudes of the Nutrition Education Assistants (NEAS) were evaluated by responses to forty statements designed to determine both flexible and rigid attitudes toward changing nutritional practices. Groups of attitude statements were correlated separately from scores on the total forty-item test instrument. For both the experimental and control groups, scores on selected subsets of statements and the overall score on the forty statements were 1) positively correlated with mail requests for literature; 2) negatively correlated with verbal behavior; and 3) positively correlated with observed behaviors. Those results suggested that a more flexible attitude toward changing nutrition behavior was reflected

in more observed behavior rather than as increased verbalization. Furthermore, it was concluded that attitudes not only influence dietary practices but also were better predictors of nutrition-related behavior ($P < 0.01$) than was knowledge.

In general, the literature suggests that there is some relationship between attitudes and behavior. The fact that some researchers have observed a stronger relationship between these variables, than have other researchers, may be explained by Giffit et al., (1972) who suggest that a number of factors influence attitude formation. Furthermore, the complexity of these factors affect the potential for changing the attitude, and ultimately the potential for changing behavior.

RELATIONSHIPS BETWEEN NUTRITION KNOWLEDGE AND NUTRITION ATTITUDES

If attitudes are related to practices, what influences attitudes? Giffit et al., (1972) suggest that one of the major factors causing a change in attitudes is the motivational support for the attitude. Dillehay, as cited by Giffit et al., (1972), describes three forms of such support: 1) knowledge, 2) social adjustment and 3) defense of the ego, and suggests that it is only when attitudes are based mainly on knowledge that information alone can result in a change in attitudes.

Several researchers have examined whether or not a relationship exists between nutrition knowledge and attitudes. For example, Petersen and Kies (1972), using a mailed questionnaire, examined the nutrition knowledge and attitudes of 910 kindergarten and first, second and third grade teachers in Nebraska. Nutrition knowledge was assessed using a modification of the test instrument developed by Eppright et al., (1970). It should be noted that attitude assessment was more of an evaluation of the teacher's attitudes toward the linkage between knowledge and attitudes, whereas other studies in this section assess the actual relationship between knowledge and attitudes. Petersen and Kies (1972) evaluated the teacher's attitudes toward teaching nutrition and school feeding programs by responses to attitude statements which were rated on a five point scale from "strongly agree" to "strongly disagree." Nutrition knowledge was significantly ($P < 0.10$) correlated with the attitude that knowledge of the Basic Four would not be sufficient to ensure selection of an adequate diet. In comparison,

no significant relationship existed between knowledge scores and the attitude that development of a favourable attitude toward food is more important in changing dietary patterns than learning facts. Furthermore, the attitude that learning facts is the best way to achieve behavioral change was significantly and negatively ($P < -.10$) correlated with the teacher's nutrition knowledge. From these data, the researchers concluded that more nutrition knowledge will not necessarily be reflected in more positive attitudes toward teaching nutrition.

In contrast, studies by Eppright et al., (1970) and Schwartz (1975), cited previously, showed significant correlations between nutrition knowledge and attitudes. In particular, Eppright et al., (1970) found that knowledge of nutrition was positively and significantly ($P < 0.01$) correlated with attitude toward nutrition, meal planning and food preparation. Sims (1976), using a mailed questionnaire, drew similar conclusions after assessing the nutrition knowledge and attitudes of mothers of 163 preschool children in a midwestern city. Knowledge was assessed using a twenty-three statement true--false test developed by Eppright et al., (1970). The mother's attitudes about childrearing, family life and their role as parents were assessed by responses to items in a Parent Attitudes Research Instrument. Attitudes toward feelings of permissiveness were measured on a Powerless Scale while a "Nutrition Is Important" attitude scale was designed to measure the mother's attitudes toward the importance of proper nutrition for her child. Agreement or disagreement with the attitude statements was