MSU
LIBRARIES

RETURNING MATERIALS:
Place in book drop to remove this checkout from your record. FINES will be charged if book is returned after the date stamped below.

DEC 8 [illegible]

FEB 0 6 1996

ABSTRACT

NUTRITIONAL STATUS OF PRESCHOOL CHILDREN
IN RELATION TO SELECTED FACTORS
CHARACTERIZING THE FAMILY ENVIRONMENT-
AN ECOLOGICAL APPROACH

By

Laura Smail Sims

Nutrient intake is recognized as but one of many environmental factors which act upon the genetic potential of the young child to influence his physical development. The syndrome of malnutrition occurs not in isolation, but within the context of an entire constellation of environmental factors which together contribute to the final manifestation of the problem. Often differences which may be observed in children's dietary intake may be traced to contributory factors in the home setting. Thus, because nutrient intake may be associated with various environmental characteristics, the approach taken in the present study is ecological, i.e., the nutritional status of preschool children is examined in relation to factors which characterize his near environment, particularly his family.

A total of 163 children served as the sample for the present study. These children were attending either a nursery school program or a public health clinic. Although

the sample was drawn from a relatively small geographical area, the families of the children represented a variety of ethnic, socioeconomic, and resource characteristics. Data collected on the children which would serve to evaluate their nutritional status included: dietary records which were used for the calculation of nutrient intakes; blood tests analyzed for hemoglobin, hematocrit, serum albumin, and total serum proteins; urinalysis for the determination of urinary hydroxyproline and creatinine; and a series of anthropometric measurements. Because the objectives of the research entailed studying nutritional status in an environmental context, mothers of the children in the sample were asked to provide the researcher with data which would serve to characterize the family environment. Data collected included: a home interview to determine demographic characteristics and certain resource and management patterns, an evaluation of the home and immediate neighborhood, and a series of attitude-measuring instruments used to assess certain psychosocial attributes of the mothers.

Analysis of the three-day food records indicated that children in the sample were, for the most part, well nourished. On the average, all nutrients, except iron, either met or exceeded the Recommended Dietary Allowances. For those few children who had nutrient intakes less than two-thirds of the RDA for any one nutrient, those nutrients which were most limiting were iron, ascorbic

acid, calcium, and Vitamin A. Evaluation of the blood components and anthropometric measurements failed to reveal evidences of gross malnutrition. Evaluation of weight and height measurements in reference to accepted standards revealed that more children were overweight for height than were underweight.

Using correlational and multiple-group cluster analysis procedures, a typology of family characteristics and maternal attributes was elucidated which, in turn, had a direct bearing on the dietary intake and resultant physical status of the children. The "Type I" family had a higher socioeconomic status and this mother exhibited more equalitarian attitudes toward child-rearing. In contrast, the Type II family was from the lower socioeconomic groups, and the mother displayed more authoritarian attitudes and powerlessness. The typology of family environment characteristics was directly associated with certain patterns of nutrient intake. Children of the more affluent, non-authoritarian mothers tended to have higher intakes of calcium and ascorbic acid, while children of the Type II mothers ate more calories, carbohydrate, iron, and thiamin. Children of the latter type of mothers tended to have higher hemoglobin and hematocrit values and were somewhat more overweight for their height.

The primary contribution of the present research is the demonstration that an ecological approach is a viable

means of studying the nutritional status of individuals in the context of their environmental setting. In addition, multivariate analysis procedures were effectively used to establish a typology of family environment characteristics which exerted a direct influence on the dietary intake and the consequent nutritional status of children within particular family environments.

NUTRITIONAL STATUS OF PRESCHOOL CHILDREN IN RELATION TO SELECTED FACTORS CHARACTERIZING THE FAMILY ENVIRONMENT- AN ECOLOGICAL APPROACH

By

Laura Smail Sims

A THESIS

Submitted to

Michigan State University

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

Department of Food Science and Human Nutrition

1971

67-23,1

© Copyright by
LAURA SMAIL SIMS

1972

DEDICATION

In honor of my mother, and
in memory of my grandmother,

whose inspiration instilled
a love for learning.

ACKNOWLEDGMENTS

Any successful research results not from the efforts of a single individual, but as a cooperative venture among many. It is virtually impossible to conduct a study of this nature without accumulating numerous debts to many people.

Sincere appreciation is extended to members of my guidance committee:

To Dr. Portia M. Morris, Department of Food Science and Human Nutrition, who served as my major professor, for her continuous support, encouragement, and guidance throughout this research.

To Dr. Dena C. Cederquist, Department of Food Science and Human Nutrition, for her interest and support throughout my course of study.

To Dr. Beatrice Paolucci, Department of Family Ecology, for her incisive direction and encouragement throughout the study.

To Dr. Everett M. Rogers, Department of Communication, for his interest and advice, particularly in the area of multivariate analysis.

Dr. Dr. William B. Weil, Department of Human Development, for his support and advice regarding assessment of physical development and nutritional status.

Thanks are extended to Dr. Robert P. Boger, the teachers and staff of the M. S. U. Laboratory Preschool Program, to Miss Mariella Aikman and the staff of the Spartan Nursery School, and to the staff of the Cristo Rey clinic for their invaluable assistance in helping me to obtain data from the children and their mothers.

Sincere appreciation is expressed as well to others who helped me with various phases of the study.

To Dr. Olaf Mickelsen and Dr. Modesto Yang, of the Department of Food Science and Human Nutrition, for technical guidance and advice regarding determination of nutritional status.

To Mrs. Margaret Shick and Mrs. Nadine Fisher of the Olin Health Center who were responsible for the collection and analysis of blood samples.

To Tom Nicol, Steve Huyser, and Dr. John Hunter of the Department of Psychology, who were extremely helpful in assisting me with the computer analyses and interpretation of data.

I also wish to express my heartfelt appreciation to all the families who welcomed me and my interviewers into their homes. Without their cooperation and interest, this study could never have been conducted.

Finally, a personal note of thanks is due to my husband, Henry P. Sims, jr., without whose understanding, encouragement, and insightful advice, this project would never have reached fruition.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

Nutrient intake is but one of a myriad of environmental factors that affects the growth and development of young children. Malnutrition does not occur in isolation; many of the non-nutritional factors which contribute to its occurrence may independently operate to influence development. Often differences in the level of dietary intake are associated with other profound differences in familial characteristics and environmental circumstances. Because preschool children are, by necessity, dependent on others (primarily other family members) for the provision of food as well as environmental stimulation (both factors which operate to influence growth and development), it is proposed that data on the physical growth and nutritional status of the preschool child is most meaningful when examined in the context of his home and family environment. It has been emphasized that, "...much more research is needed on the effect of interrelationships between socio-psychological and physical factors in the environment on the...physical status of the child (Wakefield and Merrow, 1967)."

The relationships which exist between malnutrition, certain disease states, and physical development have been well documented, although the underlying mechanisms are not yet well elucidated. It is commonly recognized that per capita income, infant mortality, sanitation, and malnutrition are interrelated. But, why then, are children from families of similarly low levels of income and deprived environmental circumstances not equally impaired in terms of nutritional status? Is it possible that the end result (in this case, malnutrition) may be a result of more than the linear sum of the individual contributing factors? It is not sufficient to identify only evidences of the clinical nutritional deficiency; the entire constellation of ecologic factors contributing to the problem must be examined (Read, 1970). Thus, there is a need for the development of a theoretical model for the study of the syndrome of malnutrition which identifies underlying causes as well as showing interrelationships among contributory factors.

The model presented by this research focuses on the nutritional status of the preschool-aged child. The Conference, "Malnutrition Is A Problem of Ecology", called attention to the fact that the preschool child was at the most vulnerable age class in human development (Gyorgy and Kline, 1970). Bloom (1964:200) suggested that, "the environment will have its greatest effects in

the period of most rapid development." This statement lends additional support to the contention that the young child is most vulnerable to changes in his environmental circumstances.

It has been established from the results of animal experimentation that undernutrition at an early age may exert an adverse effect on subsequent physical development (McCance, 1962). There is considerable evidence both direct and indirect, that the increased growth rate seen in some children is attributable to improved nutrition (Greulich, 1958). Growth of underprivileged children, both in developing countries and in the so-called developed countries, is accelerated when they receive improved environmental care (especially better food and more protection from infectious diseases), a factor which is especially evident in the critical preschool age period (Jackson, 1966:18). In addition to the effect of nutritional intake on physical development of children, food practices and attitudes developed during the formative years of childhood tend to persist into adulthood. Eating practices thus established during the early years are believed to affect food choices and consequently, nutritional status throughout life.

Thus, because food intake varies with environmental circumstances, the approach taken in the present study is ecological, i.e., a nutritional status of preschool

children is examined in relation to factors which characterize the near environment of the child, particularly his family.

Objectives

The primary objective of the present research is to study the relationship between a child's physical growth and nutritional status with selected factors which may be used to characterize the family environment. A second objective is to determine which variables (of those selected as representative of the family environment) are the most predictive of the level of nutritional status of the preschool child. In addition, the study also seeks to obtain information on the physical growth and nutritional intake of children from several socioeconomic groups. A final objective entails the development of a conceptual framework appropriate to the study of nutritional status of children from an ecological perspective.

Assumptions

1. Sociopsychological disturbances in the family environment exert an adverse effect on the physical growth and nutritional status of the growing child (Fried and Mayer, 1948).

2. Nutritional status and family environment characteristics can be adequately appraised using the instruments selected for this study.

3. Mothers of preschool children are familiar with the family characteristics and eating practices of their children and can accurately report on such practices.

CHAPTER II

DEVELOPMENT OF THE CONCEPTUAL FRAMEWORK

It is important in any research study to assimilate data from the literature in order to condense findings into a unified and valid theory. Conceptual frameworks have been used increasingly in recent years because of their contribution to theory building, i.e., they introduce orderliness into the research process and provide opportunities for replication and application of the findings. Hill and Hansen (1960) use the term conceptual framework to refer to "clusters of inter-related but not necessarily inter-defined concepts." Nye and Berardo (1966:5) have suggested that conceptual frameworks have three functions: 1) identification of factors that enter into behavioral processes; 2) tracing the sequence of various stages of behavioral processes; and 3) description of structural relationships between and among factors suspected to be associated with observed behaviors. The present study is primarily concerned with the latter function, i.e., the development of a framework by which the nutritional status of children may be studied.

An Ecological Systems Approach

In the development of a conceptual model for the study of the nutritional status of population groups, it is proposed that the most meaningful approach is one which deals with the subject population as an "ecosystem." An ecosystem framework is appropriate for the study of nutritional status because it integrates the science of ecology with the systems approach.

A system may be conceptualized as "a set of components which act with and upon one another to bring about a state of balance, inter-dependence, or 'wholeness'" (Havelock, 1971). On the other hand, the environment may be thought of as "all other factors [outside the system] which impinge upon that system" (Chin, 1969).

Systems may be characterized as either "open" or "closed." Closed systems are isolated from their environment in that there is no exchange of information across system boundaries. In contrast, open systems may exchange information, energy, and materials with their environments. Living entities most certainly demonstrate the complexity of open systems, i.e., they have inputs and outputs.

Systems may be further described as "static" or "dynamic." In static systems, components exist in a more or less fixed relationship with one another. In contrast, components of dynamic systems act upon one another; they force changes in a pattern of action and reaction that

maintains a dynamic equilibrium or balance of forces. Most systems that can be identified and examined in the real world are likely to be open systems which contain both dynamic and static components (Havelock, 1971).

In classical terms, ecology may be defined as the science of relationships between organisms and their environment. An ecological perspective in the study of living systems enables one to consider the "whole" being rather than isolated component parts in the analysis of any system. Jackson (1966) has stated,

> The study of nutrition is a study of ecology, and for a valid assessment the whole of the environment must be examined.

The term "ecosystem" is used to describe the basic functional unit for the study of living entities (Evans, 1956). This term, first proposed by Tansley in 1935, refers to the interaction system comprised both of living things together with their non-living habitat, intimately linked by a variety of biological, chemical and physical processes.

> An ecosystem, can be visualized as a grouping of components linked by... flows of energy and connected to the surrounding biosphere by its system of inputs and outputs (Bormann and Likens, 1970).

All ecosystems are open systems in that matter-energy continually escape from them in the course of life processes and must be replaced if the system is to continue to function (Evans, 1956).

The environment of the ecosystem is seen as providing resources potentially useful for the maintenance of life. Two types of environmental factors may be distinguished: 1) those independent of man, i.e., the physical and biological components; and 2) those related to the association of man with his fellow man, i.e., the social, cultural, and economic features of human existence (Rafalski and Mackiewicz, 1968). Within this total environment can be superimposed three human systems: 1) the biophysical, or metabolic and physiological processes; 2) the psychosocial, or the interpersonal relationships expressed by individual and collective patterns of behavior; and 3) the technological, which includes materials, tools, and techniques (McHale, 1968).

In order to utilize the systems approach effectively, it is imperative that the environmental factors which impinge upon the system be identified. Obviously, this task is far easier in describing physical systems than for systems in the life, behavioral, or social sciences. Many of the models which have addressed themselves to the multiple etiology of malnutrition focused upon a particular environment which exists in the developing countries. The ecosystem approach allows one to develop a model which is appropriate for describing the environment for a complex, affluent society, as well as for more primitive societies.

According to Kartman (1967), the term, "human ecology" implies,

> The broadest possible view of human beings, both as individuals and as populations, in terms of the ecosystem, that is, the biologic, socioeconomic, political, cultural, and emotional complexes in their dynamic action and reaction.

Hanlon (1969) emphasized that the convergent complexity of the relationship of total man to his total environment must be recognized. He suggested that human ecology attempts to develop a conceptual framework whereby,

> ...needs of mankind--as individuals, in groups, and as communities--may be approached, not merely in a reductionist fashion...but rather in a holistic manner wherein the integrated responses of man to environmental forces find expression.

The human ecologic approach must, by necessity, draw upon an interdisciplinary effort. Auerswald (1968) indicated that an ecological systems approach focuses on the interfaces between various disciplines and the processes taking place there, rather than on the conceptual framework of each contributing discipline in the research. He suggested that this type of analysis coupled with the holistic nonexclusive nature of the ecological approach, minimizes the dangers of excessive selectivity in the collection of data and allows for much more clarity in the contextual contributions to the analysis of the problem.

Characteristics of Ecosystems

Miller (1971) has stated that living systems are composed of matter and energy, organized by information. Thus, two cycles, or flows, may characterize an ecosystem: 1) the matter-energy flow, and 2) the flow of information. The movement of matter-energy over space, action, is one form of process which describes the first type of flow. Another form of process is information processing or communication, which is the change of information from one state to another, or its movement from one point to another over space (Miller, 1971a). The exchange of matter-energy contributes to the information a system processes, and communication of any type requires the input or out-take of matter-energy. Information signifies input of matter-energy or perceptual data from outside the system. Matter-energy and information always flow together (Miller, 1971a).

Hanlon (1969) has applied the notion of the flows of matter-energy and information in the ecosystem to the study of human ecology:

> ...We can think of the biosocial organism that we call man as an open-ended system through which the energy, resources, and influences of the environment are transformed for good or ill, and which transforms man in the process... From the sociocultural component comes the never-ending stream of informational stimuli which require correct decisions or adaptive strategies that too often pose a threat to psychological and social integrity, and trigger emotional and

> behavioral patterns inimical to self and others.

The Flow of Matter-Energy in the Ecosystem

Katz and Kahn (1966:16-17) indicate that open systems are characterized by,

> ...input of energies and the conversion of output into further energic input [which] consist of transactions between the [system] and its environment. ...The stability or recurrence of activities, in the system can be examined in relation to the energic input into the system, the transformation of energies within the system, and the resulting product or energic output.

For all living things it is essential that a source of energy, in the form of calories, be provided from the environment in order to carry out growth and maintenance of life.

The matter-energy flow through a system consists of three processes: 1) the input from the environment; 2) the transformation or utilization of energy by the organism; and 3) the output of energy from the system, which may or may not be recycled back into the system (Katz and Kahn, 1966).

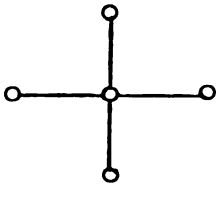
The energy flow model may be applied to the study of nutritional status for energy which is essential for the maintenance of life and the promotion of growth is furnished from the larger environment. Although an individual functions as an ecosystem himself, he is also a member of a larger system--a family--which in turn exists

as but one subsystem in a much larger supersystem, or macrosystem. The input of energy (in the form of food) to the individual comes, usually, as a result of the transactional process between the family and the total environment.

The Flow of Information in an Ecosystem

Ecosystems, as any human organization, are informational as well as energic systems in that both the exchange of matter-energy and information with the environment must be considered in order to understand the overall functioning of the system. Information exchange is itself energic, but its energic aspects are negligible compared with its symbolic aspects, i.e., information flows are significant for what they imply, trigger, or control (Katz and Kahn, 1966:257).

Communication circuits, or information flows, within systems, may be characterized by the type of communication network which they represent. Several types of networks (named the "circle", "all-channel", and "wheel") have been proposed (Katz and Kahn, 1966:237). The "wheel" network is most appropriate for consideration in the evaluation of nutritional status. This type of communication network may be represented by the following diagram:



where each circle represents one individual in the system (such as the family).

Using the "wheel" network as a model for information flows, the mother in a nuclear family may be represented as the central figure. She acts as the major link between the outside environment and the other family members in that it is usually she who is responsible for the preparation and distribution of energy, i.e., food, to the family members.

Cultural patterns and folkways exert a powerful influence on the physical distribution of food to individual family members. In some African cultures, heads of households receive food first and consume the larger portion of what is made available, often thus depriving the small children of sufficient calories or protein to meet their nutritive requirements for growth. In the "typical" American family today, it seems (upon observation) that even when the amount of food available to the family is limited, small children are usually adequately fed, and their food likes and dislikes are a strong influence upon decisions regarding meal planning for the family.

The use of the "wheel" communications network to analyze the flow of energy and information within the family system has relevance to Lewin's "channel theory" (1943) in which he described his theory why people eat what they eat. Lewin (1943) suggests that food comes to the table

via channels that are controlled by a "gatekeeper" figure, usually represented as the mother. The mother's psychology exerts an influence on food habits of the family. In turn, her choice of food may be influenced by: 1) her cognitive structure, i.e., what she considers "food for us" and what "fits into our idea of meals", and 2) the values behind her choice of foods, e.g., her motives and ideologies such as health, taste, status, cost.

The Ecosystem Approach to the Study of Nutritional Status

Two types of systems may be considered in the study of the nutritional status of preschool children, namely the family and the individual child. Hook and Paolucci (1970) suggest that the family may be viewed as an ecosystem on the basis that interdependent relations between man and his near environment basically focus on the family which acts as a life support system in providing both physical and social nurturance. The family as a life support system links both the natural environment with the social environment because of its mutual dependency upon both the natural environment for physical sustenance and upon the social organizations which are related to man's humanness and give quality and meaning to life. Because the interactions of man as a total being and his near environment may be managed and controlled by the family, an ecological approach is implied.

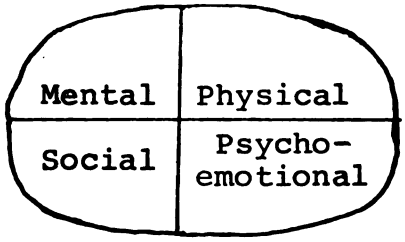
Literature from the field of home management suggests that family resources, both tangible and intangible, may be managed in such a way as to direct family behaviors toward predetermined group goals, the major one being growth and development of individual family members.

> Home management helps the group create an environment in which members can perform, grow, and develop as individuals and at the same time, cooperate in attaining group goals (Paolucci, 1966).

The family may be seen as a system in that it acts as a processor or convertor of input goods and services from the environment, by means of services (managed in such a way as to meet the needs of individual family members), and produce an output flow of converted products, waste, or surplus. Thus, when families manage resources appropriately and establish relevant goals, requirements of children will be met for a supply of required nutrients (as food) and for emotional support and stimulation, all required for optimum growth and nutritional status. The individual family may be viewed as but one of a number of subsystems (such as the political system, the educational system, the religious system, etc.) within the total social macrosystem.

A second type of system which may be defined is that of the individual child as an ecosystem. The individual may be viewed as a type of open system in that he, too, is a processor of information, materials, and energy from

his environment which he utilizes to provide sustenance to meet physical, mental, emotional, or social needs. Nutritional status and physical development of the child are but facets of a larger, more complex, system which contributes to the total ecosystem concept of the child, thus:



This approach views both the individual as a system and the family (as a unit of interacting personalities) (Hook and Paolucci, 1970) as a subsystem within the larger social macrosystem. The family is regarded as a system; however, in addition, this model also assumes that the family acts as environment for the developing child.

> The family is seen as both an environment for the individual and as existing in a larger physical and biological and social environment; the family exists within only part of the total environment (Hook and Paolucci, 1970).

In essence, the family functions as an interface between the developing child and his larger environment. (An interface is the boundary across which matter-energy or information is transmitted from the external systems into the system at issue.) Breckenridge and Murphy (1969) state,

> ...how a child's needs will be met will depend upon the family and the circumstances in which it lives.

Certain fundamental needs, both physical and psychological, which are considered basic to a child's sense of well-being and optimum development include: 1) warmth, both physical and close personal warmth or love (conceived of as an information flow component in the present model); 2) physical and psychologic security; 3) dependence and independence; 4) nutrition; 5) activity, which includes movement itself and as it provides a means for exploration of the larger environment; 6) rest and sleep; 7) social contact. The child, although independent in being able to satisfy his tissue needs for nutrients and energy, to excrete waste products of metabolism, and to make involuntary movements, is dependent on others (primarily the family) to provide him with food, warmth, and security (Breckenridge and Murphy, 1969).

Implications of the Model

Nutrition is recognized as an important environmental factor affecting the growth and development of young children. Moreover, the food practices and attitudes developed during the early years are established primarily by the family in which the child is raised. Such food habits are believed to affect food choices, and consequently, nutritional status throughout life. The development of food habits in children as a result of

family mealtime practices reflects an inter-meshing of the flows of energy and information. We may consider that food habits are a result of the transactional patterns between resources which may enter the family from the environment, and the family's use of such resources which, in turn, may vary as a result of the decision-making and valuing processes.

Flows of matter-energy and of information in the ecosystem act together to influence the nutrient intake, and physical development of the child. The matter-energy flow relates to the provision of food to the child to meet his physical, or survival, needs, while the information flow relates more specifically to the affective or behavioral components of the system. Man directs his available resources to meet his needs, both for the survival and affective components of his environment.

The energy flow concept may be related to Maslow's "Hierarchy of Needs" theory. In this concept, Maslow classified all human needs into either physiological (survival) and social (e.g., the belongingness and love needs, the esteem needs, and the self-actualization needs). He maintains that a minimum satisfaction of a need at one level is essential before the person can move on to seek satisfaction of the next need in the hierarchy. From this theory, one can postulate that only when a person has enough food to satisfy hunger, i.e., to meet the

survival need, can he be interested in any other meaning for food (Lawenberg *et al.*, 1968:105-106).

The flow of information in the system (the "communication circuit") reflects, to a large degree, the affective or socio-emotional components of the child's environment. Many studies have been conducted to determine the influence of the emotional climate on the child's physical growth and development. Widdowson (1951) suggests that an unfavorable psychological environment may operate independently of caloric intake to retard linear growth. Fried and Mayer (1948) emphasize that emotional adjustment and physical growth of children are inseparably related. Patton and Gardner (1962) indicate that there are several means by which disturbances in the sociopsychological quality of the environment could interfere with growth, including: 1) inadequate intake of calories to meet physiological needs; 2) reduction in appetite resulting from the child's lethargy and depression; 3) altered intestinal motility and rates of absorption resulting from emotional disturbances; and 4) emotional effects on the endocrine system resulting in an interference with intermediary metabolic processes. A review of studies both on children reared in an institutional setting and on those who experienced maternal deprivation in their own homes, revealed that neglected, or emotionally deprived, children may not grow as well as happy, emotionally secure youngsters.

Kallen (1971) has suggested that the slower mental development observed in some children from disadvantaged environment may simply be a reflection that these children had insufficient energy to benefit from social stimulation provided by the environment. Likewise, Dubos (1968:86) observed:

> ...a child may be listless, dull, and immobile because he hasn't enough energy to act otherwise.

Such examples provide support for the contention that the flows of matter-energy and information within the ecosystem are inseparably linked; both must be functioning well in order to meet the needs of the system.

Whitten *et al.* (1969) undertook a study to test the validity of the assumption that the growth failure in the maternal deprivation syndrome is due solely to psychological factors. Their data suggest that maternally deprived infants are underweight not because of some psychologically induced defect in absorption of metabolites, but because of undereating, secondary to not being offered adequate food, or not accepting what is offered. Studies such as this demonstrate the interelatedness of the matter-energy flow with the information flow, i.e., the amount of matter-energy available to the system influences communication patterns, and in turn, information flows influence the utilization of matter-energy components, such as food.

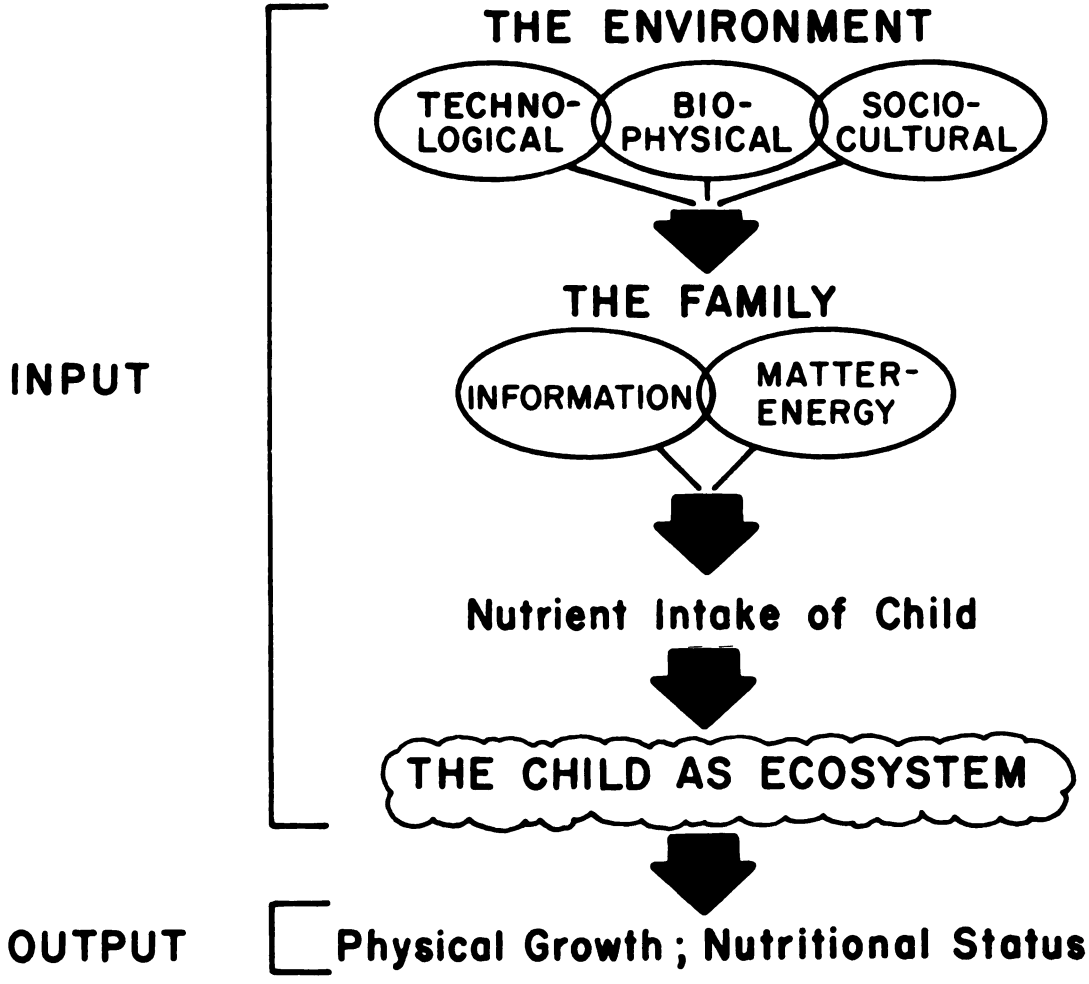
Description of the Model

The concept of the "child as ecosystem" implies a dynamic, changing system. Moreover, it is acknowledged that the present model is somewhat limited in its capacity to deccribe the ecosystem concept in its entirety because of its static nature, and because it views the subjects at one point in time rather than over their entire life span. The overall conceptual model developed to study nutritional status of preschool children is shown by Figure 1.

In the context of this model, nutrient intake of the child is seen as the most significant linkage between the systems of the family and the individual child. (Linkage is a term which may be used to indicate that two systems are connected so as to form a greater system; it suggests a regularized pattern of interaction between the two systems which in a sense forms a bond between them (Havelock, 1971:2-10).) Nutrient supply to the child is an output of the family system in that it is a result of the processing features or the interplay between the matter-energy and information flows within the family system. The child (functioning as an ecosystem), in turn, processes the nutrient supply in such a way as to produce (as outputs of the system) his physical development and nutritional status. The model as developed has been used to study physical development of preschool

Figure 1

A CONCEPTUAL MODEL FOR THE STUDY OF NUTRITIONAL STATUS OF CHILDREN



children; however, it is suggested that it may be also appropriate for the study of mental development and behavioral patterns as well.

CHAPTER III

SELECTION AND MEASUREMENT OF VARIABLES

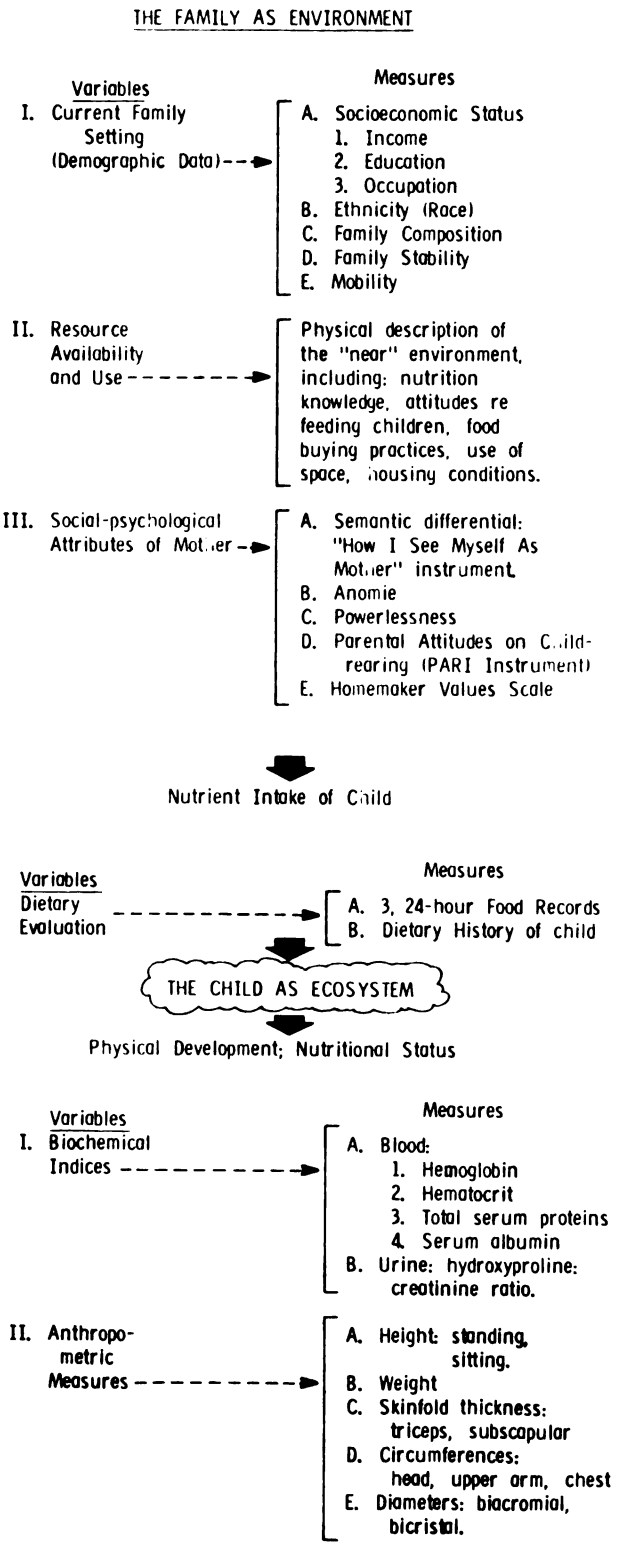
This chapter presents a brief discussion of the rationale behind the selection of each category of variables included in the model. In addition, the specific measurement techniques and procedures used to assess each variable in the present research are discussed.

Figure 2 is a more detailed version of the model which describes categories of variables which are applicable to the study of nutritional status from an ecological perspective. These variables have been chosen for study in the present research because of evidence in the literature that such factors are influential in characterizing the family, or because they represent an appropriate way of measuring physical growth and nutritional status of children.

The Family as Environment

The premise that the family acts as the immediate environment for the developing child is the basic assumption of the ecological approach to the assessment of nutritional status in this study. The family plays a key linking role in providing the conditions for interchange between the developing organism and the larger

Figure 2. Description of Variables in Study



environment. A family may be viewed as, "a corporate unit of interacting and interdependent personalities who have a common theme and goals, have a commitment over time, and share resources and living space (Hook and Paolucci, 1970)."

For the child, the family might be considered as an environment which represents a primary set of powerful pervading forces which affect human characteristics, such as physical development and nutritional status. Within the home setting, as well as in the neighborhood and community, in which the young child is living and carrying out his daily activities, would be found those environmental resources or means for enabling him to meet his growth potential. Operationally, the environment would be bounded by the child's direct and indirect involvement with these resources, whether they be persons, activities, or objects (Baker, 1970:50-51).

Children are not isolated beings; they exist not only as individuals, but as members of families, as members of peer groups, and as members of general social systems. Any study of the nutritional status of children which fails to consider the impact of the family and other environmental influences can be expected to provide only limited insight regarding the nature of the situation. It is duly recognized that the influences upon a child's well-being act as a complex of interacting factors.

Identification and analysis of the interrelationships among such variables is essential for a complete understanding of nutritional status of children.

It is acknowledged that a wide range of environmental forces may act concurrently to influence human development. Burgess *et al.* (1942:29) suggest:

> ...any [factor]...may legitimately become the focus of interest: the biological influences,..., the highly specific features of the immediate environment, or, finally, those more general influences which are characteristic of a particular culture... . A one-sided emphasis on any of these factors necessarily leads to false conclusions.

Stott (1967:405-407) suggests that family environmental factors which act to influence the development of children may be divided into two classes: 1) those that relate to family functions, such as providing the common essentials for health, growth, and personal development; and 2) family structural differences, such as the composition, physical and social nature, as well as the cultural backgrounds of the family itself. It is apparent that families differ structurally, for instance in the number of family members, in the sex and age distributions of children in the home. In addition, differences are to be found in the physical facilities of the home, the general educational level of family members, and the adequacy of intellectual and cultural stimulation within the home setting.

An outstanding example of the interchange between the developing child and his larger environment via his family is related to the food intake and dietary practices of the family. The adequacy or inadequacy of the food intake of the growing child depends directly, and in most cases completely, upon the family, most specifically the mother. The role of family members in influencing the development of dietary practices of the young child may be viewed from two aspects: 1) the family directly influences dietary practices in terms of its obligation to provide the child with the necessary foods in sufficient quantities and in forms suitable to his needs and his ability to manage them, and 2) indirectly, dietary practices are influenced by the family's transmission of food attitudes, preferences, and other factors which affect lifetime eating patterns.

In summary, two aspects by which the family serves as an environment to influence the nutritional status and physical development of the young child are:

1. The family controls the food intake of the child, and in general, is responsible for directly providing the appropriate nutrients of sufficient quantity and quality which act to influence the child's development.

2. The emotional climate of the home setting influences the child's physical growth. Studies, both on children in an institutional setting and on those in their

own homes who experienced "maternal deprivation", have shown that neglected, or emotionally deprived, children may not grow as well as happy, emotionally secure children (Widdowson, 1951; Fried and Mayer, 1948; Patton and Gardner, 1962).

Demographic Characteristics

Jessor and Richardson (1968) indicate that demographic characteristics of the family (including race, amount and source of family income, occupation and education of parents, family composition [age and sex of family members] marital status of parents, mobility, and the like) may be considered components of the distal environment. They suggest that such distal environment characteristics can serve as indicators for the kinds of behaviors which can be expected of people located within a specified strata within the larger society. Comparable factors, such as family income, education and occupation of parents, family size and composition, employment status of the parents, and arrangements for child care when the mother is employed, have been included in other nutrition studies, such as the North Central Regional Study of Diets of Preschool Children (Fox *et al.*, 1970) because it was felt that such variables influenced food habits and the nutritional well-being of the children. In the present research such variables were included for study in order to more completely assess those environmental characteristics

which are most influential in affecting the nutritional quality of preschool children's diets. In addition, comparisons can thus be made with other studies which used the same variables.

The concept of "socioeconomic status" has received considerable attention in recent literature. It is generally accepted that socioeconomic status (SES) is not defined solely by the level of income, but is also related to education and occupation. One index of socioeconomic status used in the present study was that developed for the Washington Heights Mental Health Survey and published in the Milbank Memorial Fund Quarterly (1969). This Index was formed as a summative score on the basis of the education and occupation of the head of household and the total family income. Students who were also heads of households were evaluated on the basis of potential occupations, i.e., they were rated in the "professional and managerial" classification. There was a preponderance of scores in the nine to thirteen range in this sample of preschool children's families.

Education of the parents was coded independently as the number of school years completed. Parental occupation was coded according to the system developed by the Bureau of the Census as "scores for categories of occupation component" (Bureau of the Census, 1967).

The family may be viewed as a developing entity in that as circumstances change, the family as a unit also

changes in order to cope with them. One approach used to study the family's sequence is in terms of its life cycle. Duvall (1967) has developed the concept of the "family life cycle" whose stages are determined according to the ages of the children and adults in the family, as follows:

Stage I	Beginning families (married couple without children)
Stage II	Childbearing families (oldest child, birth to 30 months)
Stage III	Families with preschool children (oldest child 2 1/2 to 6 years)
Stage IV	Families with school children (oldest child 6 to 13 years)
Stage V	Families with teenagers (oldest child 13 to 20 years)
Stage VI	Families as launching centers (first child gone to last child's leaving home)
Stage VII	Families in the middle years (empty nest to retirement)
Stage VIII	Aging families (retirement to death of both spouses)

This scheme was used in the present study as one means of classifying individual families in the sample.

Family Resources

Literature in the field of home management emphasizes that through the use of resources families are able to achieve their goals. Thus, in order to achieve the goal of optimum development for its members, the family must have sufficient resources and be able to manage them well. Obviously, in terms of the study of nutritional status of children, the family must have resources so that sufficient nutrients may in turn be channeled to the child. Deacon and Maloch (1966) define family resources as, "...any-

thing--knowledge, abilities, and skills, objects--which can be used or which has direct application in the meeting of demands."

Gross and Crandall (1963:124) have suggested that family resources may be classified as human, which include time, energy, skills, knowledge, attitudes, and nonhuman which would apply to tangible goods and facilities. They stress that there may be potential human resources (such as increased capabilities in a particular skill) which may not presently be available for family use.

In addition to studying tangible resources such as family income, the amount of money spent for food and other food buying practices, it is equally important to assess the human resources in the family which relate to the child's nutrient intake. For this reason, variables such as the mother's knowledge of nutrition, her attitudes about feeding children, and factors which were influential in helping her choose what foods to feed her family are considered for study.

Important among the human resources which may act to influence the child's nutrient intake and, consequently, his physical status are the mother's knowledge of nutrition and her attitudes about the feeding of children. Morse *et al.* (1967) after assessing mothers' levels of nutrition knowledge using a standardized test, determined that the higher the level of education, the better was the

mother's knowledge of nutrition facts. In addition, a course in nutrition (irregardless of the level of higher education) was directly beneficial to the score attained. The investigators found positive linear correlations of mothers' scores of the nutrition knowledge test with the blood levels for plasma ascorbic acid, and, in male children, with plasma carotene and cholesterol levels.

Eppright *et al.* (1970) reported associations among the scores of mothers on nutrition knowledge and attitude tests, nutritional quality of the children's diets, and selected socioeconomic factors. They reported that the mothers of the children with the lowest and highest calorie intakes had the lowest nutrition knowledge test scores. Of the attitudes investigated, that of permissiveness was negatively correlated with all nutrients, except fat. Favorable attitudes toward nutrition did not seem to influence the nutritional quality of the children's diets. Of the socioeconomic variables studied, that of education of the mother was more highly related than was income to dietary components, but was less highly related than were money spent for food and the number of persons in the household.

In the present study, several means were used to assess the amount of family resources and the manner in which they were used. The amount of family income was recorded independently as a variable. In addition, in

their study of the assessment of socioeconomic status, Warner *et al.* (1949) concluded that source of family income was as significant a variable as was the absolute amount of income. Their classification scheme for determining source of income was used in the present research.

The mother's level of nutrition knowledge and her attitudes about feeding children were measured using tests previously validated by empirical research[1] (Appendix C-3e).

The test designed to measure the knowledge of nutrition was composed of twenty-three true-false items dealing with factual information about nutrition. The total number of correct responses was used in subsequent statistical analyses.

Attitude-measuring scales[1] (Appendix C-3e) were employed to measure the mother's attitudes regarding the importance of nutrition for the child and her feelings about permissiveness in feeding children. Responses were scored on a Likert scale so that a "strongly agree" opinion was assigned a score of one while responses of "strongly disagree" were given a value of four. Thus, a lower score on these instruments indicated that the mother felt that

---

[1]The tests were developed at Iowa State University, Ames, Iowa, under the direction of Dr. Ercel S. Eppright, Professor of Foods and Nutrition, and were used in the North Central Regional Study on Diets of Preschool Children (Eppright *et al.*, 1970).

proper nutrition was most important for her child or that she was highly permissive regarding the feeding of her children.

Space, as evidenced by family housing conditions, is an important resource to be considered when defining environmental characteristics which influence a child's physical growth. Havighurst and Neugarten (1942:206-207) indicate that the "life-space" in which a child lives and grows involves at least three different elements, including "the physical space, the objects contained within that space, and the people who inhabit that space." Crowded living conditions have been identified as characteristic of persons in the "lower" class (Bell, 1965). Rice (1969), in a study with preschool children to determine the effects of different housing environments and participation in a Head Start program on the achievement level of the children, concluded that:

> ...rather than acting as a direct controlling influence in a child's growth and development, the housing environment may simply provide the setting or the conditioning variable which encourages or inhibits the influence of other variables within the total social environment.

Housing and neighborhood quality were assessed by the interviewer according to guidelines developed by the U. S. Bureau of the Census (1963). Each dwelling unit was visually inspected immediately before or after the interview with the child's mother. The dwelling inspection

items were tallied to place the dwelling structure in one of four housing quality classifications: poor, fair, good or excellent (Rice, 1969). An attempt was made to obtain at least a cursory appraisal of a sample of the immediate neighborhood around each dwelling. Land use was noted and structural condition was recorded simply as dilapidated, deteriorating, or sound. Because literature has revealed that crowding may be appraised using the "one person per room" standard, this procedure was also included in the present study.

Psychosocial Attributes of the Mother

Bloom (1964:222) has indicated that a distinction should be made between:

> ...environmental measures which are based on relevant...features of the environment and a set of procedures which more searchingly summarize the interactional processes between the individual and various features of the environment... . The second approach should be especially useful for the further development of theories of human development and for attempts to alter environmental conditions.

Thus, in addition to demographic characteristics of the family and a description of available family resources, it is important to assess some aspects of the qualitative facets of the family system as environment for the developing child, i.e., characteristics which would be indicative of the affective components, or communicative and symbolic aspects, within that family system. The

following sections describe variables which were chosen for study because they characterize these psychosocial attributes of the child's mother, the key link between him and his near environment. Included also is a description of the manner in which these variables were measured in the present research.

Parent Attitude Research Instrument

Mothers' attitudes about childrearing have been assessed in the present study by use of the "Parent Attitude Research Instrument" (PARI) developed by Schaefer and Bell (1958). The authors' aim was to develop an instrument which would indicate how mothers felt about family life and their role as parents. Theoretically, such attitudes would extend to the mother's behavior toward the child and would, in turn, have a bearing on the child's physical development and nutritional status.

The original instrument contained 115 items, designated as beonging to thirty-two attitude scales (Schaefer and Bell, 1958). Cross and Kawash (1968) developed a shortened form of the PARI, which according to them, could be used to measure authoritarian attitudes about child-rearing. This revised instrument contained the following scales: Encouraging Verbalization, Equalitarianism, Deification, Excluding Outside Influences, Irritability, and Deception (used as a filler in this shortened

instrument because it was not associated with authoritarian attitudes.)

Schaefer and Bell (1958) indicated that selection of concepts for measurement in the attitude instrument was based upon a literature search for areas which could provide information relevant to parent-child relationships. Several of the "rapport" scales contained in the instrument included Equalitarianism and Encouraging Verbalization. The latter scale was written, according to the authors, to determine whether the parent would permit or encourage the child to talk about his anxieties, conflicts, hostilities, and disagreements with parental policies. Several of the scales were designed to measure concepts of marital adjustment and tensions in the home environment. Rejection of the Homemaking Role measured the mother's discontent over the confinement found in homemaking and dissatisfaction with the duties and responsibilities required of the homemaker and parent. Irritability scale was developed around items which indicate that children "get on a woman's nerves" and that any woman would "blow her top" frequently in the difficult job of managing a home. The authors felt that this scale may be related to several sources of tension, including tensions in the marital relationship.

Schaefer and Bell (1958) cite evidence of content validity for their instrument. Reliability was established

by the test-retest method. Pearson product-moment correlation coefficients reported for the scales used in the present study were:

	r
Equalitarianism	---
Deification	.79
Encouraging Verbalization	.61
Irritability	.73
Excluding Outside Influences	.67
Rejection of the Homemaking Role	.72

In the present research, the shortened form of the PARI developed by Cross and Kawash (1968) was administered to mothers participating in the study. Originally, the scale, Rejection of the Homemaking Role, had been omitted from the short form in order to make the instrument suitable for use with fathers as well as mothers. For purposes of the present study, however, this scale was reinserted into the instrument because only mothers' responses were being evaluated. The final instrument used contained fifty-three items belonging to seven scales, according to the following distribution: (Copy of the instrument is in Appendix C-3a.)

Table 3.1. Items in PARI According to Scale Designation.

Scale	Number of Items
Rejection of the homemaking role	(8)
Excluding outside influences	(5)
Irritability	(5)
Deification	(5)
Deception	(5)
Encouraging verbalization	(5)
Equalitarianism	(5)
Deification (reversed)	(5)
Excluding outside influences (reversed)	(5)
Irritability (reversed)	(5)

Mothers were asked to express their agreement with the statements on a four-point continuum. Statements were worded in such a manner that a lower score (after "reflection" by the computer) represented less authoritarian attitudes about childrearing.

Several studies using the techniques of factor analysis have been conducted using the PARI items. Schaefer and Bell (1958) suggest that the instrument is comprised of three factors: 1) democratic acceptance vs. rejection factor; composed of the "encouraging verbalization" and "equalitarianism" scales; 2) irritability vs. warmth factor, composed of the "irritability" and "rejection of the homemaking role" scales; and 3) parental authoritarianism vs. democratic acceptance factor, composed of the "excluding outside influences" and "deification" scales. Zuckerman *et al.* (1958) also identified three main factors: 1) authoritarian--control factor; 2) hostility--rejection factor; and 3) democratic attitudes factor, all composed

of scales comparable to those previously indicated. A third study employing factor analysis was conducted by Yater *et al.* (1968) to determine whether responses of mothers of Head Start children would be comparable to those of mothers from higher socioeconomic groups. They identified three factors, as well: 1) authoritarian--control; 2) democratic attitudes; and 3) hostility--rejection. These researchers concluded that since responses were so similar to those found in other studies, there was a commonality of childrearing attitudes across different socioeconomic and educational groups. According to the authors, such findings suggest that the PARI might be measuring cultural attitudes toward childrearing rather than attitudes endorsed by specific groupings of mothers.

Homemaker Values

Values represent those qualities or entities which are prized and for which one strives. They are derived from a number of factors, such as an individual's ideals, motives, attitudes, and tastes, which are in turn determined by his cultural background, education, habits, and experiences. In their classic research, Vernon and Allport (1931) define values as, "...broad functions of personality common to all and universal enough for comparison of one person with another."

Values influence behavior in the sense that they provide a basis by which to make decisions, to choose

goals for which to work, and to make choices among alternative paths to a goal. Kluckholn (1959) suggested that the concept of a value implies:

> ...a code or standard...which organizes a system of action...a conception, explicit or implicit, distinctive of an individual or characteristic of a group, of the desirable which influences the selection from available modes, means, and ends of action.

To operationalize values, Kluckholn (1959) suggested that "real" values can be discerned by careful analysis of selections made in situations demanding a choice of action, many of which occur in the usual run of living.

Several studies have been done to identify those values related to home and family life. Dyer (1962) sought to determine homemakers' awareness of values as they were reflected in family activities. The values defined in that study were family centrism, health, aesthetics, friendship, freedom, education, economy, prestige, and religion. In Dyer's study, homemakers were asked to identify activities they performed for a given period of time and to state reasons for performing those activities. The reasons were sorted into value categories. Each homemaker then rank-ordered her activities and reasons. In addition, she also rank ordered the same values in a forced-choice test situation. Nearly all of the homemakers' activities and accompanying reasons for them were concerned with the values of health, aesthetics, and family centrism. The greatest number of activities

performed were those related to health. Many of these health activities were those concerned with the daily care of family members. Religion and education were rated high on the rank order values test, but did not rate equally high when the homemakers assigned reasons for activities into value categories. Data from this study seemed to indicate that activities centering around keeping the family healthy were more important to homemakers than growth in interactional activities among family members.

Kohlmann and Smith (1970) developed two inventories of values (one for men, the other for women) which were designed to measure a functional aspect of personality in the areas of home and family life. Instead of the eight values originally included in the inventories, the researchers found that only two scales for women (Family Life and Status) and one for men (Family Life) could be well defined.

Thus, because behavior may be influenced by values, it was felt that by assessing the mother's values, it would be possible to determine if such qualities as health and family well-being were significant in the sense that they influenced the nutrient intake of the child. The forced choice values test, "Homemakers' Values" (included in Appendix C-3b) which was developed by Dyer (1962) was used in the present study. Mothers were asked to select the two value descriptions which

described them best (subsequently assigned a score of two), and second best (assigned a value of one) and to choose the one value least likely to describe themselves; this choice was assigned a score of -2. Dyer indicated that Spearman rank order correlation coefficients between first choices on the rank order test and the categorized reasons for homemaker's activities were of the order 0.51.

Anomie

According to Seeman (1959), the concept of anomie is a facet of alienation, analogous to the condition of "normlessness." He indicated that, "in the traditional usage, anomie denotes a situation in which the social norms regulating individual conduct have broken down or are no longer effective as rules for behavior." Anomie has also been defined as "an anxious awareness that the prevailing values of society have little or no personal relevance to one's condition," (Funk and Wagnalls, 1968).

A measure of anomie, or "interpersonal alienation" has been developed by Srole (1956). In that study, certain "ideational states" or components were selected because they theoretically represented internalized counterparts or reactions in the individual's life situation to conditions of social dysfunction. Srole (1956) included five such components in his instrument. The first of these postulated components was the individual's sense that community leaders are detached from and are indifferent to

his needs, reflecting severance of the inter-dependent bond within the social system between leaders and those they represent. The second element of anomie was the individual's perception of the social order as essentially fickle and unpredictable, i.e., orderless, inducing the sense that under such conditions he could accomplish little toward realizing future life goals. Srole's third element of anomie related to the respondent's view that he, and people like him, were retrogressing from the goals they had already reached. The fourth component postulated that the deflation or loss of internalized social norms and values was reflected in extreme form in the individual's sense of the meaninglessness of life itself. The fifth anomie component was conceptualized as the individual's perception that his framework of immediate personal relationships, i.e., the "very rock of his social existence," was no longer predictive or supportive (Srole, 1956). Using procedures of structural analysis, Srole determined that the five items in the instrument satisfied the criteria of unidimensionality, i.e., they comprised a single continuum.

In a recent study, low income mothers participating in a summer camping experience through the Expanded Nutrition Program in Kent County, Michigan, were asked to respond to the anomie instrument. Anomie scores did not differ significantly when compared with the number of

children in the home, the housekeeping "style", one-day dietary adequacy, or the education of the homemaker. Homemakers with husbands present had higher anomie scores. The number of children at home made little difference in itself, but when the husband was present, anomie was higher when there was more children in the home. When the husband was absent, anomie was higher for mothers of fewer children (Evaluation, 1969).

In the present research, Srole's (1956) five-item anomie instrument was administered to the mothers in the study (Appendix C-3e). Mothers were asked to express their agreement with the statements on a five-point Likert scale. Mothers with lower scores on the instrument would be considered less alienated and fatalistic than those with higher scores. It was hypothesized that if the mother reflected a high degree of anomie, she would feel as well that there was little she could do to aid in her child's development and consequently, his dietary intake and physical status would be less than optimal.

Powerlessness

Seeman (1959) identified the sense of powerlessness as one among five alternative meanings classically associated with the concept of alienation. He demonstrated by empirical research that persons with a strong sense of powerlessness are less likely to feel that they can control their environmental circumstances.

Polansky (1969) defines the concept of felt powerlessness as, "...the degree to which the individual believes that he has little control over his fate, but either is at the mercy of outside forces beyond his control, or his circumstances are due largely to chance, or both." Battle and Rotter (1963) suggested that this attitude relates to the individual's social circumstances, i.e., his class and ethnic group status.

A "Powerlessness Scale", devised by Rotter and Seeman (1959), measures an individual's feelings that he is not in control of his own life, that he cannot see any real pattern or meaning to the things that happen to him or to people in general, and that his life is "other-administered" rather than "self-administered." Jaffee (1959:31) demonstrated adequate reliability for the instrument. In the study by Polansky (1969), a recheck of odd-even split-half reliability yielded an r of .72. Evidence of construct validity was cited in the study of delinquency-proneness by Jaffee and Polansky (1962).

In the present study, it was felt that it would be productive to assess the level of felt powerlessness among mothers of preschool children. This attitude would, in turn, be reflected in the mother's behavior in which she would decline to take any responsibility for her child's dietary intake because she believed that there was little she could do to control her life situation and that her

efforts would not avail any lasting changes. Mothers were asked to indicate their agreement with twenty-five powerlessness items, using a Likert-type format (Appendix C-3d). After a reflection of scoring, a higher total score of this instrument indicated that the mother felt less in control of her own life or the greater were her feelings of powerlessness.

Semantic Differential Instrument

The "semantic differential" is one method of observing and measuring the connotative meanings of various concepts as held by a number of individuals. The actual semantic differential instrument consists of a number of scales, each of which is a bipolar adjective pair (e.g., good-bad) together with the concepts to be rated using the various scales (Kerlinger, 1968:564-580). Osgood *et al.* (1964: 37) have found that, when analyzed, adjective pairs fall into clusters, which measure one or more of the basic dimensions or factors, such as evaluative (illustrated by the adjective paid, "large--small"), potency (e.g., "strong-weak") and activity (illustrated by "fast--slow"), adjectives which seem to express motion and action. The semantic differential can be applied to a variety of research problems. It has been shown to be sufficiently reliable and valid for many research purposes (Kerlinger, 1968:578).

In the present study, the concept, "Myself as Mother", was measured using a semantic differential instrument (Appendix C-3f). This instrument was adapted by Haiman (1970) from a similar semantic used to measure the "Myself as Teacher" concept (Wright and Tuska, 1966). This semantic differential instrument has been factored and the results may be found in Osgood *et al.* (1964).

Dietary Evaluation

In the present study, the nutrient intake of the child is viewed as a key linking variable between the ecosystems of the family and the child. Assessment of dietary intake is therefore of prime importance in the research.

The evaluation of dietary, or nutrient intake, is integral to any study of nutritional status. The goal is to determine accurately what foods and how much of each food a person has eaten. Phases of the dietary intake survey include: collection of information about foods consumed and the quantity eaten, the determination of nutrients in the foods consumed, and an assessment of nutrient adequacy, using a comparison with a dietary standard, usually the Recommended Dietary Allowances (RDA) designed for use in this country. When dietary surveys form part of a clinical--biochemical--dietary triad, these data may serve as a check on the validity of the clinical and biochemical observations, and vice versa (Pearson, 1968:574).

In general, four methods may be used to determine individual food consumption: estimation by recall, dietary history, the weighed intake, and the food record (Pike and Brown, 1967:470). Becker *et al.* (1960:4) have found it more useful to consider only two distinctly separate methods of collecting dietary information, rather than the above four. These are: 1) food records, where dietary intake is recorded in weighed, measured, or estimated amounts, and 2) the dietary history.

The recall procedure is generally used for a twenty-four hour period only, where the subject is asked to recall all food consumed during the previous day and to estimate quantities in ordinary household measures or servings. Information by this method obviously is not necessarily representative of the usual food intake of the individual. A very accurate record of food consumption may be obtained by having the subject weigh all food consumed during a specific period of time. This procedure for obtaining food intake data is expensive and time consuming, however, and consequently is rarely used in nutrition surveys (Pike and Brown, 1967:470). As an alternative method, the diet history is designed to discover usual food intake patterns over a relatively long period of time and is most often obtained by interview. This method measures frequency of intake of a large number of foods and thus smooths out seasonal variations in food intake.

The fourth method, the food record procedure, is used most often for nutritional status studies. In this method, the subject is asked to keep a record of the food he has eaten for a certain period of time, usually three to seven days. Quantities of food are estimated in common household measures. Obviously, usefulness of this method depends largely upon diligent reporting by the subject and upon his ability to estimate quantities of food accurately. The method appears to be a fairly accurate estimate of food intake over a specific period of time (Pike and Brown, 1967:470). In a comparison of the results of the various methodologies for obtaining dietary intake information, Huenemann and Turner (1942) recommend the use of the food record method when individuals or small groups are being studied or when reliable quantitative data are being sought.

The literature has focused much attention on the length of time that a dietary survey should be conducted in order to furnish a true picture of the nutrient intake. Becker *et al.* (1960) indicated that when the mean intake of a group is desired, one-day records are sufficient, providing the sample is sufficiently large. But, when a comparison of intakes on an individual basis is desired, the suggested number of days was three to seven. Tinsley (1946) recommended that three days be accepted as the minimum length of time for a fairly satisfactory picture

of individual food intakes. For collecting dietary information about groups of children, Eppright *et al.* (1952) suggest that data from dietary records should be interpreted in a variety of ways in order to get a true picture of the children's food habits. They recommended inclusion of week-end days and the use of seven-day food records for use with children.

As in all interview methods, the subject's ability to accurately recall or record what he has eaten is of utmost importance for the reliability of the results. Eppright *et al.* (1952) indicated that when records are kept by untrained people, the results obtained from recording food items by servings were likely to be somewhat higher than those which were recorded by weighed amounts. Young *et al.* (1952) suggested that the errors in estimation of portion sizes were probably the largest single source of error in dietary record-keeping. Becker *et al.* (1960) concluded that the recall technique tended to result in underestimations, while recording in household measures tended to lead to overestimations, on the basis of comparison with a weighed diet procedure.

It is well accepted that the pattern of growth throughout childhood influences a corresponding changing food intake. During infancy and adolescence, when physical growth is most rapid, nutritional requirements are high, and providing that the child has good physical

and emotional health, his appetite, and consequently, his food intake increases accordingly. The picture changes somewhat in regard to the preschool child. During this period, demands for physical growth are somewhat less, but at the same time, the child's development and maturation are rapidly progressing. There are intervals when appetite is decreased and the intake of some or all nutrients may be lowered. Other environmental or intrinsic factors may alter food intake or utilization. For example, appetite may be increased or decreased by the emotional changes within the child himself as he reacts to the progress of his own maturation and to the people and events in his surroundings. As a result, changes occur in the level of food intake as the individual progresses from birth to maturity.

Some of the classic work in exploring the nature of the changing food intake of the growing child has been done by Virginia Beal, working at the Child Research Council in Denver, Colorado. The objective of this comprehensive longitudinal study was to investigate the effects of differing levels of dietary intake on the physical and physiological findings of the children. Beal's studies lend much to understanding the nature of dietary intakes of preschool children; they suggested that the lowered nutrient intakes noted during the immediate post-weaning period were increased somewhat after the

third year (Beal, 1953, 1954, 1955, 1956). Beal (1961) also reported that healthy children growing at acceptable rates vary widely in the amount of food they consume. The tendency for very high intakes was observed to be greater than the tendency toward very low intakes.

An important environmental influence on dietary intake that has received considerable attention in the literature is that of family income. As a result of the nationwide household food consumption survey in the mid-1950's, it was suggested that the diets of families with low incomes were not as good as those of families with higher incomes. But, results of a comparable survey in 1965 revealed that a high family income alone does not necessarily insure good diets (Adelson, 1968). The more recent survey revealed that even at the highest income level, a sizable proportion of families had poor diets. Food habits, not the inability to purchase adequate food, were the dominant causes behind poor diets for this group (Clark, 1969:270).

Studies conducted with children have been inconclusive in defining the association between low family income and inadequate dietary intake. Certain investigators (Hardy *et al.*, 1943; Metheny *et al.*, 1962a; Owen and Kram 1969) have reported an inverse correlation between the level of family income and dietary adequacy. Although they did not specifically evaluate dietary

intakes of preschool children from "impoverished" families, Zee *et al.* (1970) attributed the growth retardation and anemia found in the children they studied to a lack of food; they suggested that this inadequate intake was primarily due to an inability of the family to obtain a sufficient quantity and quality of food.

In contrast, other investigators have shown no association between dietary inadequacy and low family income. Hootman *et al.* (1967) and Kerrey *et al.* (1968) indicated that poor diets may not be an inevitable accompaniment of low levels of family income. These studies reported that the calculated nutrient intakes of children from low-income families did not reveal the prevalence of gross inadequacies in the children's diets.

Certain nutrients have been noted as the ones most often limiting in children's diets. Implicated in this regard have been iron, calcium, ascorbic acid, and to a somewhat lesser extent, Vitamin A, niacin, and calories (Metheny *et al.*, 1962a; Skidmore, 1965; Cloud, 1967; Kerrey *et al.*, 1968; Owen and Kram, 1969; Brown *et al.*, 1970). Lund and Burk (1969) found a significant association between dietary intake of certain nutrients, particularly Vitamin A and ascorbic acid, with various socioeconomic parameters, most notably family income and educational level of the mother. Studies by Kerrey *et al.* (1968) and by Owen and Kram (1969) indicated that while children from high income

families had diets providing more ascorbic acid and Vitamin A, children from the low income groups received diets providing the same or additional amounts of iron and thiamin. Both studies indicated that higher income children received proportionately more calories from dairy products, while the greatest single source of calories for the lower income children was the bread and cereals group.

It has been suggested that the younger child may be more likely than an older, school-age child to consume a diet which meets the Recommended Dietary Allowances (Emerson, 1967). This observation may be related to the fact that the preschool-aged child is far less independent and is less likely to be eating meals away from home.

In order to obtain information on children's nutrient intake, mothers participating in the present study were requested to keep a record of the child's food intake for a twenty-four hour period on three separate occasions. These food records were analyzed and the nutrient content of the diets was used for all subsequent data analyses. Copies of the form used for the collection of dietary information are in Appendix C-1.

Assessment of Nutritional Status

Nutritional status may be defined as, "the state of health of an individual or group as conditioned by choice and amounts of foods, or more specifically, nutrients,

eaten (Morgan, 1959)." In assessing nutritional status, an attempt is made to obtain a composite picture of the many facets of the body's growth, function, and structure, as related to previous and present food intake; one aims to measure the extent of a cause-and-effect relationship between nutrient intake and the level of well-being of the individual (Leverton, 1960). Several reports have attempted to review the literature from the numerous studies conducted to learn the nutritional status of various population groups. The most comprehensive of these were probably by Morgan (1959) and by Kelsay (1969). Investigators have generally agreed that there is a serious lack of information on the nutritional status of young children in this country (Krehl and Hodges, 1965; Lowe, 1967; Select Comm., 1969:586).

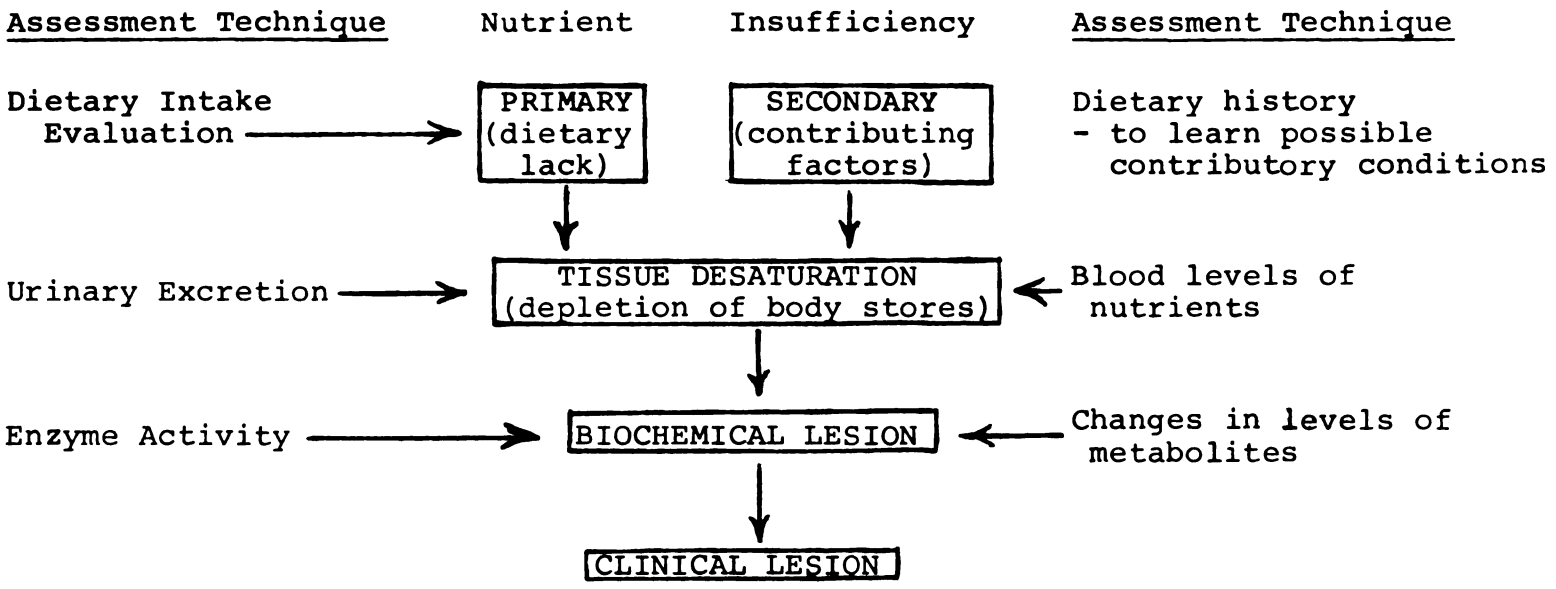
The first "comprehensive survey to assess the nutritional status of the population of the United States of America" was the National Nutrition Survey, undertaken in 1967. This endeavor received much nationwide support and attention because the final results were intended to give a "reliable picture of the nutritional health status of the people living in the lower income areas of America" (Schaefer and Johnson, 1969). Only preliminary findings from the survey in several states have been published to date (McGanity, 1969; Unglaub, 1969).

Classic methods used for the evaluation of nutritional status include: 1) dietary evaluation; 2) biochemical tests; and 3) clinical examinations. In general, dietary surveys evaluate current food intake; biochemical data reflect recent nutritional status, and clinical examinations evaluate long-term nutritional history (Pike and Brown, 1967:466). Figure 3 illustrates the relationships which exist between the three measures of nutritional status, their positions in the child's ecosystem framework as well as the sequence of events, which occur between nutrient inadequacy and the development of a clinical lesion. It must be stressed that the appraisal of nutritional status involves more than merely an evaluation of dietary intake. In the present study, the other means of evaluating nutritional status, namely the biochemical and clinical measurements, are viewed as outputs of the child's ecosystem processes.

Clinical Methods: Nutritional Anthropometry

The clinical examination is an important practical method for assessing the nutritional status of a population group. For the most part, the method is based on examination for bodily changes believed related to inadequate nutrition that can be seen or felt in superficial epithelial tissues (Jelliffe, 1966:10). The clinical assessment of nutritional status may include an appraisal of the following: 1) growth and development;

Figure 3. Techniques for Evaluation of Nutritional Status



Adapted from Pearson, in Wohl and Goodhart, 1968:576.

2) the degree of fatness or leanness; or 3) specific physical signs thought to be associated with particular nutrient deficiencies (Pearson, 1968:565). The evaluation of growth and developmental status is important in the nutritional appraisal of infants and young children. Most commonly, anthropometric measurements, such as height, weight, or skinfold thicknesses, are employed for this purpose. Because growth performance is influenced by genetic factors, anthropometric measurements are more useful for describing certain population characteristics than for evaluating the growth of individuals. The assessment of fatness or leanness is most appropriate for population groups for whom height- and weight-for-age standards have been developed. Clinical signs of nutritional deficiency reflect the result of long-term nutritional impairment. The clinical evaluation is by far the most subjective area in the determination of nutritional status. Lesions observed are often non-specific, i.e., they may be due to trauma, exposure, or allergies rather than to some distinct nutritional deficiency. In addition, lesions may be attributable to some secondary conditioning factor, such as malabsorption or parasitism, and are rarely diagnostic by themselves. The specific lesion noted should always be evaluated in light of a continuum of severity; this procedure, as well, lends itself to subjective evaluation (Jelliffe, 1966:12).

A child's actual growth and developmental progress exists as an interrelated whole, involving concurrent progress in psychological and social development, as well as biological or physical growth. A comprehensive concept of development implies a growing body, a maturing ego, and the environment in which those processes are evolving.

The physical development of children is directly influenced by environmental factors which act upon the genetic potential (Watson and Lowrey, 1967:51-52). Clinical observation substantiates the fact that genetic potentialities of the human organism may not become manifest unless a complex of stimuli act together in a favorable environment. Genetically determined factors thus remain used or unused to the extent that the environment offers opportunity for their realization.

The final size a person attains is limited largely by heredity, but whether or not the individual realizes his full growth potential is determined largely by nutrition (Mitchell, 1962). It is well known that growth is stunted in young children receiving diets severely restricted in proteins and/or calories. The extent to which such undernutrition influences the size of an individual depends upon the age at which it occurs (the greatest effect being at the period of maximum growth) and by its duration in relation to the total period of growth (Stoch and Smythe, 1963).

Jackson (1966:11) has stated, "growth rate of children is one of the most simple, inexpensive, reliable, and important tools available as an index of nutritional status." He further suggested that nutritional surveys should always include observations on the height and weight of children. Hundley *et al.* (1955) indicated that height-weight measurements of young children could serve as a reliable index of nutritional status.

Nutritional anthropometry is concerned with the measurement of the variations of the physical dimensions and the gross composition of the human body at different degrees of nutrition (Jelliffe, 1966:50). Garn (1962) stated, "anthropometry provides the operational measurement of long-term nutritional status, given the assumption for growing children within a particular gene pool, that the larger ones have been better nourished." He further suggested that anthropometry can be a valuable adjunct to clinical appraisal providing a quantitative indication of the rapidity of size increase, the relative amount of different tissues present, and an indication of caloric excess.

The two most universally accepted measures of human physical growth are height (increase in linear size) and weight (increase in bulk). Weight seems to be the anthropometric measurement most in use. The prevalence of malnutrition, according to some investigators (Jelliffe,

1966), is best indicated by a weight deficiency as evidence by growth failure in children. On the other hand, height is considered by others to be a more accurate reflection of nutritional status in children because it is not influenced by such a variety of extraneous factors as is weight (Mickelsen *et al.*, 1970). Bloom (1964:36) noted that height represents a highly stable characteristic and is not reversible in that growth once attained is not lost except as a result of senility, surgery, or disease. In contrast, weight may go up as well as down over a period of time and, to a limited extent, may be controlled by the individual. Jackson (1966:10) pointed out,

> ...although weight is used as a standard reference point, it is a poor index, whether used for maturity, growth, or body composition... . Rate of growth in length is a better criterion of adequacy of nutrition in infancy and childhood than are changes in body weight.

A recent study suggested that the ratio, weight to the squared height, is a measure which can be used in field studies as a simple and easy criterion of nutritional status (Rao and Singh, 1970).

Height and weight measurements of children may be adversely affected by poor environmental conditions. Data from several studies supported the contention that height and weight measurements tend to be greater for children from the higher socioeconomic groups (Hundley *et al.*, 1955; Stine *et al.*, 1967; Crispin *et al.*, 1968). Comparing

heights and weights of Head Start children with measurements of children from suburgan areas in Cleveland, McClelland (1969) concluded that, "growth progress is related in a negative way with income level." Owen *et al.* (1969) also indicated, "among factors serving to characterize low income children, undernutrition and underachievement in growth were evident and may well have been causally related."

Sex differences in growth rates have been reported. Douglass (1962) stated that in the more prosperous occupational groups in Britain, the girls gained more in height between two and four and one-half years than the boys did, whereas in the less prosperous groups they gained less, thus suggesting to the author that the growth of girls may be more affected by environmental factors than is the growth of boys. In contrast to this conclusion, Stine *et al.* (1967) indicated that in their sample of four-year-old children from impoverished families, they found that male children were significantly heavier than the females.

Studies of racial differences in appearance and physiological attributes in which American Negro and whites have been compared commonly appear in medical literature. Malina (1969), in reviewing findings about the differences between American Negroes and whites on the basis of growth patterns, concluded that the major differences do not lie in over-all body size as reflected

in stature and weight, but rather exist in the relative proportions of limbs and trunk. From physical measurements obtained from over 2000 healthy North American Negro children from low-income families, Verghese *et al.* (1969) concluded that, "height and weight of the Negro children [appeared] to be similar to those of North American Caucasian children." The opposite viewpoint was presented by Stine *et al.* (1967) who concluded that Negro males and females were significantly taller than their white counterparts.

In the present study, certain physical measurements were selected for study on the basis that the literature revealed that differences in physical measurements would be observed in response to various environmental circumstances, sex, or race. The variables studied included standing height and weight. Weight was measured on a balance-beam scale to the nearest 0.25 pound. Standing height was measured according to the procedures outlined by Bayer and Bayley (1959:8) to the nearest 0.1 inch. Both standing height and weight were measured on children who were wearing light indoor clothing, but no shoes.

Procedures used to classify children either by height or weight alone may be misleading because of the range in the heights and weights of children of any given age. In an attempt to rectify this situation in the present study, heights and weights of the children were compared with several well accepted standards. One of

these was the height- and weight-for-age standards which had been developed at the Fels Research Institute by Garn and Rohmann; this standard was recommended for use in the evaluation of nutritional status of preschool children by the U. S. Children's Bureau (1967). A second means used to assess physical measurements was the height- and weight-for-age standards developed by Stuart and his associates (Nelson, 1968:1007).

From the various height or weight ratios used for defining body types, one weight-for-height classification system used in the present study was that developed by Sargent (1961). In this system, a linear regression line representative of a normal weight is computed, and percentile deviations from this line are determined and identified by descriptive body type terms. Six weight-height classification codes were used.

> Children whose weight for height (regardless of age) fell within plus and minus ten percent of this average line were classified in the "normal" weight for height classification. Children weighing more in relation to their height were classified as "stocky" if their weight for height fell between ten and twenty percent above the average line; "overweight" for height if between twenty and forty percent above; or "obese" if forty percent or more above. Children weighing less in relation to their height were classified as "slender" if their weight for height fell between ten and twenty percent below the average line, or "underweight" for height if more than twenty percent below (Sargent, 1961:27).

Noting that no recommendations had been made by the Children's Bureau (1967) for the combining of weight-for-age and height-for-age classifications for estimating overweight or underweight, Smith and Brown (1970) developed five height-weight-age divisions based on the Fels Research Institute percentiles for height and weight. These divisions were also used for classification of heights and weights in the present study.

Drash *et al.* (1968:61) suggest that the assessment of "developmental age" is a "useful means of comparing a given individual to a standard population." This concept is valid for use for any anthropometric characteristic which varies predictably with chronologic age and for which there are acceptable standards for children at various ages. Assessments of "height age" and "weight age" were performed in the present study. The concept, "height age", expresses an individual's height as the age at which his height is equivalent to the median height of a standard, chronologically arranged population. "Weight age" is calculated in the same manner. The standard of reference for height and weight measurements used in the present study was the Boston Growth Chart, developed by Stuart and his associates (Nelson, 1968: 1007). The height and weight age for each of the subjects in the study was determined by finding the chronologic age (in months) at which the individual's measurement crossed

the fiftieth percentile line of the Stuart Percentile Grid (Nelson, 1968).

The "developmental index" concept, used by Drash *et al.* (1968) expresses an individual's attainment of a particular height or weight numerically by eliminating chronologic age as a variable. Although this concept has been more commonly used by psychologists in converting mental age to an intelligence quotient, it is equally applicable to variables of physical growth and development. Its major drawback is the absence of previous standardization. As used in the present study, the developmental index was obtained by dividing developmental age for height and weight by chronologic age. In a normal population, the developmental index would equal 1.0. Advanced development would be represented by a value greater than 1.0 and retarded development by a value less than 1.0. According to Drash *et al.* (1968) a height index of 0.80 or less would indicate that the individual was below the third percentile for height, using the Stuart standards (Nelson, 1968:1007). Weight index, which is a more variable factor, is 0.63 for the third percentile at the age of four years.

The measurement of head circumference is a standard procedure widely used in pediatric practice. Head circumference has been found to be smaller in malnourished children than in children who were well nourished (Stoch

and Smythe, 1963). Stine *et al.* (1967) indicated that twenty-five percent of the children studied in their sample of preschool children from low-income families had smaller head circumferences than the lowest ten percent of the standard population. These investigators found significant correlations between height and weight measurements and head circumferences. Verghese *et al.* (1969) found that the head circumference was consistently less for Negro children than for white children.

In the present study, in addition to standing height and weight, other physical measurements obtained included sitting height, circumferences of head, upper arm and chest, bi-acromial (shoulder) and bi-cristal (also called bi-iliac or pelvic) diameters. Sitting height was measured according to the procedures specified by Bayer and Bayley (1959:9). Circumferences were measured to the nearest 0.25 centimeter using a flexible steel tape measure. Diameters were measured to the nearest millimeter using steel bow calipers (Bayer and Bayley, 1959:11).

A comprehensive evaluation of the quality of growth requires not only measurements of overall body size, length and mass, but also of relative amounts of musculature and body fat. Since muscle and fat tissues are most influenced by the relative amounts of protein and calories, it is desirable to evaluate body composition in order to determine the amount and distribution of human subcutaneous

fat which represents caloric reserves. While several means of evaluating body composition are available, only the use of skin-fold calipers has been shown to be practical for field studies (Jelliffe, 1966:72). Garn (1962) indicated that despite their simplicity (a fact which had led them to be scorned by some investigators), fat-fold calipers are of proved value. He concluded, "...fat-folds are useful measures of relative fatness."

Differences in skinfold thicknesses according to race or socioeconomic status have been reported in the literature. Subcutaneous fat, as measured by skin-fold thicknesses has been reported to be less in Negro children than white children (Malina, 1971; Stine *et al.*, 1967). Crispin *et al.* (1968) found that in contrast to all other measurements (such as height, weight, body circumferences, and muscularity measurements), skin-fold thicknesses were not greater for the higher than the lower socioeconomic group.

In the present study, skinfold measurements were taken at two sites on the body: at the triceps (at the back of the mid-arm over the triceps muscle), and the subscapular region (below the tip of the scapula on the back). All thicknesses were measured by the investigator using a Lange skinfold caliper and recorded to the nearest millimeter.

Biochemical Parameters

Certain biochemical procedures may be employed to test aspects of nutrition, such as 1) the relative adequacy of dietary intake as reflected by levels in a particular tissue, e.g., blood; and 2) metabolic changes due to tissue malnutrition; and 3) depletion of body stores of certain nutrients, e.g., protein (Jelliffe, 1966:78-85). Levels of nutrients in the body may be interpreted in relation to their biochemical significance as well as compared with certain standards of reference appropriate for the age and sex of the population under study. The Interdepartmental Committee for Nutrition for National Defense (ICNND) has established a set of standard values which carry descriptive labels, such as "deficient", "low", "acceptable", and "high" (ICNND, 1963).

Certain biochemical measurements are important for study in preschool children because they either are associated with growth or reflect dietary intake of certain nutrients noted as being particularly crucial for the optimal development of young children. The parameters of hemoglobin and hematocrit were appropriate for investigation because low values are associated with the incidence of anemia. Filer (1969) has described iron deficiency anemia as a "significant public health problem among young children." In fact, some even regard this syndrome

as the most common deficiency disease occurring in infancy and childhood today (Jacobs, 1960).

Certain investigators support the idea that anemia occurs more frequently among low-income groups in the population (Klipstein, 1968; Hillman and Smith, 1968); this fact is commonly interpreted to mean that there is a significant association between low socioeconomic status and the prevalence of anemia.

Certain studies have focused on the prevalence of anemia among children from low-income families. A number of surveys have shown that a rather large percentage of these children had hemoglobin or hematocrit values indicative of anemia. Studies which have supported this view would include Kravitz (1966), Owen *et al.* (1969), and Goldsmith and Unglaub (1968).

In contrast, other studies, including Kerrey *et al.* (1968), Crumrine and Fryer (1970), Mickelsen *et al.* (1970) and Haughton (1963), have failed to document that anemia is widespread among preschool children from low-income families. Following the mass screening of 7000 preschool children enrolled in Head Start programs, Pearson *et al.* (1967) indicated that they had failed to reveal the expected high incidence of anemia. Considering levels of hemoglobin below 11 gm/100 ml as unacceptable for children between the ages of twenty-four and seventy-one months, Owen *et al.* (1970) concluded that iron deficiency anemia was not

uncommon among preschool children, regardless of socio-economic status. Other researchers (Mickelsen *et al.*, 1970) have suggested that other factors which may account for the discrepancy in the prevalence figures from the various studies include the ages of the children, race, and other regional differences.

Measurement of total serum proteins and serum albumin levels reflects the protein status of the body. In addition to knowing the level of total proteins in the blood, it is also important to assess the albumin level because this component of the blood is noted to be reduced in cases of severe protein malnutrition (Jelliffe, 1966:87). Schendel *et al.* (1960) have stated that the albumin levels of children can be used as an index of protein depletion. The recent study of Crumrine and Fryer (1970) indicated that only one child out of forty had a serum protein level below the acceptable level and that albumin levels for all the children studied were above the acceptable level.

In the present study, blood tests were obtained on each child to determine hemoglobin, hematocrit, total serum proteins, and serum albumin levels. A finger prick blood sample was drawn by a registered medical technologist from the Olin Health Center on the Michigan State University campus where analyses for hemoglobin and hematocrit were performed. A portion of the whole blood sample was

used for the hemoglobin determination, which was then analyzed by the cyanmethemoglobin method (ICNND, 1963: 115), as recommended by the Children's Bureau for the determination of nutritional status of preschool children (1967). This procedure has been widely adopted because it is considered simple and accurate (O'Brien *et al.*, 1968:167). Hematocrit was determined after collection of an aliquot of the whole blood sample in heparinized micro-capillary tubes by spinning samples in a Micro Capillary centrifuge for five minutes (O'Brien *et al.*, 1968:187).

Blood samples for the serum protein and serum albumin determinations, which were subsequently analyzed by an independent commercial laboratory, were collected in unheparinized capillary tubes. The portion of serum used for the albumin determinations was analyzed colorimetrically using the dye, bromcresol green (BCG) (Rodkey, 1965; Hernadez *et al.*, 1967; Dow and Pinto, 1969). At pH 4.0, albumin combines with the dye to yield a blue color, the intensity of which is proportional to the albumin concentration in the serum; color intensity of the samples in the present study was measured on a Coleman Jr. spectrophotometer at 600 mμ. Total serum proteins were measured using a refractometer, a procedure which measures only the dissolved proteins by means of light refraction. This

method is unaffected by the presence of chromogens in the serum (Bullen, 1970).

A biochemical index of growth that recently has been proposed is the rate of urinary excretion of hydroxyproline. This amino acid is present in urine principally in the form of peptides derived from the metabolism of collagen. Processes such as growth which accelerate collagen formation are associated with an increase in hydroxyproline peptide excretion (Pearson, 1968:577). Whitehead (1965) indicated that hydroxyproline excretion might be used as "a simple and practical test of assessing the rate of growth, and consequently, the nutritional status of children."

In community studies, the collection of twenty-four hour specimens of urine is not practical on a large scale. For this reason, Whitehead (1965) has developed a test called the "hydroxyproline index" which indicates the ratio between the amount of hydroxyproline and creatinine in random samples of urine, as corrected for body weight. The index is calculated as the following ratio:

$$\frac{\text{mmoles of hydroxyproline per liter of urine}}{\text{mmoles of creatinine per liter of urine per kg body weight}}$$

Allison *et al.* (1966) have shown that the simple ratio, hydroxyproline to creatinine, falls progressively until the fifth year, then levels off and is nearly constant between the ages of five and twelve. Thus, the "hydroxy-proline index" may be used indepedently of age, but is

probably not valid for use after the age of five (Committee Report, 1970). Mohanram *et al.* (1969) indicated that in the same child, there was considerable variation in the hydroxyproline index and that daily fluctuations in the ratio of hydroxyproline to creatinine could have been responsible for such variations. If used as one test of nutritional status and growth, Whitehead (1965) indicated that the hydroxyproline index may be used to pick up "marginal" cases of malnutrition.

Because a twenty-four hour urine sample can rarely be obtained in field studies, random urine samples may be collected. Excretion data from such single samples are then expressed in relation to creatinine content of the sample on the assumption that creatinine excretion is relatively constant and thus can serve as a basis for equating excretion data from different individuals (Pike and Brown, 1967:474-475).

In the present study, random urine samples were collected at the nursery school and clinic for approximately one-third of the children in the total sample. Samples were stored in the refrigerator using toluene as a preservative. Analyses for urinary creatinine were performed by the investigator using the alkaline-sodium picrate method as modified by Bonsnes and Taussky (1945). In this procedure, creatinine in solution with picric acid and sodium hydroxide forms an intense yellow color

measured on the Beckman DB spectrophotometer at 525 mμ. Analyses for urinary hydroxyproline peptides were done using methods developed by Prockop and Udenfriend (1960). In this procedure, hydroxyproline is oxidized to pyrrole in the presence of alanine. Upon addition of p-dimethylaminobenzaldehyde (Ehrlich's reagent), the pyrrole forms a chromophore. The intensity of the bright pink color thus formed was measured on the Beckman DB spectrophotometer at 560 mμ.

CHAPTER IV

DATA COLLECTION AND ANALYSIS

This chapter discusses the selection and description of subjects in the sample; the methods used for data collection; classification and coding of data for analysis; and procedures used for data analysis.

Selection and Description of Sample

The particular sampling procedures employed in the present study may be described as "chunk" sampling (Kish, 1965:320) because typical or representative units of preschool children were chosen on an *a priori* basis to be included in the final sample. In order that children in the study would come from a variety of family backgrounds (in terms of ethnicity, family income, size and composition, parental occupation and education), the only restrictions placed on the children included in the sample were:

1) That children should be between the ages of three and five years.

2) That mothers (or caretakers) of the children would agree to participate in the study by completing an interview, questionnaires, and records of the child's food intake.

The final sample consisted of 163 children drawn from the following sources:

1. Michigan State University Laboratory Preschool Program. A total of sixty-four children who were enrolled in this program subsequently participated in the present study. Approximately one-fourth of these children had been previously designated as "disadvantaged" for purposes of inclusion in other concurrent research projects. The remainder of children were from middle- and high-income families living in East Lansing and other surrounding communities.

2. Spartan Nursery School. Ninety-one children were included in the sample from this program. Approximately 20% of these children were enrolled in a "Head Start" class and met the designated criteria for admission into that program. The majority of the other children attending this nursery school lived in Michigan State University Married Student Housing; a large percentage of their parents were enrolled as full-time students at the University.

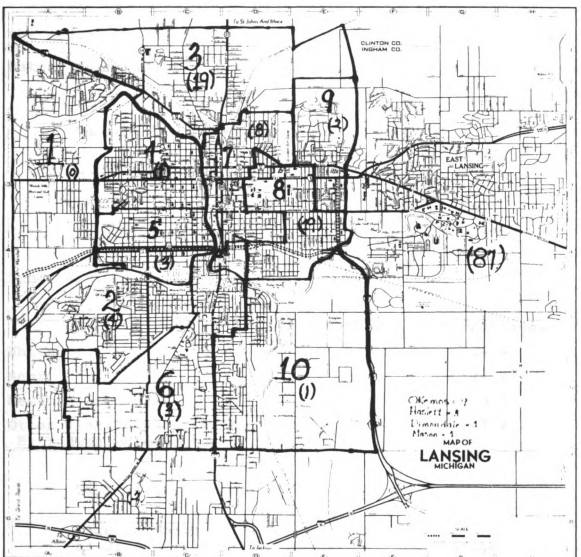
3. Public Health Clinic, Cristo Rey Area. Eight children attending the Clinic, which is staffed by personnel from the Ingham County Health Department and the Michigan State University College of Human Medicine, were included in the sample. All of these children were from low-income families.

Certain previous studies conducted in the greater Lansing area documented the fact that the children included in the final sample had been drawn from a variety of neighborhoods possessing different population characteristics. The Michigan Health Survey (known locally as "ECHO" for Evidence for Community Health Organization) was organized as a collaborative effort between the Ingham County Health Department and the Michigan Department of Public Health Center for Health Statistics to sample the Lansing area for the purpose of documenting the prevalence of health problems in certain areas of the city. Table 4.1 is a profile of the characteristics of the neighborhood areas identified by ECHO sampling. (Comparable population characteristics were not available for the East Lansing and other outlying areas.) Figure 4 is a map of the area indicating the number of children included in the sample from each ECHO neighborhood area. Low-income children enrolled in the Laboratory Preschool Program were drawn from ECHO Area No. 5 and the Turner Street Housing Project in Area No. 3. Children in the Head Start class at Spartan Nursery School were drawn primarily from ECHO Area No. 8. The Cristo Rey area in Lansing (included in ECHO Area No. 7) had been identified by previous public health studies as one in which certain problems, including a high infant mortality rate, were particularly prevalent.

Table 4.1. E.C.H.O. Neighborhood Profile, Lansing, Michigan. 4th Baseline Report (1969)

Items	Neighborhood Number							Total Sampled Area
	2	3	4	5	6	7	8	
A. General Characteristics								
Population estimate	20,100	4,612	13,329	10,416	21,907	9,467	13,884	115,059
Census of dwelling units	5,948	1,297	5,822	3,472	7,554	3,459	4,359	38,965
Total household units sampled	26	18	31	22	26	16	25	182
Total number of persons in sample	98	64	87	78	87	52	88	618
Average number of persons per household	3.0	3.6	2.8	3.5	3.3	3.3	3.4	3.4
Average number of persons per room	0.59	0.66	0.58	0.66	0.58	0.73	0.62	0.63
B. Population Characteristics								
Percentage of persons reported white	90.8	82.8	93.1	25.6	94.3	92.3	80.7	80.1
Percentage of population less than 15 years of age	30.5	34.3	28.6	35.8	40.1	38.5	31.8	33.9
Percentage of families with income less than $4000/year	0.0	6.7	13.7	35.0	19.2	20.0	13.3	13.7
Percentage of families with residence less than 1 year	7.6	11.2	32.2	22.7	7.7	18.8	12.0	16.4
C. Environmental Characteristics								
Percentage with exterior condition-deteriorating	7.7	22.2	12.9	31.8	7.7	37.5	12.0	15.4
Interior condition-deteriorating	0.0	22.2	6.5	22.7	3.8	31.3	12.0	11.0
Rented dwellings	3.8	11.1	48.4	68.2	19.2	56.3	36.0	33.5
D. Selected Social Concerns								
Illegitimate live births (per 1000 live births)	45.9	51.9	115.9	241.9	58.2	114.1	132.1	99.2
A.D.C. recepient rates* (Aid to Dependent Children per 1000 families) January 1971	29.9	72.9	70.6	133.6	80.1	142.2	49.3	65.1
Ratio-percent change in A.D.C. recepient rates Jan. '69 to Jan. '71	8.3	1.9	3.1	2.7	4.0	3.8	2.6	NA

*Source: Ingham County and State of Michigan Department of Social Service, Ingham Co. Health Dept., Project E.C.H.O., and Michigan Dept. of Public Health.
Rates calculated on basis of samples from A.D.C. lists of January 1969 and January 1971 and E.C.H.O. estimates of number of families per neighborhood.


CLINTON CO.
INGHAM CO.
EAST LANSING
MAP OF
LANSING
MICHIGAN

The sex and racial distribution of the children included in the sample are shown by Tables 4.2 and 4.3. Table 4.4 indicates the age distribution of the children studied. The mean age of the children in the sample at the beginning of the study in September, 1969 was approximately four years.

Table 4.2. Sex Distribution

	Number	Percentage
Male	81	49.7
Female	82	50.3

Table 4.3. Race Distribution

	Number	Percentage
White	96	64.4
Negro	37	24.8
Mexican American	5	3.3
Other (including Oriental, E. Indian, Mid-Eastern)	11	7.4

Table 4.4. Age Distribution

Age in Months, as of Sept. 1969	Number	Percentage
<36	12	7.4
36-42	40	24.5
43-48	43	26.4
49-54	46	28.2
55-60	19	12.9
>60	1	.6

Mean Age: 46.2 months

Data Collection

Permission was granted by the directors, supervisors, and teachers of the two nursery school programs and by administrative personnel at the public health clinic for the researcher to study the children enrolled therein. A multiple-phase program was initiated whereby serial measurements of anthropometric characteristics and food records for the children and interviews with the children's mothers could be obtained. Parental permission for inclusion of the child in the study had been obtained by the nursery school and clinic personnel prior to data collection. Refer to Table 4.5 for the scheduling of data collection.

Measurements obtained on each child included: certain physical measurements, a blood test and urinalysis, and food records. Data for the anthropometric measurements were collected during the time that the child was attending the nursery school or clinic. Standing height and weight were measured three times throughout the school year, i.e., in November, February and May. In addition to these measurements, sitting height, triceps and subscapular skinfold thicknesses, biacromial and bicristal diameters, and head, chest and upper arm circumferences were collected in the spring.

A separate parental permission was requested prior to the blood tests. This letter is included in Appendix A-4. Blood samples for all participating children

Table 4.5. Timing Schedule for Data Collection

Data	Person From Whom Collected
Fall, 1969	
Standing height and weight measurements	Children
One-day food record	Mothers*
Winter, 1970	
Standing height and weight measurements	Children
Home interview	Mothers*
Attitude-measuring questionnaires	Mothers*
One-day food record	Mothers*
Spring, 1970	
All anthropometric measurements	Children
Blood test	Children
Urine collection	Children
One-day food record	Mothers*

*Copies of instruments used may be found in Appendix C.

obtained by finger prick, was collected by a registered medical technologist from the Olin Health Center on the Michigan State University campus. These tests were obtained in the spring during the time that the children were attending the nursery school or clinic. Random urine specimens, collected from approximately one-third of the children, were collected by the investigator while the children were at the nursery school or clinic.

Mothers of the children were requested to cooperate in the study for purposes of gaining information about the child's family and his medical and dietary history. The mothers were first requested to complete a twenty-four hour food record (Appendix C-1) for each child. They were instructed to record all food in terms of household measures and to complete the record for a day when the child was not attending the nursery school in order that she might observe first-hand her child's food intake. For the first record obtained in the fall, instructions for completing the food record forms were given by the researcher to a group of approximately twenty mothers. For those not attending this meeting, the forms with accompanying instructions and a self-addressed stamped envelope were mailed. Completed food records were then returned by mail to the researcher. The second food record form was given to the mother at the time of the home interview in the winter; completed forms were again returned by mail.

In the spring, the food record forms were mailed to the mothers participating in the study; completed forms were returned by mail. An attempt was made to coordinate data collection so that measurements of height and weight on the children might be made at approximately the same time as records were being kept of their food intake.

Interviews with the mothers were performed by persons specifically selected and trained for the task by the investigator. Phone calls were made to arrange the most suitable time for the interview. At the time the appointment for the interview was made, the attitude-measuring questionnaires were mailed to the mother so that she could independently respond to them and have the completed forms ready for the interviewer to collect at the time of the home interview. It required approximately one hour for completion of both the questionnaires and the interview.

Data Analyses

Data collected from measurements taken on the children and from the interview with the mother were scored and transferred to data processing cards. Analysis was primarily performed on the Control Data Corporation (CDC) 3600 model computer, supplemented by the CDC 6500 model computer. Table 4.6 summarizes the procedures used for the complete analysis of the data including the statistical procedures used. The following sections present a more complete discussion of the classification and coding

Table 4.6. Methods Used in Analysis of Data

INTENT OF ANALYSIS	DATA EMPLOYED	STATISTICS AND COMPUTER PROGRAMS
1. Determination of nutrient content of children's food intake and number of servings within specified food groups.	Three, one-day food records. Punch cards with nutritive values per specified food unit.[1]	Transformation program.[2]
2. Description of nutrient intake information, physical measurements, and biochemical data for children in sample.	Data from food record transformation program. Results of analysis of blood and urine. Physical measurements of children.	Frequency distribution; mean, range, cell count, and percentages.[3,4,5]
3. Description of family environmental characteristics of subjects.	Demographic data. Interview with mother. "ECHO" Project data.	Frequency distribution, including mean, range, cell count, and percentages.[3,4,5]
4. Determination of children's physical measurements according to weight- and height-for-age standards.	Serial measurements of children's standing height and weight.	Conversion program.[6]
5. Graphical representation of children's characteristics and family environment characteristics.	Interview data; Demographic data. Results from food record transformation program. Analysis of blood and urine. Physical measurements of children.	Histograms[7]
6. Determination of degree of association between characteristics of the children with family environment variables.	As above.	Contingency tables.[3,4,8] Computation of Pearson product-moment correlation coefficients.[9,10]
7. Determination of clusters of variables which describe sample.	As above.	Oblique multiple-groups cluster analysis.[10]
8. Determination of effects of moderating variables.	As above.	Moderating effects-computer program.[11]

[1]Davenport, E. *Calculating the Nutritive Value of Diets.* A Manual of Instructions for the Use of Punch Cards for Machine Tabulation. U. S. Department of Agriculture, ARS Publication No. 62-10-1, September 1964.

[2]Program written by Steven L. Huyser, Michigan State University, 1969.

[3]Price, L. A. and J. L. Peterson. Control Cards for Programs on the New 6500 CISSR Library System. Computer Institute for Social Science Research Tech. Report No. 70-4. East Lansing: Michigan State University, 1970.

[4]Price, L. A. and J. L. Peterson. Program DATA. Computer Institute for Social Science Research Tech. Report No. 70-3. East Lansing: Michigan State University, 1970.

[5]Thiel, L. and L. Patrick. PERCOUNT. Computer Institute for Social Science Research Tech. Report No. 18. East Lansing: Michigan State University, 1968.

[6]Program written by Thomas Nicol, Michigan State University, 1971.

[7]Clark, J. and G. Gillmore. Data Plot and Statistics for Variables and Pairs of Variables--DAPI. Computer Institute for Social Science Research Tech. Report No. 15. East Lansing: Michigan State University, 1968.

[8]Holdridge, A. R. Four-dimensional contingency tables--NUCROS. Computer Institute for Social Science Research Tech. Report. No. 12, East Lansing: Michigan State University, 1968.

[9]Kline, D. IDCORR: Incomplete Data Correlation Program. Computer Institute for Social Science Research Tech. Report No. 4. East Lansing: Michigan State University, 1968.

[10]Hunter, J. E. and S. H. Cohen. PACKAGE, Version 1.0, CDC 3600 Extended FORTRAN. Computer Institute for Social Science Research. East Lansing: Michigan State University, 1969.

[11]Hunter, J. E. and R. J. Chesser. MODERATOR: A Family of Computer Programs Designed to Show Simultaneously the Moderating Effects and Non-linear Relationships Among a Set of Variables. Unpublished paper written at Michigan State University, East Lansing, 1971.

procedures used in preparing the data for analysis and the particular types of computer-assisted analyses which were performed on the data.

Factor Analysis

As a statistical technique for data analysis, factor analysis has been described as "a method for determining the number and nature of the underlying variables among large numbers of measures (Kerlinger, 1967:650)." Its main contribution lies in helping the researcher to identify unities or fundamental properties underlying a large set of variables. As Harman (1967:4, 5) states,

> The principal concern of factor analysis is the resolution of a set of variables linearly in terms of (usually) a small number of categories or "factors". This resolution can be accomplished by the analysis of the correlations among the variables. A satisfactory solution will yield factors which convey all the essential information of the original set of variables. Thus, the chief aim is to attain scientific parsimony or economy of description. ...
> This aim should not be construed to mean that factor analysis necessarily attempts to discover the 'fundamental' or 'basic' categories in a given field of investigation... Since measures for certain important variables may not yet have been developed, the factors identified from the available data cannot be considered completely fundamental...While the goal of complete description cannot be reached theoretically, it may be approached practically in a limited field of investigation where a relatively small number of variables is considered exhaustive. In all cases, however, factor analysis does give a simple interpretation of a given body of data and thus affords a fundamental description of the particular set of variables analyzed.

Factor analysis is an important technique in multivariate research because it is a useful tool for the explication of constructs.[1] Nunnally (1967:289) further explained:

> The first step...is to develop measures of particular attributes which are thought to be related to the construct. The second step is to correlate scores on the different measures. The correlations are analyzed to determine whether 1) all measures are dominated by specific factors, 2) all measures are dominated by one common factor, or 3) the measures tend to break up into a number of common factors. ... Factor analysis is a broad term referring to methods of analysis used in the second step above.

Nunnally (1967:289) has also indicated that "factor analysis can be used either to test hypotheses about the existence of constructs, or if no credible hypotheses are at issue, to search for constructs in a group of interesting variables."

In general, factor analysis consists of extracting common and unique factors that can be attributed to each variable from an intercorrelation matrix of a set of variables. Within the factor analysis system, a variable can be represented in terms of several underlying factors, i.e.,

---

[1] A "construct" may be thought of as an effort to measure relatively abstract variables, i.e., ones thought to be evidenced in a variety of behaviors but which do not exist as an isolated, observable dimension of behavior. In essence, the construct represents a rather "half-formed" hypothesis that certain behaviors will correlate with one another in studies of individual differences (Nunnally, 1967:84-85).

A. Common Factors: those pertaining to more than one variable in the set.
   1. General factor: present in all variables.
   2. Group factor: present in more than one, but not all, variables.

B. Unique Factors: those pertaining only to a single variable in the set.

Common factors account for the observed intercorrelation among all variables. In contrast, each unique factor accounts for that portion of the variance of a variable that is not associated with that of any other variable in the set. The fundamental goal of factor analysis is to determine the amount of common variance which exists between sets of variables.

One method available to the researcher for factor-analyzing a correlation matrix has been termed cluster analysis. Tryon and Bailey (1970:1) indicate that cluster analysis is a procedure by which entities are objectively grouped on the basis of their similarities and differences. Such methods depend upon the identification of clusters and presumed factors by searching for interrelated groups of correlation coefficients or other measures of relation. This procedure is most appropriate when the investigator is able to designate a set of variables as belonging to a particular cluster on an *a priori* basis.

In the present study, a system of correlational analysis programs (named "PACKAGE"), developed by Hunter and Cohen (1969), was used. In addition to the computation of means, standard deviations, and product-moment correlation coefficients, these routines also perform an oblique multiple-groups analysis in which groups may be specified by the investigator from those comprising the correlation matrix stored in core memory. It has been shown that factor analysis serves the cause of "scientific parsimony" (Harmon, 1967:4); thus, by using these programs in the present research, the initially large set of variables can be reduced to a more manageable number. These procedures are useful in indicating which measures can be added and studied together rather than separately.

While a complete description of PACKAGE is beyond the scope of this report, it must be pointed out that the analytical strategy used by PACKAGE is to de-emphasize blind rules for forming large clusters and to facilitate reordering and presenting correlational matrices for efficient visual inspection. A hierarchial approach to synthesis of data is employed in PACKAGE. The operational procedure entails first the inspection of an inter-item correlation matrix, followed by the formation of small clusters of similar items, possibly two or three item groups. The procedure of combining items and groups into

larger groups is continued until it is felt that additional combinations would only blur important distinctions.

Scale Development

In practice, scale development is an iterative process of grouping items and evaluating the combinations. While PACKAGE was capable of generating and arranging the matrices, the final determination of the manner in which items were to be grouped was left to the discretion of the researcher. Three techniques were used, to evaluate item clusters, including internal analysis, external analysis, and content analysis.

Internal analysis is concerned with internal consistency or how well the items in the scale are related to one another. If scales consist of parallel items, a high degree of internal consistency would be expected. A second means of evaluating the similarity of items in a group is to analyze the patterns of correlations with items outside the group; this is called external analysis. If items in the group "belong" together in the sense that they are parallel items, they should exhibit a similar pattern of correlations with other items. Unfortunately, no single quantitative measure exists to facilitate an easy assessment of the external consistency. The researcher must visually inspect the correlation pattern of each item in the scale with other items, noting areas of inconsistency. A third means used to evaluate a

particular item combination was to examine the content of the items. If items were roughly parallel in their correlational patterns, one would expect that the content of the items would be similar. One must be cautious in interpreting the content of an item because an individual's perception of the content of that item may or may not be the same as the original writer's. Given this limitation, the researcher can subjectively judge the "reasonable" similarity of the content of the various items.

Moderator Effects

To a limited extent, computer-assisted analysis was performed to determine the interaction (or "moderating") effects of a group of selected variables. Anastasi (1964: 286) notes that it is not uncommon to find that a validity coefficient, whem computed for a total group, may be too low to be of much practical value; however, when recomputed for subsets of individuals differing in some identifiable characteristic, validity may be high in one subset and negligible in anothers. One means of testing for this effect is to divide subjects into high and low groups on some third variable (identified as the "moderator") and compute the correlations for both groups. The significance level of the difference between the correlations obtained for the high and low groups may then be tested. To test for such effects in the present research, a family of computer programs, called MODERATOR, was used;

this routine was designed to show simultaneously the moderating effects and the nonlinear relations among a set of variables. The mathematical derivation and description of the computer analysis may be found in Hunter and Chesser (1971).

Classification and Codification of Data for Analysis

Dietary Data

Dietary data were obtained from three separate one-day food records kept by the children's mothers or persons responsible for the child's meals. Amounts of food consumed were recorded in terms of common household measures on forms provided by the researcher for that purpose (Appendix C-1). Transformations of the data from each of the three original food records were made for analytical purposes. The following is a brief discussion of each of the transformation procedures employed.

1. Conversion of estimated quantities of food consumed to corresponding nutrient values. Transformation of the original food record data, reported in terms of estimated quantities of foods consumed, to nutrient values was made by using the coding system and conversion factors for computer usage developed by the Consumer and Food Economics Research Division, U. S. Department of Agriculture. Specifics of this method are presented in USDA-ARS Bulletin No. 62-10-1 (Davenport, 1964).

Briefly, this method involved calculation of the nutritive values of foods by means of:

> two sets of data--one with the quantities of food consumed, the other with nutritive values per specified unit of food. The two sets are matched by identifying food codes. The products of quantity times nutritive value are derived and then summed to obtain the nutritive value of the diet. (Davenport, 1964:1)

The food composition values used in this method were those published in the U. S. Department of Agriculture Home and Garden Bulletin No. 72, 1964. Identification codes for 512 food items, along with a master set of punch cards carrying the nutritive values for each of the 512 items, were obtained from the U. S. Department of Agriculture, Agricultural Research Service. In the present study, approximately 300 additional identification codes and matching master cards were developed for food items not included in the manual. Food composition data for these additional items were obtained from food manufacturers, as well as from Agricultural Handbook No. 8 (Watt and Merrill, 1963) and from Bowes and Church (Church and Church, 1970).

2. Conversion of nutrient values to proportions of Recommended Dietary Allowances (RDA). These computations involved comparisons of the individual nutrient intake values with the 1968 revision of the RDA for three- and four-year old children (Food and Nutrition Board, 1968).

Percentages of the Recommended Dietary Allowances provided by food intake were calculated for calories, protein, calcium, iron, vitamin A, thiamin, riboflavin, niacin, and ascorbic acid.

3. Comparison of quantities of calories and protein consumed in relation to how each was eaten. The amount of food energy and protein ingested, as derived from the above computer transformations, were analyzed for the proportion of each eaten at meals or at snacks, with whom it was eaten (whether alone, with all of the family, with some of the family, or with others outside the family) and where it was eaten (whether at home or elsewhere).

4. Conversion of estimated quantities of foods consumed to number of servings eaten in certain food groupings. The manual (Davenport, 1964) used for the coding of food items for purposes of nutrient analysis provides a six-digit identification code per food item. The first three digits refer to the consecutive numbering process for this listed food items. The next three digits refer to a food group code number, designed to group foods by major sources of nutrients for further study of the composition of the diets. This code number was used to analyze the food consumption data in terms of number of servings by specified food groups.

5. Conversion of nutrient values of foods ingested according to the percentage of calories furnished by carbohydrate, fat, and protein. The number of calories consumed, as computed by the transformation procedures just described, were analyzed for the proportions contributed by carbohydrate, fat, and protein.

Each of the three food records for each child were analyzed separately. The results indicated no significant seasonal differences. Therefore, a computer program was written to average the figures obtained for the three separate food records and produce one set of data output for each child in the sample. This average value will be referred to as the nutritive values of the children's food intake records.

Biochemical Data

Data obtained from the blood tests for hemoglobin, hematocrit, total serum proteins, and serum albumin were transferred to computer cards. In addition, conversion of these values was made to a category designating the value as "deficient", "low", "acceptable", or "high", as specified in the ICNND Manual for Nutrition Surveys (1963).

Figures for urinary hydroxyproline and creatinine were transferred to computer cards as: 1) the hydroxyproline:creatinine ratio, and 2) the "hydroxyproline index" (Whitehead, 1965) which calculates urinary hydroxyproline:creatinine, as corrected for body weight.

CHAPTER V

FINDINGS

The chapter presents a description of the findings for each category of variables studied and a discussion of the interrelationships between variables which was elucidated.

Characteristics of Families in the Sample

Results from Home Interview

Demographic characteristics of families (analogous to the Jessor and Richardson concept of components of the "distal environment") were obtained by a home interview conducted with mothers of the children participating in the study.

11.4% of the children were from single-parent families in that their mothers were divorced, widowed, or had never married. The remaining 88.6% of the mothers were married and living with their husbands.

Parents in the sample were rather highly educated in terms of the number of school years completed (Table 5.1). On the average, mothers had completed fourteen years (or two years past high school), while fathers had completed an average of seventeen years (or one year past undergraduate education).

Table 5.1. Education of Parents (as number school years completed)

	Mother	Father
<12 years	14.8%	12.1%
12-16 years	61.7%	25.0%
>16 years	23.5%	62.9%
MEAN YEARS	14	17

Over one-third of the mothers were employed either part-time or full-time (Table 5.2). Over half of the children were cared for by someone other than the parents ten hours or less per week. In contrast, 13.5% were cared for by others thirty-five hours or more per week (Table 5.3). Over half of the fathers were employed on a full-time basis. However, 13.8% of the fathers who were working indicated that they did not have "steady" work. Of the 38.5% of the fathers who were classified as "unemployed", many were full-time students at the university (Table 5.2).

Table 5.2. Employment Status of Parents

	Mother	Father
Unemployed	63.8%	38.5%
Employed part-time	22.8%	9.6%
Employed full-time	13.4%	51.9%

Table 5.3. Hours per Week Child is Cared for by Someone Other Than Parents

Hours per week	Number	Percentage
0-6	34	23.0
7-10	46	31.1
11-15	28	18.9
16-34	20	13.5
35-60	20	13.5

Over 13% of the families in the sample were receiving less than $4000 annually, while nearly 5% had incomes of over $20,000. The mean annual family income was $9014, and the median family income was $7047 (Table 5.4). When classified according to the source of family income (Warner *et al.*, 1949), the greatest percentage (69.1%) of families were receiving a salaried wage, while 10.7% were supported by public welfare (Table 5.5).

Table 5.4. Income Distribution of Families in Sample

Annual Family Income	Number	Percentage
<$4000	19	13.3
$ 4000- 6999	46	32.2
7000- 9999	19	15.4
10000-14999	30	20.9
15000-19999	19	13.3
20,000+	7	4.9
MEAN INCOME:	$9014	
MEDIAN INCOME:	$7047	

Table 5.5. Classification of Families By Source of Family Income (Warner *et al.*, 1949)

Source	Number	Percentage
1. Inherited wealth	0	0
2. Earned wealth	0	0
3. Fees, Services	1	0.7
4. Salary	103	69.1
5. Hourly wages	26	17.5
6. Private relief	3	2.0
7. Public welfare	16	10.7

For the most part, children came from two-parent, four member families (Table 5.6). Most families had two children, both of whom were preschool age; therefore nearly half of the sample children were first-born. On the average, over half of the families had two years between births of the children (Table 5.7). According to Duvall's (1967) stages in the "family life cycle", most of the families (59.1%) were in Stage III, i.e., their eldest child was from two and one-half to six years of age (Table 5.8).

Table 5.6. Household Size

Number of Persons in Home	Number	Percentage
2-3	19	12.8
4	61	40.9
5-7	55	36.9
8-11	14	9.4

Table 5.7. Characteristics of Families in Relation to Number, Age and Spacing of Children (Expressed as Percentage of Families in Each Category)

	One	Two	Three	Four	Five-Nine
Total number of children in household	12.1	40.9	22.2	10.1	14.8
Number of children 5 years & under	31.5	47.7	13.4	6.0	1.3
Average years between births in family	16.9	53.1	21.5	6.2	2.3

Table 5.8. Description of Families by Stage in Family Life Cycle

Stage	Number	Percentage
III. Families with preschool children (oldest child 2 1/2 to 6 years)	88	59.1
IV. Families with school children (oldest child 6 to 13 years)	43	28.9
V. Families with teenagers (oldest child 13 to 20 years)	17	11.4
VI. Families as launching centers (first child gone to last child's leaving home)	1	0.7

It is thought that food habits are in part influenced by the family's religious practices. Most children in the present study were Protestant. Nationality ties did not exert a discernible influence on the types of foods consumed in the home (Table 5.9).

Table 5.9. Religion of Children in Sample

	Number	Percentage
No religion followed	15	10.7
Protestant	67	47.8
Roman Catholic	30	21.4
Jewish	6	4.3
Mixed (affiliated with 2 or more religious groups)	4	2.8
Other (inc. Buddism, Islam, etc.)	18	12.9

In an attempt to ascertain the mobility of the families in the sample, mothers were asked how many years they had resided at their present address and how many times they had moved in the past three years. In general, families were rather mobile in that 39.9% had lived in their present home one year or less (Table 5.10). Approximately one-third of the families had moved two or more times in the previous three year period.

Table 5.10. Number of Years in Present Home

Years	Number	Percentage
One or less	58	38.9
Two, three	57	38.3
Four to six	28	8.8
Seven or more	6	3.4

An index of crowding that has been extensively used is the ratio of the number of persons living in the home to the number of rooms in the house. A ratio of less than 1.0 is said to indicate a degree of crowding. In this sample, the mean crowding index was 1.16±0.41, with a range of 0.4 to 2.8 rooms per person in the family.

Using the guidelines set up by the U. S. Census Bureau (1963) to assess the quality of housing, it was determined that 85.2% of the homes were in "sound" condition, while 13.3% were "deteriorating" and 1.6% were "dilapidated." 66.2% of the homes were in residential areas. Observation of the exterior structure of the houses revealed that 42.1% were of excellent quality, 39.5% were good, 15.8% were fair and 2.6% were of poor quality. Analysis of the interviewers' evaluations of the general state of cleanliness and housekeeping conditions showed that nearly half (49.7%) were rated "very clean and orderly" while 10.5% were "dirty and unkept."

Certain appliances are important in the home in order to assess which items might contribute to the quality of the child's nutrient intake. Table 5.11 indicates that more families had a television than an automobile in working order and that more families had a telephone than had a properly functioning refrigerator.

Table 5.11. Appliances Present in the Home

	Not present or Not in working order		Present, and functioning properly	
	Number	Percentage	Number	Percentage
Telephone	8	5.4	141	94.6
Radio	16	10.7	133	89.3
Television	19	12.8	130	87.2
Car or truck	22	15.0	127	85.0
Refrigerator	10	6.7	139	93.3
Separate Freezer Unit	118	80.3	31	19.7
Range with Oven	11	7.5	138	92.5
Hot plate	141	94.7	8	5.3

The interview with the mother in regard to the child's medical and dietary history revealed that thirteen children (8.8% of the sample) had had a history of food allergy at some time in the past. However, only two children were on some type of special diet at the time of the interview. Twenty-three children (15.5%) had been diagnosed as anemic in the past; of these, ten had been diagnosed recently, while the others had been diagnosed at an earlier age. Mothers reported that thirty-three children (nearly one-fourth of those interviewed) had had a history of feeding problems serious enough to warrant consultation with a physician. Of these seven had presented feeding problems recently.

Nearly three-fourths of the mothers indicated that they gave their child some type of vitamin supplement. Of these, the most frequently named type was the multiple-vitamin capsule; 76.4% of the children received this type. (Mothers frequently reported during the course of the interview that they gave the child his "choice" of supplements; thus, the type of flavored, chewable supplement designed especially for consumption by children was the type most often named.) Thirteen mothers (8.7% of the sample) indicated that they also gave their child some other type of supplement or "health food." These were usually wheat germ and cod liver oil. Approximately half of the mothers indicated that the recommendation for

the child's taking vitamin supplements was of their own volition, while slightly fewer indicated that the physician had recommended their use.

The vast majority of children had been seen by a physician within the past year for a routine physical examination and judged admissable to the nursery school programs. The other children were being seen by a physician at the public health clinic. At the time of the study, 45.8% of the children had been seen by a dentist within the past year, usually for the purpose of a routine dental examination. Nearly half (46.5%) had never been examined by a dentist. Twenty-five children (nearly 18%) had some filled teeth at the time of the interview.

Questions were asked in order to gain information regarding the family's mealtime practices. In general, most families ate the evening meal together; lunch and snacks were consumed on an individual, rather than on a family, basis (Table 5.12).

Table 5.12. Meals Eaten Together as a Family

	Never	Less than 1/2 the time	About 1/2 the time	Almost always
Breakfast	25.5%	26.9%	9.4%	38.2%
Lunch	32.0%	32.7%	11.6%	23.8%
Dinner	3.4%	3.4%	5.8%	87.9%
Other, Inc. Snacks	50.8%	22.2%	3.9%	23.0%

Mothers were asked about their child's attitude about eating. Nearly half (45.6%) responded that her preschooler's attitude varied; however, almost as many mothers (39.6%) felt that their child truly enjoyed eating. Far fewer mothers felt that the child had to be coaxed to eat or that he presented an eating problem.

In an attempt to gain information about how important it was, in the mother's opinion, for the child to finish everything on his plate, responses were fairly equally divided. The largest proportion of mothers (36.2%) thought that this was fairly important (Table 5.13).

Table 5.13. Mothers' Responses as to How Important It Is For a Child to Finish Everything on His Plate

	Number	Percentage
Not important at all	25	16.8
Slightly important	24	16.1
Moderately important	54	36.2
Considerably important	31	20.8
Extremely important	15	10.1

Table 5.14 presents the results of the mothers' usual actions when the child dawdles or plays with his food. A nearly equal proportion stated that they insist that the child eat a certain portion of each food (28.9%) as did those who threaten some type of punishment for not eating (26.7%). A somewhat fewer number tell the child

there will be nothing to eat until the next meal, then remove the food (11.1%), and 10.4% say nothing because they do not think this is important.

Table 5.14. Mothers' Usual Action When the Child Dawdles With Food or Refuses Food Served to Him

	Number	Percentage
1. Insists that child finish meal promptly	10	7.4
2. Insists that child complete a certain portion of each food	39	28.9
3. Promises reward e.g., dessert, for completion of eating	9	6.7
4. Coaxes, but does not force eating	7	5.2
5. Tells child there will be nothing to eat until the next meal, then removes food	15	11.1
6. Threatens punishment, e.g., withholding of dessert, if food is not eaten	36	26.7
7. Says nothing to child; talks to child later about it	0	0
8. Says nothing to child; does not like arguments at the table	5	3.7
9. Says nothing, does not think this is important	14	10.4

It was believed that preschool children consume a considerable proportion of their calorie intake as snacks. Mothers were thus asked to estimate the frequency of her child's snacking at particular times throughout the day. Table 5.15 indicates that few children snack before the

breakfast meal. (Some mothers indicated, however, that the child may have helped himself to food before she arose in the morning, and thus she had no way of knowing exactly if he ate before breakfast.) Most children did snack during the day, and nearly two-thirds have something to eat between the noon and evening meals daily.

Over 30% of the mothers indicated that the child may miss meals. Reasons cited for the child's not eating included lack of time (19.5%), lack of appetite (43.9%), fatigue (22.0%), and illness (14.6%).

Responses regarding the time of day when the child seemed to be the most hungry were fairly equally divided. 39.9% of the mothers felt her child was the most hungry in the morning, 27.8% stated that this occurred in the afternoon, while 33.3% indicated the evening.

Over half (52.7%) of the mothers rated her child's appetite in the previous three months as "good." 19.9% felt the appetite could be rated as "excellent", 22.6% rated it as "fair", and only 4.8% indicated that it had been "poor."

Nearly all the children in the sample (97.1%) were able to feed themselves, using a spoon and fork. Approximately half of the children (49.0%) were able to use a knife.

Most people have fairly definite ideas about the kinds of foods that children will or will not eat. Mothers

Table 5.15. Frequency of Snacking

	Every day	2-3 times per week	Less than once/week	Never
Before breakfast	2.7%	4.7%	6.1%	86.5%
Between Breakfast & Lunch	44.2%	34.7%	5.4%	15.7%
Between Lunch & Dinner	65.8%	19.2%	6.2%	8.9%
Between Dinner & Bedtime	47.6%	21.1%	8.2%	23.1%

were asked to name their child's "favorite" food and the food he disliked the most. Responses were categorized into food groups according to the distribution presented in Table 5.16. The most popular food group was meat (rated as a favorite by 32.8% of the mothers), followed by the bread and cereal group (24.4%). Nearly 18% indicated that sweets were the favorite. The overwhelming majority of the mothers indicated that vegetables were the most unpopular food to the child.

Table 5.16. Food Preferences of Children

	Favorite		Most Disliked	
	Number	Percentage	Number	Percentage
1. Meat	43	32.8	12	10.3
2. Milk, dairy products	11	8.4	0	0
3. Fruits	5	3.8	3	2.6
4. Vegetables	13	9.9	94	81.0
5. Eggs	4	3.1	5	4.3
6. Bread, cereals	32	24.4	2	1.7
7. Sweets	23	17.6	0	0

Mothers were asked to name the one factor which, she felt, exerted the most important influence on her meal planning. 40.4% of the mothers indicated that the nutritional quality of the food was the most important. Fewer mothers (31.2%) named family preferences. Other responses, in order of decreasing frequency, were: health needs of

the family (13.5%), cost of the food (7.8%), time required for preparation (3.6%), and the mother's own food preferences (3.6%).

A question was asked to determine how the families accepted new foods or new methods of food preparation. Only 12.8% of the mothers answered that their families were "enthusiastic" about this, 43.3% said they were "willing", 27.0% said they were "cautious", and 13.5% were "reluctant", but only 3.6% said their families refused to accept new foods at all.

Only 19.4% of the mothers reported that the child regularly ate some meals away from home. Over one-fourth of these children usually ate at the home of a relative; a similar number ate at a restaurant. Approximately one-fifth of all children eating away from home ate at the home of the babysitter, and the rest ate in the homes of friends or neighbors.

Because the preschool period is notorious for its reputed feeding problems, Table 5.17 presents the results of the mothers' responses to certain frequently encountered problems. In general, mothers did not feel that their children were eating inappropriate amounts of foods or were consuming the wrong types of foods. The exception to this was that more mothers (61.6% compared with 38.4%) felt that the child chose a limited variety of foods.

Table 5.17. Extent of Feeding Problems in the Preschool Period

Do you think your child:	No	Yes
Eats too little food?	76.0%	24.0%
Eats too much food?	89.0%	11.0%
Chooses a limited variety of foods?	38.4%	61.6%
Eats too few fruits and vegetables?	59.9%	40.1%
Plays or dawdles with his food?	55.2%	44.8%
Eats too much meat?	91.0%	9.0%
Eats too little meat?	69.4%	30.6%
Drinks too much milk?	88.4%	11.6%
Drinks too little milk?	85.6%	14.4%
Eats too many sweets?	63.8%	36.2%

In order to gain a better understanding of families' food buying practices, a series of questions pertaining to this topic were included in the interview. In nearly three-fourths of the families (71.4%), the mother alone decides what foods should be purchased. In 19.1% of the others, the mother and father decide together, in 5.4% the entire family decides, and in 2% each, the father alone or the mother and children (without the father) have a voice in the decision-making.

In nearly half (49.0%) of the families interviewed, the mother did the grocery shopping alone, while in 20.1% the grocery shopping was done by the mother and the children, in 12.8% by the entire family, in 10.7% by the mother and father together without the children, in 6.7%

by the father alone, and in only one family (0.7% of the entire sample) by the father and children. Over half (53%) of the families did the grocery shopping once a week. Over 97% of the families shopped in supermarkets rather than in small, independent grocery stores. Table 5.18 shows the reasons the mothers gave for shopping in the stores they preferred. Families spent, on the average, $35.66 for food each week. Table 5.19 indicates the distribution of family food spending.

Table 5.18. Reasons for Shopping in Particular Markets

	Number	Percentage
No reason given	1	0.7
Lower food prices	37	25.7
More convenient and/or personal loyalty	21	14.6
Store offers trading stamps, etc.	1	0.7
Combination of better quality and lower food prices	58	40.3
Better quality and/or variety and/or ethnic foods	26	18.1

Table 5.19. Weekly Food Expenditure

	Number	Percentage
<$20	6	4.1
$20-30	45	30.6
30-40	51	34.7
40-50	18	12.2
>$50	27	18.4

Because "convenience" foods are increasingly being used, mothers were asked how frequently they used certain food items. Table 5.20 presents the results of these data. The use of ready-to-eat cereal is so widespread that it can hardly be considered a "convenience" food item by most people. On the other hand, the fact that approximately two-thirds of the families interviewed never used items such as frozen TV dinners, frozen dessert pies and pie crust mix, indicates that other items are not universally well accepted.

83.1% of the families in the sample were not using Food Stamps at the time of the interview. Eight families were using them and eleven others said that although they thought they were eligible they were not using Food Stamps; the most frequently cited reasons for their not using them were that they did not know enough about them or that the inconvenience caused by a lack of transportation was a detriment.

In an attempt to assess the mother's level of knowledge of nutrition, two techniques were used. Mothers were asked to name the foods thought to be necessary for her child every day; responses were evaluated in regard to the number of the "Basic Four" named (Table 5.21). Only one mother did not name any of these food groups. Over half of the sample (54.7%) were able to name all four. A true-false "Nutrition Knowledge Test" (Appendix C-3e) was administered and scored. Three-fourths of the mothers

Table 5.20. Frequency of Use of Certain Convenience Food Items

	Percentage of Families				
	Never	Rarely	Occasionally	Nearly All the time	All the Time
Frozen Meat Pies	47.7	34.2	15.4	2.0	0.7
Frozen TV Dinners	65.1	20.8	13.4	0.7	0
Canned Soup, Stews	6.0	6.0	38.3	29.5	20.1
Frozen Pies	61.5	26.4	8.8	2.7	0.7
Cake Mixes	10.2	15.7	38.1	28.6	7.5
Instant Coffee	37.7	12.3	9.6	11.0	29.5
Cold Cereal	5.4	1.4	9.5	21.8	61.9
Pie Crust Mix	69.6	10.8	10.1	5.4	4.1
Pudding Mix	23.3	12.3	41.1	13.0	10.3

were able to answer fifteen of the twenty-three items (a score of 65%) correctly (Table 5.22).

Table 5.21. Number of "Basic 4" Named

None	0.7%
One	1.4%
Two	14.2%
Three	29.1%
Four	54.7%

Table 5.22. Score on Nutrition Knowledge Test (23 total correct responses)

9	4.2%
9-14	20.8%
15-19	59.7%
20-23	15.3%

Mothers were asked which classes, persons, or sources of information had been most influential on their planning of meals to meet the nutrient needs of their families. Junior and senior high school home economics classes accounted for nearly three-fourths of the responses. Others, in order of decreasing frequency, were professional or college training (19.0%), prenatal classes (4.2%), adult education classes (3.2%), as well as youth groups (such as 4-H or Girl Scouts) and cooking classes (1.1% each). (Approximately 36% of the mothers interviewed felt

that they had never attended any classes in which they learned about food and nutrition.)

Half of the mothers named their own mothers as the person who had exerted the most influence on their ways of feeding their families. Others named were: the physician (by 6.3%), friends or neighbors (by 4.7%), a home economist or dietitian (by 3.9%), the nurse (by 0.8%), and a combination of the above individuals (most frequently it was the mother and physician) for 34.4% of the sample. 14% said that they had not been influenced by any other persons in regard to nutrition knowledge. Mothers were also asked where they would go if they had a question about the nutritive content of various fruits and vegetables. 37.2% said they would go to books (other than cookbooks), 29.1% would go to cookbooks, 11.5% would go to an extension agent or home economist, 10.1% to food articles in magazines or newspapers, 4.7% to her mother or another relative, 2.7% to food advertisements, and the remainder to TV, neighbors and friends, members of the immediate family, and teachers.

Using a computer program specifically written to average individual item scores into a mean "scale score", scales were developed from items contained in the home interview schedule. Table 5.23 presents a breakdown of items which were included in the final scales for the large inter-scale correlation matrix in Appendix E-2.

(Only those scales which were composed of more than one item are listed in the table.)

Table 5.24 is an intercorrelation matrix showing the relationships among selected demographic and resource characteristics of families in the sample. Those figures enclosed in parentheses denote a significant correlation, i.e., a correlation coefficient of 0.23 is considered significant at the 0.01 level (Dixon and Massey, 1969: 569). The following chart describes the significant correlations found between these variables.

Variable	Positively Correlated	Negatively Correlated
Total number of persons in the home	1) Number of children under five years 2) Ordinal position of child 3) Money spent for food per week 4) Stage in the family life cycle	1) Parents' occupation and education scale 2) Socioeconomic status 3) Amount of time mother is away from child 4) Owning the house 5) Crowding index 6) Number of "Basic 4" named 7) Score on nutrition knowledge test
Number of children under five years	None	1) Parents' occupation and education scale 2) Socioeconomic status 3) Crowding index 4) Score on nutrition knowledge test
Ordinal position of child	1) Money spent for food per week 2) Stage in family life cycle	1) Parental occupation and education scale 2) Socioeconomic status 3) Own the home 4) Crowding index 5) Number of "Basic 4" named 6) Score on nutrition knowledge test
Marital status of the mother	(Married mothers) 1) Income status scale 2) Mother away from the child 3) Caucasian race	(Unmarried mothers) 1) Family income 2) Socioeconomic status 3) Parental occupation and education scale

Variable	Positively Correlated	Negatively Correlated
Parental occupation and education scale	1) Family income 2) Socioeconomic status 3) Mother away from child 4) Crowding index 5) Condition of home and neighborhood 6) Number of "Basic 4" named 7) Score on nutrition knowledge test	1) Income status-father unemployed 2) Money spent for food 3) Stage in family life cycle
Income status-father unemployed	1) Caucasian race	1) Socioeconomic status
Family income	1) Socioeconomic status 2) Crowding index 3) Condition of home-neighborhood	1) Renting the home
Socioeconomic status	1) Condition of home-neighborhood 2) Number "Basic 4" named 3) Score on nutrition knowledge test	1) Money spent for food 2) Black race
Money spent for food	1) Stage in family life cycle	1) Renting home 2) Number "Basic 4" named 3) Score on nutrition knowledge test

Variable	Positively Correlated	Negatively Correlated
Mother away from child	1) Crowding index 2) Condition of home-neighborhood	
Owning the home		1) Crowding index
Condition of home and neighborhood	1) Score on nutrition knowledge test	
Number of "Basic 4" named	1) Score on nutrition knowledge test	1) Stage in family life cycle
Score on nutrition knowledge test	None	1) Stage in family life cycle

Table 5.23. Scales Developed From Items in Interview Schedule

Scale Name	Items
Parents' occupation and education	Fathers' schooling Mothers' schooling Fathers' occupation rating Mothers' occupation rating
Income status	Fathers' employment status Father have steady work? Source of family income
Mother away from child	Mother's employment status Hours/week child is cared for by someone else
Condition of home and neighborhood	Framed pictures Decorative accessories Green plants State of housekeeping condition Observation of home exterior condition Rating of neighborhood Use of car, truck? Telephone in home? Land use in neighborhood
Infantile behavior	Drinks from bottle? Uses pacifier? History of food allergy? Special diet?
Feeding problems	History of feeding problems? Age of feeding problems? Child's attitude toward food, meals Meals ever missed? Child's appetite in past three months Child eats too little food? Child eats too much food? Child eats too few fruits and vegetables? Child dawdles with food? Child eats too little meat? Child drinks too little milk?
Family eats together	Eats breakfast together? Eats lunch together? Eats dinner together? Snacks together?
Frequency of snacking	Snacking before breakfast? Snacking between breakfast and lunch? Snacking between lunch and dinner? Snacking between dinner and bedtime?
Use of convenience foods	Use of cake and muffin mixes Use of ready-to-eat cereal Use of pie crust mix Use of pudding mix

Table 5.24. Intercorrelations Among Demographic/Resource Characteristics of Families

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Total persons in home	1.00																	
2. Children <5 years	(+.45)	1.00																
3. Ordinal position	(+.78)	-.05	1.00															
4. Marital status	-.05	.08	.14	1.00														
5. Occup. + educ. scale	(-.50)	(-.48)	(-.33)	(-.32)	1.00													
6. Income status scale	.01	.06	.18	(.70)	(-.30)	1.00												
7. Family income	.06	-.17	.09	(-.24)	(.39)	-.15	1.00											
8. Milbank SES index	(-.37)	(-.36)	(-.30)	(-.44)	(.85)	(-.36)	(.54)	1.00										
9. $ for food	(.54)	.20	(.39)	0	(-.39)	.09	.18	(-.27)	1.00									
10. Mother away from child	(-.26)	-.20	-.12	(.26)	(.32)	.04	.16	.14	-.17	1.00								
11. Race (white/black)	(.14)	.06	.23	(.29)	-.17	(.35)	.01	(-.23)	-.02	+.12	1.00							
12. Times moved	.01	.14	.02	.09	-.17	.11	-.14	-.14	.04	-.18	-.09	1.00						
13. Own/rent	(-.40)	-.15	(-.35)	-.04	.13	-.03	(-.55)	.04	(-.26)	-.11	-.20	.04	1.00					
14. Crowding index	(-.45)	(-.39)	(-.24)	.17	(.29)	.05	(.37)	.21	-.15	(.37)	.07	-.04	(-.42)	1.00				
15. Home-neighborhood	-.20	-.17	-.06	.08	(.55)	.06	(.39)	(.52)	-.19	(.27)	.04	-.03	-.13	.24	1.00			
16. No. "Basic 4"	(-.37)	-.12	(-.36)	-.17	(.35)	-.13	.19	(.41)	(-.26)	.10	-.02	-.03	.01	.22	.31	1.00		
17. Nutr. knowledge	(-.41)	(-.26)	(-.25)	-.08	(.51)	-.06	.14	(.47)	(-.36)	.06	-.15	.09	.15	.23	(.29)	(.37)	1.00	
18. Stage in fam. life cycle	(.71)	-.06	(.82)	.05	(-.28)	.11	.19	-.21	(.49)	-.05	.13	-.09	-.20	-.22	-.10	(-.31)	(-.27)	1.00

Psychosocial Attributes of Mothers

Items in the Parent Attitude Research Instrument were analyzed using the PACKAGE multiple-groups cluster analysis programs. Items were initially grouped on the basis of the original scales as elaborated by Cross and Kawash (1968). These initial procedures indicated that, for this sample, the original scales were not consistent with expectations. Thus, it was deemed necessary to develop new scales from these data. The scales and the items of which they are composed are presented in Table 5.25. The matrix formed from the multiple groups cluster analysis is in Appendix E-1. Following are brief descriptions of the eleven clusters of items which were formed from the original fifty-three items in the questionnaire.

Table 5.25. Development of New PARI Scales

Scales Used from Parent Attitude Research Instrument	Questionnaire Items
1. Rejection of the Homemaking Role	5,10,15,20,25,30,35,40
2. Irritability	6,17,28,39,49
3. Equalitarianism	2,13,24,36,46
4. Encouraging Verbalization	1,12,23,34,45
5. Excluding Outside Influences	4,16,27,38,48
6. Parental Deification	9,21,32,43,52
7. Deception	7,18,29,41,50

Table 5.25. (Cont'd)

	Questionnaire Items
8. Deification (reflected)*	3,14,26,37,47
9. Excluding outisde Influences (reflected)	8,19,31,42,51
10. Irritability (reflected)	11,22,23,44,53

As result of "multiple-groups cluster analysis":

	Items
1. Parents are "all-wise"	48,51,21,38,9
2. Children should be treated as equals	45,1,23,12,13,34,19,8,42
3. Children should only listen to and trust parents	4,16,27
4. Unquestioned loyalty	32,52,43,47,26
5. Deception	7,18,29,41
6. Homemaking is being trapped in a dull job	25,15,35,20,30
7. Homemakers would like to get out!	5,10
8. Raising children is nerve-wracking	17,28,49
9. Occasional dissatis-faction with being a homemaker	39,11,6
10. Frequent dissatisfaction	53,44,22
11. Residuals	2,3,14,24,31,33,36,37,40,46

Cluster No. 1: "Parents are all-wise."

Those who agree with these items indicate a feeling that children should implicitly trust their parents because

*Reflected means that the wording of the item as it appears in the questionnaire was reversed for scoring. The reversed score was used for all subsequent correlational analyses.

of the parents' superior knowledge and experience. The general content of items in this group present a type of mother who feels that children have undeveloped judgment and therefore should always trust their parents without question.

Cluster No. 2: "Children should be treated as equals." All of the items in this cluster deal with encouragement of the child to verbalize disagreement with this parents' views. This cluster was inversely related to Cluster No. 1.

Cluster No. 3: "Children should listen to and trust only parents."

This cluster was positively related to Cluster No. 1 and inversely correlated with Cluster No. 2. All items deal with external forces which potentially cause the parents to appear inferior in the child's eyes or to lose the confidence of their children. Although the relationship to Cluster No. 1 is positive, the discriminating aspect of the relationship is the fact that here forces outside the parents' control cause a loss of confidence, while in the first cluster, children are not to express any lack of confidence in the parents.

Cluster No. 4: "Unquestioned loyalty."

This cluster consists of items which were all concerned indirectly with the unquestioning loyalty

of the child to his parents. It is positively correlated with the Clusters No. 1, 3, yet is negatively correlated with the Cluster No. 2.

Cluster No. 5: "Deception."

This cluster contained all of the items from the original "deception" scale, with the exception of item 50. The content of the items implies a viewpoint that tricking children to get them to do what the parents want is a legitimate and common device of control. Item 50 does not use the concept of trickery in quite the same context, in that it implies a more subtle guiding rather than overt deception. An interesting point is the positive correlation of this cluster with item 40, "raising children is very much more difficult than most jobs men do." This finding implies the attitude on the part of the mother that raising children is difficult because the parent is forced to out-smart them by trickery.

Cluster No. 6: "Homemaking is being trapped in a dull job."

This cluster is composed of some items from the original "rejection of the homemaking role" scale. All items imply that the children are the ultimate cause of the mother's perceived loss of

freedom. Items 20 and 25 suggest that the mother is not free to do temporary activities, such as shopping, while items 15 and 35 imply that the mother feels restrained from doing more time-demanding activities, such as taking a trip or taking a job. It is interesting to note that items 25, 15, and 35 correlate positively with the anomie scale, all implying a sense of helplessness on the part of the mothers.

Cluster No. 7: "Homemakers would like to get out!" Items in this cluster were strongly related to the previous cluster because they deal with the mother's feeling of being trapped by the demands of caring for a home and children. The differentiating aspect of the content between these items and Cluster No. 6 is the implication in Cluster No. 7 of the mother's feeling of being isolated from the happenings in the "outside world." This attitude is somewhat different from that expressed in the previous cluster because it reflects an inability on the part of the mother to experience a sense of accomplishment. This cluster correlates positively with Clusters 8, 9, and 10 which deal with the parents' irritability with children. Such relationships may be expected, since, if a mother feels trapped by the demands of

the children, she is more likely to feel resentful and irritable because of them.

Cluster No. 8: "Raising children is a nerve-wracking job!"

This cluster is composed of items which deal with the mother's feeling that she is justified in a sense of irritability with children because of her agreement that the job of raising children is certainly "nerve-wracking."

Cluster No. 9: "Occasional dissatisfaction."

This cluster is composed of three items which imply that parents occasionally get upset with their children for no specific reason. The fact that no reasons were stated in the items of this cluster as they were in the previous scale (e.g., when children are demanding), seems to be the single difference with respect to content between this cluster and Cluster No. 8.

Cluster No. 10: "Frequent dissatisfaction."

This cluster is composed of items which deal with the mother's becoming frequently irritated with children. While this scale was related to the Clusters 8 and 9, it is distinct because of the unique content of the items and lower inter-item correlations with other clusters.

Cluster No. 11: "Residuals"

Ten items were placed in the "residuals" cluster because some contained independent information and others added nothing to the analysis. This cluster was not considered in subsequent analyses.

Scales formed from items contained in the Parent Attitude Research Instrument (PARI) were used in all subsequent data analyses as representative of the psychosocial attributes of the mothers in regard to authoritarian attitudes about child-rearing.

Anomie and Powerlessness Scales

The five-item anomie test, developed by Srole, underwent item analysis and the scale was found to be unidimensional; consequently, further scale refinement was unnecessary. The final powerlessness scale was developed using only those items which were consistently strong in the inter-item correlation matrix. These items were 2, 3, 5 through 8, 10 through 16, and 18 through 24 (Appendix C-3d).

Semantic Differential Scales

The semantic differential instrument (Appendix C-3f) served as the basis for the development of two scales. The first, composed of items 1, 2, 4 through 15, 17 through 22, 24, 25, 28 and 30,

was felt to be measuring a general self concept or worthiness of the mother, while the second scale developed from this instrument (composed of items 26, 29, 32, and 33) was felt to be related to a more general concept of feminity or "womanliness."

Nutrition Attitudes Scales

The permissiveness in feeding attitude from the Nutrition Attitudes Instrument (Appendix C-3e) was drawn from the following items 1, 4, 8, 9, 11, 16, and 18. Inter-item analysis revealed that all items appeared consistent throughout and therefore were retained for the final scale. The remainder of items in the instrument measured the "nutrition is important" attitude.

Homemaker Values

The mothers' ranking of values rated as "most important", "second most important", and "least important" were tabulated and the results appear in Table 5.26. The values of health, family centrism, and education received the largest number of "most important" ratings. Prestige and freedom values were rated as "least important" by the greatest number of mothers. Each value rating response was considered as an independent measure in subsequent data analyses.

Table 5.26. Percentage of Sample by Value Rating Responses

	Rating		
Value Name	Most Important	Second Most Important	Least Important
Economy	7.5	13.6	3.4
Prestige	1.3	4.0	46.2
Health	29.9	14.3	0
Family Centrism	24.5	13.6	1.3
Religion	9.5	13.6	7.5
Friendship	2.7	11.6	0.9
Freedom	2.7	2.7	31.9
Education	17.0	18.3	1.3
Aesthetics	1.3	4.0	3.4

Interrelationships Among Family Characteristics

Selected demographic and resource characteristics of the families studied were analyzed to determine the nature of the relationships with the psychosocial attributes of of the mothers (Table 5.27). Again, a correlation coefficient of 0.23 is considered to be significant at the 0.01 level (Dixon and Massey, 1969:569). It is noted that although the correlations do vary considerably, these do not necessarily reflect differences in the degree of association between variables but rather show the variation in the reliability of the measurement. The following chart depicts the relationships revealed.

Variable	Positively Correlated	Inversely Related
Total number of persons in the home.	1) Parents are all-wise 2) Unquestioned loyalty 3) Deception 4) Trapped in a dull job 5) Powerlessness	1) Nutrition is important attitude
Number of children under five years of age in the home.	1) Parents are all-wise 2) Unquestioned loyalty 3) Trapped in a dull job	
Ordinal position of child	1) Unquestioned loyalty 2) Trapped in a dull job 3) Powerlessness	1) Nutrition is important attitude
Mother's marital status (high score indicates single parent status)	1) Parents are all-wise 2) Trapped in a dull job 3) Anomie	

Variable	Positively Correlated	Inversely Related
Parental occupation and education scale	1) Treating child as an equal 2) Nutrition is important 3) Importance of education--value rating	1) Parents are all-wise 2) Only listen to parent 3) Unquestioned loyalty 4) Deception 5) Trapped in a dull job 6) Powerlessness 7) Prestige value 8) Religion value
Income status scale		1) Trapped in a dull job 2) Anomie
Family income		1) Parents are all-wise 2) Unquestioned loyalty 3) Trapped in a dull job 4) Powerlessness
Milbank socio-economic status scale	1) Treating child as an equal 2) Nutrition is important 3) Family centrism and education values	1) Parents are all-wise 2) Listen only to parent 3) Unquestioned loyalty 4) Deception 5) Trapped in a dull job 6) Powerlessness 7) Prestige value
Mother away from child scale	1) Friendship as a value	1) Importance of religion value
Stage in family life cycle	1) Trapped in a dull job 2) Powerlessness	1) Nutrition is important attitude
Race (white/black)	Black: 1) Only listen to parent 2) Trapped in a dull job 3) Powerlessness	White: 1) Frequent dissatisfaction

Variable	Positively Correlated	Inversely Related
Times moved in the past three years		1) Treating child as an equal
Crowding index (persons/rooms in house)	1) Nutrition is important	1) Trapped in a dull job 2) Powerlessness
Condition of home-neighborhood scale	None	1) Deception 2) Trapped in a dull job 3) Powerlessness
Number of "Basic Four" named	1) Nutrition is important	1) Parents are all-wise 2) Trapped in a dull job
Score on nutrition knowledge test	1) Nutrition is important	1) Trapped in a dull job 2) Parents are all-wise 3) Listen only to parent 4) Unquestioned loyalty 5) Deception 6) Powerlessness
Amount of money spent for food per week	1) Deception 2) Powerlessness	

Evaluation of Dietary Data

Nutrient Intake of Children

Food records completed for three days were analyzed to determine the nutrient content of preschool children's diets, the proportion of the Recommended Dietary Allowances (RDA) provided by the diets, and the pattern of consumption for calories and protein. For purposes of data reduction, results of the three food records were reduced by computing the mean nutrient intake.

Table 5.27. Intercorrelations - Psychosocial Attributes of Mothers

PARI Scales:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. Parents are all-wise	1.00																								
2. Treating child as equal	(-.45)	1.00																							
3. Only listen to parent	(+.53)	-.26	1.00																						
4. Unquestioned loyalty	(+.66)	(-.24)	(.45)	1.00																					
5. Deception	(+.32)	-.19	.20	(.43)	1.00																				
6. Trapped in a dull job	(.37)	-.08	(.24)	(.39)	(.28)	1.00																			
7. Would like to get out	(-.27)	.17	-.17	-.14	.08	.05	1.00																		
8. Children are demanding	-.04	0	+.17	.04	(.24)	.07	(.28)	1.00																	
9. Occasional dissatisfaction	-.11	.07	-.17	-.16	.10	-.19	(.35)	.40	1.00																
10. Frequent dissatisfaction	(-.26)	-.05	-.18	-.19	.04	-.11	.20	.22	.16	1.00															
11. Permissiveness in feeding	-.19	.15	-.12	.04	.04	-.08	.15	.08	.12	.02	1.00														
12. Nutrition is important	(-.33)	(-.23)	-.16	(-.41)	(-.41)	(-.39)	-.13	-.13	-.01	.09	-.13	1.00													
13. Anomie	.03	.05	.14	.02	.11	(.27)	(.46)	(.28)	.09	-.02	(.26)	(-.33)	1.00												
14. Powerlessness	(.42)	(-.27)	(.30)	(.40)	(.41)	(.54)	.06	.22	-.06	-.10	.04	(-.50)	(.26)	1.00											
15. Semantic differential (1)	-.03	(.27)	-.02	-.12	-.04	-.01	-.19	-.22	(-.26)	(-.23)	(-.24)	(.22)	-.12	-.15	1.00										
16. Semantic differential (2)	.18	.16	.09	(.28)	.03	.06	(-.29)	-.18	(-.24)	(-.30)	-.13	.11	-.03	-.01	(.68)	1.00									
VALUES:																									
17. Economy	+.22	+.13	+.03	+.14	+.14	+.01	-.13	-.07	+.04	-.02	0	(-.27)	-.10	+.17	-.10	+.02	1.00								
18. Prestige	(+.32)	+.09	(+.37)	(+.43)	(+.29)	(+.36)	-.02	+.15	-.04	+.09	-.09	-.13	+.10	+.20	+.11	+.22	+.17	1.00							
19. Health	+.17	(-.27)	+.11	+.07	+.01	+.05	-.21	-.11	-.06	-.07	-.04	+.03	+.03	+.07	-.06	-.03	+.20	-.12	1.00						
20. Family Centrism	(-.31)	+.14	-.21	(-.33)	-.20	-.12	+.02	-.05	+.17	+.03	0	+.16	-.06	-.21	+.06	+.07	+.18	+.22	+.21	1.00					
21. Religion	(+.24)	-.06	+.15	+.23	+.16	-.04	+.03	+.08	+.17	-.01	-.12	-.01	-.08	+.03	-.06	-.06	-.09	+.01	+.13	(+.26)	1.00				
22. Friendship	+.08	-.11	-.06	+.05	+.10	+.10	+.14	+.14	+.10	+.06	-.18	-.10	+.03	+.14	-.07	-.06	0	-.01	(+.23)	+.17	0	1.00			
23. Freedom	(-.24)	+.08	-.19	(-.31)	-.23	-.03	+.13	+.03	-.03	+.01	+.17	+.01	+.08	-.03	-.11	(-.23)	+.18	(+.45)	+.20	-.03	(+.30)	-.14	1.00		
24. Education	(-.38)	(+.32)	(-.26)	-.23	-.10	-.12	+.14	+.01	+.13	+.05	+.19	+.10	+.08	-.14	+.15	+.03	+.12	+.16	(+.34)	+.14	(+.25)	+.10	-.10	1.00	
25. Aesthetics	-.11	+.15	-.06	+.04	+.04	-.13	+.02	-.12	-.03	+.05	-.07	+.05	-.05	-.17	-.06	-.14	0	(+.27)	0	+.08	0	+.15	+.05	-.17	1.00

Table 5.28. Correlations Among Psychosocial Attributes of Mothers and Selected Demographic and Resource Characteristics of Families

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
PARI Scales:																		
Parents are all-wise	(+.29)	(+.31)	+.20	(+.29)	(-.48)	+.10	(-.33)	(-.55)	-.01	+.14	+.19	0	-.13	-.12	-.20	(-.25)	(-.44)	+.17
Treating child as an equal	-.15	(-.26)	-.07	-.11	(+.32)	+.08	+.16	(+.35)	-.02	-.11	-.04	(-.25)	+.05	+.12	+.15	+.17	+.18	-.12
Only listen to parent	+.16	+.22	+.10	+.17	(-.43)	-.26	-.12	(-.36)	-.13	+.05	(+.25)	+.04	-.11	-.08	-.16	-.12	(-.35)	+.20
Unquestioned loyalty	(+.38)	(+.28)	(+.28)	+.18	(-.49)	-.09	(-.31)	(-.52)	-.11	+.22	+.11	+.02	-.07	-.20	-.16	-.22	(-.42)	+.11
Deception	(+.35)	+.14	+.24	-.12	(-.37)	+.05	-.21	(-.31)	-.14	+.21	-.10	-.09	-.08	-.16	(-.27)	-.22	(-.45)	(+.25)
Trapped in a dull job	(+.33)	(+.23)	(+.30)	(+.40)	(-.57)	(-.35)	(-.36)	(-.60)	+.05	(+.29)	(+.32)	-.05	0	(-.25)	(-.27)	(-.33)	(-.43)	+.19
Would like to get out	+.06	-.23	+.14	-.11	+.08	+.03	-.04	-.01	+.04	+.10	-.13	+.10	+.07	0	-.19	-.08	+.10	-.02
Children are demanding	+.04	-.03	+.07	+.06	-.15	-.17	+.01	-.10	-.03	+.15	-.10	+.02	+.04	-.06	-.13	-.14	-.12	+.15
Occasional dissatisfaction	-.07	-.10	-.02	-.01	+.16	+.02	-.02	+.09	+.10	-.04	-.18	-.09	+.10	-.01	+.06	+.05	+.17	-.09'
Frequent dissatisfaction	-.01	+.02	-.12	-.20	+.08	+.12	+.04	+.14	-.17	0	(-.36)	+.01	+.12	-.13	-.15	-.02	+.11	+.13
Permissiveness in feeding	-.06	-.08	-.02	-.06	+.17	+.01	+.05	+.13	0	-.03	+.06	-.04	+.03	+.01	+.08	0	+.07	-.06
Nutrition is important	(-.34)	-.09	(-.36)	-.19	(+.29)	+.13	+.23	(+.37)	-.07	(-.34)	-.10	-.04	-.01	(+.24)	+.18	(+.39)	(+.48)	-.17
Anomie	+.07	-.04	+.15	(+.25)	-.03	(-.24)	-.14	-.16	+.19	+.10	+.21	+.08	+.04	-.02	-.02	-.17	-.10	-.06
Powerlessness	(+.30)	+.14	(+.26)	+.22	(-.39)	+.17	(-.32)	(-.45)	+.03	(+.30)	+.13	-.02	+.07	(-.27)	(-.25)	-.23	(-.47)	(+.26)
Semantic differential (1)	-.05	-.04	-.04	-.12	+.10	-.14	+.05	+.15	+.04	-.11	+.15	-.13	+.04	+.03	+.17	+.22	+.13	-.13
Semantic differential (2)	+.04	-.03	+.11	+.09	-.02	+.03	+.01	-.03	+.05	0	(+.29)	-.19	-.04	+.09	+.20	+.06	+.04	-.09
VALUES:																		
Economy	.21	.22	.03	-.15	-.07	-.16	-.05	-.09	-.14	.10	-.10	-.22	-.11	-.17	-.05	-.17	-.14	.16
Prestige	.07	.10	.09	.18	(-.29)	.13	-.21	(-.27)	.01	.07	.15	-.03	.07	-.14	-.01	-.07	-.20	.02
Health	.11	.17	.12	.15	-.17	.18	-.08	-.20	.02	.04	.17	.14	.05	-.15	-.01	-.03	-.06	-.02
Family Centrism	-.10	-.04	-.10	-.10	.22	-.08	.13	(.25)	.04	-.04	.03	.06	-.03	.10	.20	.14	.08	-.03
Religion	.16	.23	-.01	0	(-.26)	-.05	-.05	-.18	(-.32)	-.08	-.06	.12	-.07	-.15	-.19	-.10	-.08	.10
Friendship	-.17	-.17	-.12	.11	.06	.11	-.02	0	(.33)	-.06	-.10	-.10	.08	.19	-.08	-.12	-.04	-.10
Freedom	-.12	-.13	-.07	.03	.10	.01	.02	.10	.19	-.05	-.02	.07	.01	.12	-.13	-.05	.11	-.07
Education	-.17	(-.32)	.01	-.12	(.34)	-.03	.11	(.27)	.05	.01	-.18	-.08	.04	.17	.14	.18	.23	-.09
Aesthetics	-.04	-.04	-.04	0	.05	-.03	.11	-.09	-.02	0	-.11	0	-.08	.06	.05	.17	.13	.06

1. Total persons in home
2. Children under 5 years in home
3. Ordinal position of child
4. Mother's marital status
5. Parental occup. + educ. scale
6. Income status scale
7. Family income
8. SES index (Milbank)
9. Mother away from child scale
10. Stage in family life cycle
11. Race (white/black)
12. Times moved in past 3 years
13. Own or rent?
14. Crowding index
15. Condition of home-neighborhood scale
16. Number "Basic 4" named
17. Score on nutrition knowledge test
18. Money spent for food per week

Mean intakes of calories and ten nutrients calculated from the food records for the entire sample are presented in Table 5.29. In order to assess the nutrients contributed from foods, vitamin supplements were not included in the calculations. According to responses from the mothers of the children, approximately 63% of the children were receiving some type of additional vitamin-mineral supplement.

Table 5.29. Average Nutrient Intake for Total Sample

	Amount (Mean ± Standard Deviation)
Calories	1836 ±484
Protein (gm)	66.8 ± 17.6
Fat (gm)	75.8 ± 26.6
Carbohydrate (gm)	225.6 ± 65.2
Calcium (mg)	942 ±324
Iron (mg)	8.6 ± 4.3
Vitamin A (I.U.)	4573 ±2967
Thiamin (mg)	1.02± 0.42
Riboflavin (mg)	1.70± 0.55
Niacin (mg)	11.19± 3.46
Ascorbic Acid (mg)	93.4 ± 57.1

Table 5.30 indicates the proportion of the Recommended Dietary Allowances which were fulfilled by the mean dietary intake of nutrients. The average intakes for all nutrients, except iron, either met or exceeded the recommended allowance.

Table 5.30. Percentage of Recommended Dietary Allowances Met by Mean Intake of Nutrients from Food

	Recommended Dietary Allowances for children 3-4 years old	% of RDA
Calories	1400	129.6
Protein (gm)	30	223.9
Vitamin A (I.U.)	2500	180.3
Ascorbic Acid (mg)	40	145.7
Niacin (mg equiv.)	9	248.0*
Riboflavin (mg)	0.8	212.5
Thiamin (mg)	0.7	145.7
Calcium (mg)	800	115.9
Iron (mg)	10	96.9

*Calculated on the assumption that 1% of the dietary protein was tryptophan and that 60 mg tryptophan yields 1 mg. niacin.

While the mean intakes of the children appeared adequate, some children had diets that furnished less than the recommended amounts of some nutrients. Since it is recognized that the RDA include a "safety factor", some workers have used two-thirds of the allowance as a level of dietary adequacy (Metheny *et al.*, 1962; Kerrey *et al.*, 1968). When individual diets were evaluated using two-thirds of the allowance as the criterion of adequacy, iron, ascorbic acid, and calcium were the most limiting for the largest number of children (Table 5.31).

Table 5.31. Percentage of Sample Meeting Specified Proportions of Recommended Dietary Allowances

Nutrient	% of Recommended Dietary Allowances		
	<67%	67-100%	>100%
Calories	0	19.7	81.3
Protein	0	0	100.0
Vitamin A	8.6	21.1	70.4
Ascorbic Acid	13.2	7.2	79.6
Niacin	5.9	23.7	70.4
Riboflavin	0	1.3	98.7
Thiamin	4.6	22.4	73.0
Calcium	11.2	27.6	61.2
Iron	11.5	44.1	41.4

For the average subject, approximately half of the calories was provided by carbohydrate. Fat provided about 37% and protein the remaining 15% of calories (Table 5.32).

Table 5.32. Percentage of Calories Supplied by Carbohydrate, Fat, and Protein

Nutrient		Percentiles			Percentage	
	Mean	25	50	75	Lowest	Highest
Carbohydrate	49.3%	44.9	49.7	54.0	35.1	64.7
Fat	37.6%	34.4	37.4	41.3	23.9	50.1
Protein	15.0%	13.4	14.8	16.5	9.4	21.7

In order to determine the pattern of consumption for calories and protein, food items were originally coded according to where it was eaten (whether at home or elsewhere), with whom it was eaten, and if it was part of a meal or snack. Table 5.33 presents the results of this analysis. Table 5.34 indicates the consumption of calories and protein as expressed per kilogram of body weight. In general, consumption of both calories and protein was more than adequate.

Table 5.33. Pattern of Consumption for Calories and Protein (Expressed as Mean ± Standard Deviation)

	Percentage of Calories	Percentage of Protein
How eaten:		
As Meals	81.6±10.1	90.3±7.4
As Snacks	18.2± 9.9	9.6±7.3
Where eaten:		
At Home	94.0±11.8	95.1±12.1
Elsewhere	5.8±11.7	4.5±11.2
With whom eaten:		
Alone	8.7±17.1	7.0±15.9
With some of family	42.9±26.1	40.2±26.7
With all of family	44.8±24.7	50.5±26.4
With others	3.6± 6.3	2.5± 6.1

Table 5.34. Consumption of Calories and Protein Expressed by Kilogram of Body Weight

Calories/kg Body Weight	Percentage of Sample
50	0
50- 75	14.1
76-100	35.6
101-125	29.6
126-150	14.8
150	5.0
MEAN = 105 Cal/kg	

Gm Protein/kg Body Weight	Percentage of Sample
1	8.9
2	37.8
3	33.3
4	14.8
5	4.4
MEAN 2.66 gm/kg	

When assessing the dietary intake of preschool children by servings of certain food groups (Table 5.35), it is interesting to note that although the mean intake resembles that which would be expected, some children ate no fruits or vegetables while others ate voluminous quantities of certain foods, such as grain products.

Table 5.35. Food Intakes of Preschool Children as Expressed by Servings of Food Groups

Food Group	Number of Servings		
	Mean	Median	Range
Dairy products	2.9	2.8	0.2- 7.1
Protein foods	2.3	2.0	0.3- 6.0
Vegetables	1.4	1.3	0.0- 7.1
Fruits	1.5	1.4	0.0- 4.7
Grain products	5.7	5.5	1.0-13.0
Fats and oils	1.7	1.4	0.0- 7.8
Sugar products	1.6	1.4	0.0- 6.3

Beal found in analyzing the results of the dietary data from children that the skewness of the distribution prevented accurate description of the results merely in terms of the mean and standard deviation scores. In her papers (Beal, 1953, 1954, 1955, 1956), she presented results of the nutrient intake data in terms of the range of intake and corresponding percentile values. Table 5.36 presents a comparison between Beal's data (computed as the mean intake of children three to five years of age) and the nutrient intake data obtained in the present study. For the most part, the nutrient intakes of children in the present study exceeded those of children participating in the Denver project.

Table 5.36. Nutrient Intake Data (By Percentiles) in Comparison with Beal Data

	Percentile				
	Lowest	25th	50th	75th	Highest
Calories	863	1458	1801	2059	3569
Beal*	984	1200	1384	1572	2063
Protein (gm)	26.2	54.5	66.2	76.6	140.3
	25.1	40.6	47	54.9	87.6
Fat (gm)	30.2	57.9	75.6	91.7	170
	38.5	51.4	59.5	70.4	87.6
CHO (gm)	90	174	218	263	460
	106	138	159	177	265
Calcium (mg)	297	707	889	1120	1785
	438	716	891	1060	1490
Iron (mg)	3.92	7.6	9.2	11.4	37.7
	3.46	5.1	6.1	7.1	10.76
Vitamin A (I.U.)	1260	2391	3644	5353	14000
	1375	2806	3931	4900	7588
Thiamin (mg)	.48	.85	1.06	1.34	2.88
	.39	.64	.75	.85	1.15
Riboflavin (mg)	.62	1.38	1.71	2.12	3.33
	.753	1.28	1.52	1.78	2.39
Niacin (mg)	3.70	8.73	10.98	13.02	
	3.23	5.14	6.40	7.62	11.09
Ascorbic Acid (mg)	7	56	92	117	350
	14	43	57	82	130
Cal/kg b.w.	54	84	102	117	192
	61	74	87	106	126
Pro/kg b.w. (gm)	1.60	3.1	3.7	4.4	6.2
	1.62	2.5	2.9	3.5	4.6

*Computed as mean intake of children 3-5 years

Relationship of Nutrient Intake to Other Variables

Examination of the correlation coefficients among the various nutrients revealed that all were quite significantly inter-correlated (Table 5.37). The most notable exception to this was ascorbic acid, which was not correlated with protein, fat, calcium, or riboflavin; this fact supports the contention that vitamin C was not supplied to any great extent by any of the foods high in those other nutrients.

Correlations among nutrients and selected demographic and resource characteristics of families in the sample failed to reveal any significant patterns of association (Table 5.38). Ascorbic acid intake did correlate positively with the Milbank socioeconomic status index.

Table 5.39 shows the nutrient intake (expressed as the percentage of RDA) in relation to categorized values for family income. In most cases, well over half of the children in the sample had nutrient intakes which met or exceeded the Recommended Dietary Allowance. Exceptions here were calcium (for children in the highest and lowest income categories) and iron intake. Protein and riboflavin were provided in the most liberal amounts for all children. The intake of ascorbic acid shows a definite trend with increasing family income, thus confirming the conclusion reached from examining the correlation coefficients.

Table 5.37. Intercorrelations Among Nutrients

	1	2	3	4	5	6	7	8	9	10	11
1. Calories	1.00										
2. Protein	.79	1.00									
3. Fat	.91	.75	1.00								
4. Carbohydrate	.91	.58	.67	1.00							
5. Calcium	.63	.74	.57	.51	1.00						
6. Iron	.65	.67	.58	.56	.35	1.00					
7. Vitamin A	.38	.50	.34	.31	.51	.44	1.00				
8. Thiamin	.73	.66	.68	.63	.48	.62	.38	1.00			
9. Riboflavin	.68	.82	.61	.56	.91	.47	.53	.66	1.00		
10. Niacin	.56	.64	.47	.50	.19	.62	.22	.59	.39	1.00	
11. Ascorbic Acid	.34	.21	.19	.41	.12	.32	.29	.34	.13	.31	1.00

Table 5.38. Correlations Among Nutrient Intake and Selected Demographic and Resource Characteristics of Families

	Cal	Pro	Fat	CHO	Calc	Iron	Vit A	Thia	Ribo	Nia	Vit C
Total persons in home	.01	.04	.03	-.02	-.05	.09	.14	.05	-.04	.08	-.04
Children under 5 years	.12	.12	.09	.12	.06	.15	-.03	.08	.04	.14	.04
Ordinal position of child	-.03	0	.02	-.06	-.08	0	.18	.07	-.03	.03	-.11
Mother's marital status	.05	.03	.08	.03	-.09	-.02	-.13	.02	-.05	.02	-.21
Parental occup. + ed. scale	-.10	-.10	-.10	-.07	.07	-.18	-.04	-.11	.06	-.15	.12
Income status scale	.01	.04	.05	-.03	-.06	-.03	-.10	.09	0	.09	+.21
Family income	-.10	-.11	-.05	-.11	-.08	-.16	-.10	-.02	-.08	-.11	.19
SES index	-.06	-.06	-.11	-.01	.13	-.16	0	-.09	.10	-.15	(.25)
$ spent for food/week	.01	.07	.08	-.07	-.03	.01	.02	.02	.01	.13	-.09
Mother away from child scale	-.06	-.10	0	-.10	-.14	-.14	-.16	-.04	-.13	-.10	-.05
Stage in family life cycle	-.06	-.03	-.02	-.09	-.17	.02	.06	.06	-.08	.08	-.11
Race (white/black)	.12	.12	.20	.02	-.05	.10	.01	.19	.02	.13	-.10
Times moved in past 3 yrs	-.08	.07	-.14	-.04	.11	.02	-.03	-.02	.13	.09	-.06
Own or rent?	-.06	.01	-.05	-.07	.08	.04	.01	-.08	.04	.06	-.08
Crowding index	.02	-.07	-.01	.05	-.03	-.14	-.09	.06	.01	-.08	.10
Condition of home-neighborhood	.02	-.01	0	.06	.14	-.13	-.08	.04	.14	-.10	.10
No. "Basic 4" named	.16	.15	.06	.22	.19	.11	-.03	.12	.20	.10	.22
Score on nutr. know. test	.06	.05	-.03	.13	.20	-.08	.03	-.01	.19	.01	.15

Table 5.39. Nutrient Intake (as % of RDA) in Relation to Family Income

Calories	<$4000	4000-6999	7000-9999	10,000-12,999	13,000-15,999	16,000-19,999	$20,000+
<67%	0	0	0	0	0	0	14.3
67-100%	35.3	11.8	20.0	9.5	12.5	25.0	14.3
>100%	64.7	88.6	80.0	90.5	87.5	75.0	71.4
Number of Children	(17)	(44)	(20)	(21)	(16)	(12)	(7)
Protein							
67-100%	0	0	0	0	0	0	14.3
>100%	100.0	100.0	100.0	100.0	100.0	100.0	85.7
Calcium							
<67%	23.5	6.8	5.0	14.3	6.3	8.3	14.3
67-100%	29.4	22.7	35.0	23.8	12.5	41.7	42.9
>100%	47.1	70.5	60.0	61.9	81.3	50.0	42.9
Iron							
<67%	29.4	11.4	15.0	4.8	6.3	41.7	28.6
67-100%	41.2	36.4	45.0	52.4	56.3	16.7	42.9
>100%	29.4	52.3	40.0	42.9	37.5	41.7	28.6
Vitamin A							
<67%	12.5	11.9	5.0	4.8	0	0	28.6
67-100%	31.3	19.0	20.0	23.8	18.3	33.3	14.3
>100%	56.3	69.0	75.0	71.4	81.3	66.7	57.1
Riboflavin							
<67%	0	0	0	0	0	0	0
67-100%	0	0	0	0	0	0	14.3
>100%	100.0	100.0	100.0	100.0	100.0	100.0	85.7
Niacin							
<67%	11.8	0	10.0	0	6.3	8.3	14.3
67-100%	29.4	13.6	20.0	33.3	31.3	33.3	28.6
>100%	58.8	86.4	70.0	66.7	62.5	58.3	57.1
Ascorbic Acid							
<67%	35.3	11.4	15.0	10.0	0	20.0	0
67-100%	11.8	4.5	10.0	15.0	0	0	14.3
>100%	52.9	84.1	75.0	75.0	100.0	80.0	85.7

Table 5.40 is a comparison of children from families with "high" incomes ($20,000 and above) with children from "low-income" families ($4,000 and below). For most nutrients, except ascorbic acid, the percentages are remarkably similar. In a few instances, particularly for calories and vitamin A, the percentages of children from high-income families having less than two-thirds of the Recommended Dietary Allowances are greater than for low-income children.

Table 5.40. Comparison Between "Low-income" Children and "High-income" Children in Relation to Nutrient Intake

Nutrient		% of Children <2/3 RDA	2/3-all RDA	>RDA
Calories				
Income:	low	0	35.3	64.7
	high	14.3	14.3	71.4
Protein				
	low	0	0	100.0
	high	0	14.3	85.7
Calcium				
	low	23.5	29.4	47.1
	high	14.3	42.9	42.9
Iron				
	low	29.4	41.2	29.4
	high	28.6	42.9	28.6
Vitamin A				
	low	12.5	31.3	56.3
	high	28.6	14.3	57.1
Riboflavin				
	low	0	0	100.0
	high	0	14.3	85.7
Niacin				
	low	11.8	29.4	58.8
	high	14.3	28.6	57.1

Table 5.40 (Cont'd).

Nutrient	<2/3 RDA	2/3-all RDA	>RDA
Ascorbic Acid			
low	35.3	11.8	52.9
high	0	14.3	85.7

Figure 5 is a graph showing the relationship between dietary intake (expressed as a composite figure for all nutrients) and family income. A curvilinear relationship is evident, implying that the lowest nutrient intakes are consumed by children from the very lowest and the very highest income strata.

The association between family income with protein and calorie intake (expressed on a per kilogram of body weight basis) (Table 5.41) indicates that the highest intakes per unit of weight are consumed by children in the two lowest income categories. The lower intakes observed in the higher income groups may reflect the mother's knowledge of and concern with the increasing prevalence of childhood obesity.

Examination of the children's nutrient intake with the sociopsychological attributes of the mothers indicated that two of the PARI scales were significantly correlated with nutrient intake (Table 5.42). These scales were "treating child as an equal" (negatively correlated with intake of calories, carbohydrate, iron, and thiamin) and

Fig. 5. NUTRIENT INTAKES OF CHILDREN, EXPRESSED AS % OF RDA, IN RELATION TO FAMILY INCOME.

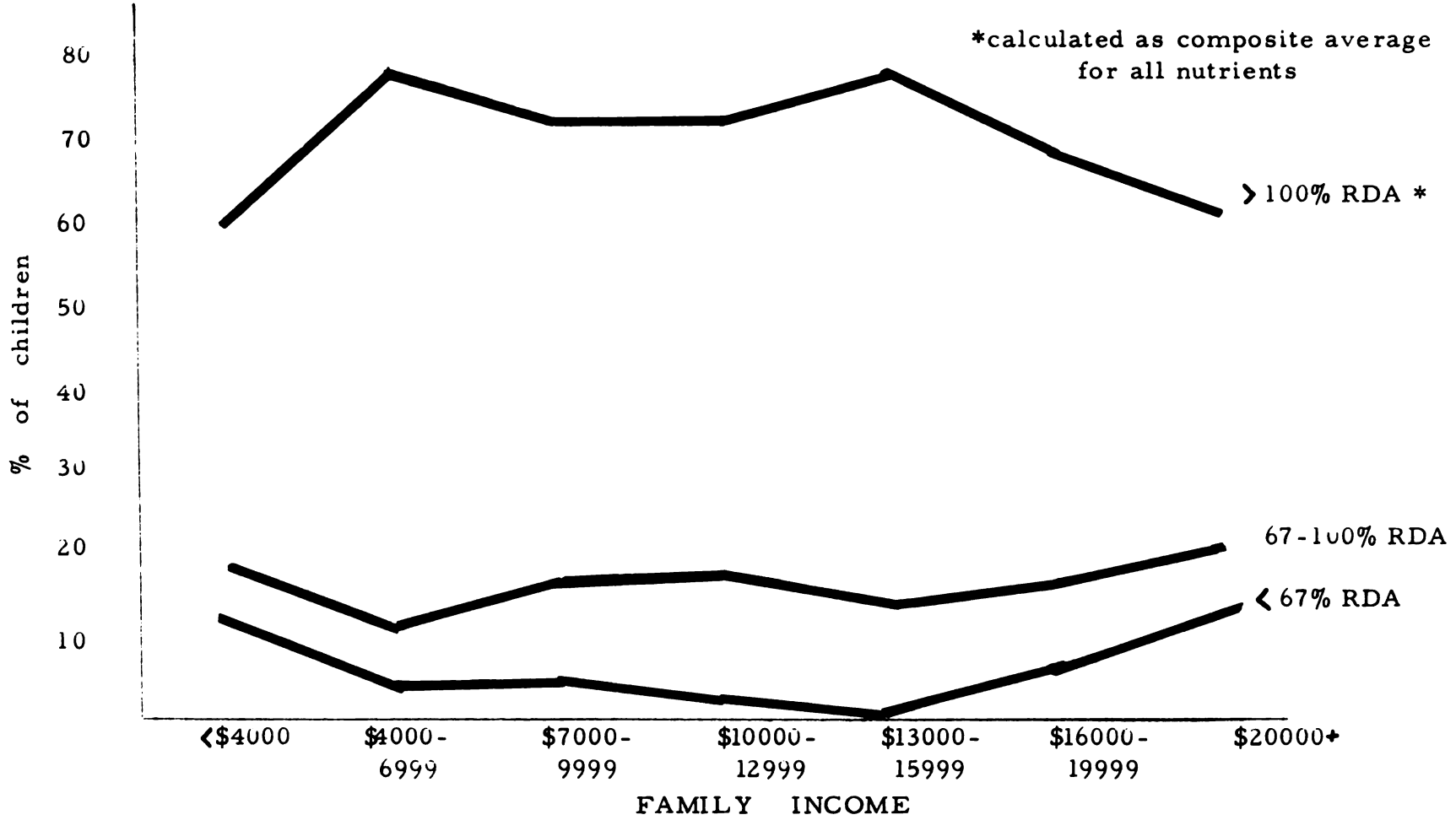


Table 5.41. Calories and Protein/kg Body Weight in Relation to Family Income

		% by Income						
Cal/kg		<$4000	4000-6999	7000-9999	10,000-12,999	13,000-15,999	16,000-19,999	$20,000+
<75		21.4	10.0	15.0	19.0	12.5	9.1	14.3
75-100		42.9	22.5	35.0	28.6	43.8	54.5	57.1
101-150		21.4	57.5	50.0	42.9	43.8	36.4	28.6
151-250		14.3	10.0	0	9.5	0	0	0
	No.	(14)	(40)	(20)	(21)	(16)	(11)	(7)

		% by Income						
Grams/protein/kg		<$4000	4000-6999	7000-9999	10,000-12,999	13,000-15,999	16,000-19,999	$20,000+
<1		0	0	0	0	0	0	14.3
1-2.0		21.4	10.0	30.0	14.3	12.5	9.1	14.3
2.1-3.0		35.7	40.0	35.0	38.1	62.5	72.7	28.6
3.1-4.0		7.1	35.0	30.0	38.1	18.8	18.2	42.9
4.1-5.0		14.3	12.5	5.0	9.5	6.3	0	0
5.1-6.0		21.4	2.5	0	0	0	0	0
	No.	(14)	(40)	(20)	(21)	(16)	(11)	(7)

Table 5.42. Correlations Among Nutrient Intake and Sociopsychological Attributes of Mothers

	Cal	Pro	Fat	CHO	Calc	Iron	Vit A	Thia	Ribo	Nia	Vit C
PARI scales:											
Parents are all-wise scale	+.11	+.04	+.15	+.07	-.13	+.11	+.02	+.10	-.08	+.13	-.14
Treating child as an equal	(-.25)	-.18	-.23	(-.25)	-.09	(-.36)	-.12	(-.26)	-.16	-.21	+.01
Only listen to parent	+.10	+.13	+.15	+.04	+.04	+.15	+.01	+.15	+.07	+.11	-.18
Unquestioned loyalty	-.03	-.04	+.01	-.05	-.12	+.04	+.01	-.05	-.11	0	-.06
Deception	-.03	-.10	-.03	-.01	-.09	+.01	+.08	-.03	-.10	-.11	0
Trapped in a dull job	-.12	-.09	-.05	-.17	(-.24)	-.06	-.08	-.05	-.22	-.05	(-.27)
Would like to get out	-.20	-.14	-.20	-.18	-.08	-.12	+.07	-.21	-.10	-.10	-.15
Children are demanding	-.01	-.06	-.01	0	-.01	-.07	-.03	-.09	-.07	-.08	+.02
Occasional dissatisfaction	+.07	-.06	+.06	+.09	+.03	-.08	-.07	-.03	+.02	-.02	-.02
Frequent dissatisfaction	-.09	-.09	-.12	-.05	-.08	+.03	+.03	-.14	-.09	-.02	+.05
Permissiveness in feeding	-.08	-.20	-.09	-.03	-.21	-.07	(-.23)	-.04	-.18	-.01	+.01
Nutrition is important	+.11	+.15	+.03	+.15	(+.30)	+.03	+.05	+.05	(+.27)	+.04	+.17
Anomie scale	-.13	-.09	-.08	-.15	-.15	-.10	-.02	-.10	-.15	-.02	-.09
Powerlessness scale	-.03	-.08	+.03	-.07	-.13	-.01	+.06	+.03	-.11	-.01	-.22
Semantic differential (1)	+.01	+.11	+.02	-.03	+.12	+.06	+.08	+.01	+.09	-.01	+.17
Semantic differential (2)	0	.01	+.03	-.03	-.03	-.01	-.01	+.10	-.02	0	+.17
VALUES:											
Economy	.12	0	.09	.14	-.07	.12	.11	.11	-.03	.09	.03
Prestige	-.02	-.04	-.01	-.02	-.13	0	-.07	-.04	-.14	.04	-.08
Health	.07	.02	.08	.07	0	0	-.07	.04	0	.12	-.10
Family Centrism	-.05	.08	-.05	-.07	.08	-.06	.05	-.01	.06	-.05	.02
Religion	-.04	.03	-.08	-.02	.03	-.02	-.02	-.04	.05	.01	.01
Friendship	-.13	-.16	-.09	-.14	-.12	-.08	-.05	-.01	-.11	-.20	-.10
Freedom	-.08	-.11	-.07	-.06	-.02	-.03	-.03	-.09	-.06	-.16	0
Education	-.02	.01	-.03	-.01	.05	0	.05	-.02	.07	-.01	.16
Aesthetics	.13	.13	.13	.10	.07	.12	.01	.02	.10	.05	.12

"trapped in a dull job" (negatively related to calcium and ascorbic acid intakes). The group of nutrients to which the "treating child as an equal" scale is inversely related is provided by the bread and cereals food group. In contrast, the fact that the "trapped in a dull job" scale inversely relates to calcium and ascorbic acid may mean that these mothers who do not feel "trapped" are more apt to provide their children with more milk, fruits and vegetables. The only other scale which shows a relationship to nutrient intake is that of the "nutrition is important" attitude which is positively related to calcium and riboflavin. This may mean that mothers who feel that nutrition is of particular concern tend to provide their children with a greater amount of dairy products.

Results of Blood Tests

Finger prick blood samples were analyzed for hemoglobin, hematocrit, serum albumin and total serum proteins, using accepted procedures previously described. Results from these analyses are expressed in relation to the ICNND categories, designated as deficient, low, acceptable, or high values (Table 5.43). Less than 2% of the sample had hemoglobin and hematocrit values in the "low" category while none were "deficient." No children had serum protein levels in the "deficient" category, and less than 3% were classified as having "low"

values. None of the children for whom blood samples were obtained had values for serum albumin in either the deficient or low category.

Table 5.43. Results of Blood Tests of Preschool Children Expressed in Relation to ICNND Categories

ICNND Categories	Deficient	Low	Acceptable	High
	<10	10.0-10.9	11.0-12.4	≥12.5
Hemoglobin (gm/100 ml)	0	(2) 1.7%	(60) 51.3%	(55) 47.0%
Mean = 12.38				
	<30	30.0-33.9	34.0-36.9	≥37.0
Hematocrit (PCV)	0	(2) 1.7%	(57) 47.1%	(62) 51.2%
Mean = 36.69				
	<6	6.0- 6.4	6.5- 6.9	≥7.0
Total Serum Proteins (gm/100 ml)	0	(3) 2.9%	(19) 18.8%	(79) 78.2%
Mean = 7.23				
	<2.8	2.8-3.51	3.52-4.24	≥4.25
Serum Albumin (gm/100 ml)	0	0	(14) 12.6%	(97) 87.4%
Mean = 4.55				

Random urine samples, collected for approximately one-third of the children in the total sample, were analyzed for hydroxyproline and creatinine content. These values were then expressed as the hydroxyproline:creatinine ratio

and the "hydroxyproline index" (Whitehead, 1965). The mean values for these two entities were 0.251 ± 0.090 and 3.577 ± 1.374. These results are comparable to those listed by Whitehead (1965) for the more affluent children in his sample.

Relationship of Biochemical Data to Other Variables

Data from the analyses of blood and urine were compared with the other variables selected for study by means of Pearson product-moment correlation coefficients. Table 5.44 indicates how the blood and urine variables compare among themselves as well as with nutrient intake. Assuming that a correlation coefficient of 0.23 is significant at the .01 level (Dixon and Massey, 1969:569), it is seen that hemoglobin and hematocrit, total serum proteins and serum albumin, as well as the hydroxyproline: creatinine ratio and the hydroxyproline index are highly related, as would be expected. Hematocrit and serum albumin values are negatively related. None of the blood values are significantly related to protein or iron intake, although some of the B-complex vitamins, namely riboflavin and niacin are associated with the hydroxyproline variables.

The relationships between the biochemical data and the anthropometric measurements are somewhat more definitive (Table 5.45). Hemoglobin is positively related

Table 5.44. Correlation Matrix: Biochemical Data vs Nutrient Intake

	Hgb	Hct	Serum Alb.	Serum Pro.	OH-pro: Creat.	OH-pro Index
1. Hemoglobin	1.00	1.				
2. Hematocrit	.45	1.00				
3. Serum Albumin	-.16	-.23	1.00			
4. Total Serum Proteins	.04	-.10	.37	1.00		
5. Hydroxyproline:creatinine					1.00	
6. Hydroxyproline index					.94	1.00
7. Calories	.16	-.0	.10	.01	-.04	- 0
8. Protein	.13	.08	.18	.10	.05	.11
9. Fat	.18	.06	.04	-.01	-.24	-.24
10. Carbohydrate	.12	-.08	.11	0	.08	.13
11. Calcium	.05	.02	.09	-.06	.06	.03
12. Iron	.06	.02	.19	.15	-.09	- 0
13. Vitamin A	-.04	-.21	.19	.05	.07	.10
14. Thiamin	.22	.11	.01	-.04	.06	.18
15. Riboflavin	.09	-.03	.12	.03	.18	.24
16. Niacin	.08	.09	.13	.21	.17	.33
17. Ascorbic Acid	.05	-.02	.20	.07	.03	.09

to most of the anthropometric values, particularly the scaled weight and height measurements.

This tendency is not shown to any great extent by the hematocrit data, except for its significant association with the height-weight-age scale and upper arm circumference. Neither the serum albumin nor the total serum proteins show any signifccant association with any of the anthropometric measurements. The hydroxyproline:creatinine ratio is positively related to several of the scaled measurements, namely height-weight-age and Sargent's weight-height scale; it is negatively related to the Fels' weight-age scale, the weight:height ratio and chest circumference. Whitehead's (1965) hydroxyproline index is significantly related to the developmental index for weight and shoulder diameter, while it shows a negative correlation with the gain in height and sitting height.

Although the degree of correlation between the demographic characteristics of families and the biochemical data is inconclusive for the most part, the hydroxy-proline:creatinine ratio and hydroxyproline index are significantly associated with the number of children in the household under five years of age (Table 5.46). Table 5.47 indicates the relationship of family income to the blood data, classified according to the ICNND standards. This table reveals no significant association between low family income and an increased prevalence of

Table 5.45. Correlation Matrix: Biochemical Data vs Anthropometric Measurements

	Hgb	Hct	Serum Alb.	Serum Pro.	OH-pro: Creat.	OH-pro Index
Total weight gain	.16	.03	-.11	-.06	-.03	-.17
Total height increment	.06	.01	.04	.03	-.14	(-.24)
Weight-age, Fels	(.29)	.14	.02	0	(-.33)	-.20
Height-age, Fels	.19	.13	-.05	-.11	-.12	(-.23)
Weight-age, Stuart-Meredith	(.32)	.12	.02	-.04	.18	.01
Height-age, Stuart-Meredith	(.23)	.16	-.12	-.12	.10	-.03
Height-weight-age	(.29)	(.24)	-.01	-.05	.24	-.22
Weight-height scale (Sargent)	(.27)	.12	.06	.05	.42	.02
Weight/height ratio	(.27)	.10	.12	.07	(-.29)	.03
Weight-age, in May	(.28)	.08	-.06	-.01	.07	-.12
Height-age, in May	.21	.07	-.19	-.08	.02	-.14
Developmental index-weight	(.29)	.13	.07	.01	-.05	(.33)
Developmental Index-height	(.24)	.17	-.08	-.10	.01	.06
Index:weight-age/height-age	.22	.04	.15	.08	.22	-.01
Sitting height	.11	.08	.13	-.08	-.08	(-.36)
Shoulder diameter	(.27)	-.03	.04	-.01	.11	.38
Pelvic diameter	(.28)	-.09	-.01	-.06	.20	.04
Head circumference	.07	.13	-.05	-.03	-.03	.01
Chest circumference	.17	.07	0	.03	(-.28)	-.10
Index of trunk breadth	.04	.13	-.05	-.08	.18	-.02
Upper arm circumference	(.42)	(.27)	.19	-.13	.15	-.01
Skinfold thickness-triceps	(.23)	.19	-.10	.13	.05	.15
Skinfold thickness-subscapular	.15	.19	- 0	.07	.09	-.05

low or unacceptable blood values. The proportion of children from families with an income of less than $4,000 who have high blood values is quite comparable to the proportion from families having annual incomes of $20,000 or more. For both hemoglobin and hematocrit values, children from families with an income of $10,000-16,000 seem to have a greater share of children in the low and acceptable categories.

The correlations between the biochemical data and the sociopsychological attributes of the mothers (Table 5.48) revealed essentially no significant relationships. The semantic differential scales do show a positive association with hemoglobin, the hydroxyproline:creatinine ratio and the hydroxyproline index. The "frequent dissatisfaction" scale (from the PARI) was negatively correlated with the hydroxyproline index. The health value was also positively related to the hydroxyproline:creatinine ratio.

Moderator Effects

Table 5.49 indicates the effects of certain variables identified as "moderating" the effects of certain independent variables, i.e., the nutrients, on the dependent variables, in this case the blood components. The association between protein and hemoglobin was positive for those children who mothers disagreed with the following PARI scales: only listen to parent,

Table 5.46. Correlations Among Biochemical Data and Selected Demographic Characteristics of Families

	Hgb	Hct	Serum Alb.	Serum Pro.	OH-pro: Creat.	OH-pro Index
Total persons in home	-.19	-.17	-.04	.15	.02	.04
No. children under 5 years	-.16	.05	-.01	.12	(.29)	(.26)
Ordinal position of child	-.19	(-.22)	.01	.06	-.13	-.11
Mothers marital status	-.20	.02	.07	.02	.06	-.09
Parents' occupation and education scale	.17	-.01	.01	-.09	-.03	.09
Income status scale	-.06	.06	.11	.14	.05	-.06
Family income	.03	-.07	-.05	-.04	.06	.12
SES index	.06	-.08	-.18	-.03	.07	.17
Money spent for food/week	-.14	.10	.05	0	.06	.12
Mother away from child	-.09	.02	-.02	-.04	-.02	.03
Stage in family life cycle	-.16	(-.25)	-.06	.02	.02	.11
Race (white/black)	-.20	.02	-.15	.11	-.10	-.16
Times moved in past 3 years	-.03	-.05	.17	.16	.17	.15
Own or rent	.14	.16	.02	-.06	-.14	-.19
Crowding index	.05	.04	-.10	-.18	.13	.11
Condition of house-neighborhood scale	-.01	-.11	.08	-.06	.06	.09
Number "Basic 4" named	.16	.05	.14	.05	-.01	.06
Score on nutr. knowledge test	-.05	-.17	.25	-.03	-.17	-.12

Table 5.47. Relationship of Family Income to Blood Data

	% of Children						
	<$4000	4000-6999	7000-9999	10,000-12,999	13,000-15,999	16,000-19,999	$20,000+
I. Hemoglobin							
Low (10.0-10.9 gm/ 100 ml)	9.1	0	0	7.1	0	0	0
Acceptable (11.0-12.4)	27.3	52.8	38.5	50.0	53.8	37.5	50.0
High (≥ 12.5 gm/ 100 ml)	63.6	47.2	61.5	42.9	46.2	62.5	50.0
Number of Children	(11)	(36)	(13)	(14)	(13)	(8)	(6)
II. Hematocrit							
Low (30.0-33.9)	0	0	14.3	0	0	0	0
Acceptable (34.0-36.9)	25.0	48.6	30.8	60.0	57.1	37.5	28.6
High (≥.37.0)	75.0	51.4	54.9	40.0	42.9	62.5	71.4
Number of Children	(12)	(37)	(14)	(15)	(14)	(8)	(7)
III. Serum Albumin							
Acceptable (3.52-4.24)	18.2	12.5	0	13.3	7.1	25.0	20.0
High (≥4.25)	81.8	87.5	100.0	86.7	929	75.0	80.0
Number of Children	(11)	(32)	(11)	(15)	(14)	(8)	(5)
IV. Serum Proteins							
Low (6.0-6.4)	0	10.3	0	0	0	0	0
Acceptable (6.5-6.9)	0	10.3	20.0	15.4	30.8	37.5	40.0
High (≥7.0)	100.0	79.3	80.0	84.6	69.2	62.5	60.0
Number of Children	(9)	(29)	(10)	(13)	(13)	(8)	(5)

Table 5.48. Correlations Among Biochemical Data vs. Sociopsychological Attributes of Mothers

	Hgb	Hct	Serum Alb	Serum Pro	OH-pro: creat.	OH-pro Index
PARI						
Parents are all-wise scale (PARI)	-.06	-.06	-.07	-.02	-.06	-.10
Treating child as an equal scale	+.07	+.12	-.03	+.03	-.19	-.20
Only listen to parent scale	-.08	+.03	-.11	+.01	-.08	-.18
Unquestioned loyalty scale	-.06	-.06	-.22	+.03	-.03	-.09
Deception scale	+.14	-.01	-.16	-.01	+.01	+.01
Trapped in a dull job scale	-.16	+.04	+.04	+.13	-.12	(-.24)
Would like to get out scale	+.05	-.01	+.19	+.09	-.07	-.04
Children are demanding scale	+.07	+.06	+.08	-.09	-.16	-.14
Occasional dissatisfaction scale	+.03	-.01	+.16	-.05	-.05	-.05
Frequent dissatisfaction scale	+.16	-.04	+.14	+.11	+.19	(+.28)
Permissiveness about feeding	+.03	+.15	-.06	-.08	+.03	+.09
Nutrition is very important	+.02	-.09	+.03	0	-.12	-.14
Anomie scale	+.02	+.08	+.10	+.04	-.15	-.19
Powerlessness scale	-.11	-.02	-.05	+.01	+.14	+.14
Semantic differential (1)	(-.27)	-.11	+.02	+.16	(-.23)	(-.31)
Semantic differential (2)	(-.27)	-.10	-.17	-.02	(-.38)	(-.45)
VALUES						
Economy	-.07	-.01	-.08	-.06	-.04	.06
Prestige	.05	-.06	-.05	.04	.05	-.03
Health	0	-.11	.04	.10	(.24)	.15
Family centrism	-.01	.03	-.09	-.13	.06	.09
Religion	-.13	-.08	.02	.04	.16	.07
Friendship	.18	.11	-.21	-.10	-.10	-.09
Freedom	.07	.17	.08	.06	-.17	-.17
Education	-.01	.02	.18	.04	(-.30)	-.20
Aesthetics	-.08	-.02	.05	0	-.06	.07

unquestioned loyalty, deception, trapped in a dull job, and with powerlessness. This same relationship was also noted in terms of those who were above the mean on the socioeconomic status scale, family income, parents' occupation and education scale, the family centrism value, and were of the Caucasian race. A significant positive correlation between iron intake and hemoglobin was observed among those who disagreed with the following PARI scales: only listen to parents, unquestioned loyalty, and trapped in a dull job, powerlessness, as well as the following variables--socioeconomic status scale, parents' occupation and education scale. A negative correlation between iron and hemoglobin was indicated for the white children. The relationship between hemoglobin and calorie intake was positive for children whose mothers disagreed with the PARI "parents are all-wise" scale and the family centrism value and for those who agreed with the "would like to get out" scale.

The relationship between serum albumin and dietary protein intake was positive for those children below the mean on the socioeconomic status scale, and whose mothers scored in the lower percentiles on the nutrition knowledge test. This correlation was negative for those mothers who rated less than the mean for the education value. The association between serum albumin and calorie intake was

Table 5.49. Effects of Selected Moderator Variables on the Relationship Between Nutrients and Blood Components

Moderator	Dependent Variable	Independent Variable	Correlation	
			Moderator Score	
			Disagreement	Agreement
"Parents are all-wise" scale (PARI)	Hemoglobin	Calories	(.34)	-.06
"Only listen to parents" scale (PARI)	Hemoglobin	Protein	(.49)	(-.23)
		Iron	(.43)	(-.29)
"Unquestioned loyalty" scale (PARI)	Hemoglobin	Protein	(.33)	-.07
		Iron	(.27)	-.13
"Deception" scale (PARI)	Hemoglobin	Protein	(.33)	-.07
"Trapped in a dull job" scale (PARI)	Hemoglobin	Protein	(.44)	-.18
		Iron	(.33)	-.19
"Would like to get out" scale (PARI)	Serum albumin	Calories	(.33)	-.09
	Hemoglobin	Calories	-.21	(-.49)
	Serum proteins	Dietary protein	-.21	(.41)
			High	Low
SES scale	Hemoglobin	Protein	(.38)	-.12
		Iron	(.33)	-.19
	Serum albumin	Protein	0	(.38)
Family centrism value	Hemoglobin	Calories	(.42)	-.10
		Protein	(.42)	-.16
Education value	Serum albumin	Protein	-.05	(-.41)
Score on "nutrition knowledge" test	Serum proteins	Protein	-.21	(.41)
	Serum albumin	Protein	-.20	(.58)
Powerlessness	Hemoglobin	Protein	(.34)	-.08
		Iron	(.32)	-.20
Parents' education and occupational scale	Hemoglobin	Protein	(.33)	-.07
		Iron	(.30)	-.16
Family income	Hemoglobin	Protein	(.32)	-.06
			Black	White
Race	Hemoglobin	Protein	-.09	(.37)
		Iron	-.12	(-.26)

positive for children whose mothers disagreed with the PARI "would like to get out" scale. The correlation between total serum proteins and dietary protein intake was positive for children whose mothers scored in the less than fiftieth percentile in the nutrition knowledge test and who agreed with the "would like to get out" scale.

Results of Anthropometric Measurements

Height and weight measurements for all children in the sample were taken at three intervals throughout the school year, while a complete set of anthropometric measurements (including certain diameters, circumferences, and skinfold thicknesses) were obtained towards the end of the school year.

Results of the incremental gains in height and weight throughout the school year revealed certain seasonal differences. The mean weight gain during the spring months (March to May) was nearly half of that which was gained throughout the winter months of November through March. Height gains did not indicate such seasonal differences. In general, children gained nearly two and one-half pounds in weight and approximately one and one-quarter inches in height throughout the school year when measurements were made.

Recognizing the influences of age, sex, and genetic differences on physical growth, any discussion of gross

height and weight measurements would be somewhat misleading. In an attempt to correct for such influences, height and weight data of children in the present study were compared with height-age and weight-age percentile values from two accepted growth standards, the Fels data (Children's Bureau, 1967) and the Boston standards (Nelson, 1968:1007). Tables 5.50 and 5.51 present the distribution of heights and weights of the children studied in relation to the percentiles of these two growth standards. On the average, over 15% of the sample was at the ninety-fifth percentile or above for weight on the Fels standard, while only 4.4% of the sample were below the fifth percentile for weight. In terms of height, 4.4% of the sample was at the ninety-fifth percentile or above on the Fels standard while over 11% were at the fifth percentile or below. In reference to the Boston percentiles for weight, over 7% of the sample was at the ninety-seventh percentile or above, while slightly more than 5% were at the third percentile or below. Approximately 3% of the sample was in the highest percentile for height while nearly 9% were at the third percentile for height. Table 5.52 presents a comparison of the height and weight measurements as expressed by the Fels and Boston standards. These data suggest that the children studied were somewhat stockier for their age than were children from the standard populations.

Table 5.50. Distribution of Heights and Weights of Preschool Children Compared With Stuart Percentiles

Percentiles	3rd	10th	25th	50th	75th	90th	97th
			Percentage of Sample				
Weight-age, November	6.8	11.4	18.2	18.2	23.5	15.2	6.8
Weight-age, March	5.0	9.3	17.1	27.1	16.4	17.1	7.9
Weight-age, May	4.2	11.9	16.1	23.8	23.8	13.3	7.0
Height-age, November	6.9	8.5	12.3	36.2	20.0	13.9	2.3
Height-age, March	10.0	7.9	15.0	37.9	15.7	9.3	4.3
Height-age, May	9.1	7.7	14.0	30.8	23.8	11.2	3.5

Table 5.51. Distribution of Heights and Weights of Preschool Children Compared With Fels Percentiles

Percentiles	3rd	5th	10th	25th	50th	75th	90th	95th	97th
				Percentage of Sample					
Weight-age, November	2.3	2.3	6.8	20.5	18.9	20.5	14.4	8.3	6.1
Weight-age, March	3.6	0	5.0	21.4	24.3	16.4	11.4	11.4	6.4
Weight-age, May	2.1	2.8	4.9	17.5	24.5	21.7	11.9	6.9	7.7
Height-age, November	5.4	3.9	8.5	14.6	36.9	15.4	10.8	3.1	1.5
Height-age, March	5.0	7.1	10.7	21.4	27.1	15.0	8.6	1.4	3.6
Height-age, May	4.9	6.9	7.0	19.6	30.1	20.3	7.7	1.4	2.1

Table 5.52. Comparison of Height and Weight Data in Reference to Fels and Stuart Standards

	Lower 10th percentile (percentage of sample)		Upper 10th (percentage of sample)	
	Fels	Boston	Fels	Boston
Weight-age (mean)	9.9	16.2	28.8	22.4
Height-age (mean)	19.8	16.7	13.4	14.8

Height and weight data for children in the study were also classified in relation to a certain height-weight-age classification devised by Smith and Brown (1970). This information is presented in Table 5.53. This classification also supports the contention that children in the sample were heavier and stockier than their counterparts in the Fels population. Over 31% of the sample were in the large and overweight categories compared to slightly more than 25% in the underweight and small categories.

According to Sargent's (1961) weight-for-height classification, most children were classified in the "normal" category. A somewhat higher percentage of the sample were in the underweight-slender categories than were in the stocky-overweight-obese categories.

The index, weight/height, has been proposed as a useful means for evaluating physical measurements. In this sample of children, the mean ratio was 1.588 ± 0.121, with the range from 1.21 to 1.94.

Table 5.53. Distribution of Height and Weight Measurements by Height-Weight-Age

	Category				
	Underweight	Small	Average	Large	Overweight
	(Percentage of Sample)				
November mmt.	4.62	20.00	45.38	21.54	8.46
March mmt.	4.29	22.14	41.43	20.71	11.43
May mmt.	4.90	16.78	46.15	20.98	11.19
Mean	4.60	19.64	44.32	21.08	10.36

The "developmental age" concept was used to express the height-age or weight-age (calculated as the chronological age at which the child's height or weight crosses the fiftieth percentile of the Boston (Stuart) percentile in relation to the child's chronological age. Ideally, this term would approximate 1.0. For this group of children the developmental index for weight averaged 0.978 ± 0.196, while that for height averaged 0.949 ± 0.126. The ratio developmental index for height/ developmental index for weight averaged 0.99 ± 0.137.

Relationships of Anthropometric Measurements to Other Variables

The intercorrelations among the various anthropometric measurements and scaled values for height and weight reveal some rather contrasting relationships (Table 5.54). For example, the total increments of height and weight are highly related to each other, but the change in weight is correlated only to weight-age in May, while the total height change is related only to the developmental index for height. The scaled weight-age and height-age values, as evaluated by the Fels and Stuart standards, are highly related ($r = 0.96$), so it seems that both scales are measuring the same dimension. Weight-age is significantly correlated with all other measurements, except head circumference and index of trunk breadth. Scaled height-age is highly related to the other scaled weight and height values, but is not related to the other

anthropometric measurements, with the exception of pelvic diameter. The height- and weight-age indexes are intercorrelated, but are not related to head circumference. Skinfold thicknesses are not related to the height and weight increments or to the height indices.

When the relationships between anthropometric measurements and nutrient intake are examined (Table 5.55), few significant correlations are evident. Protein intake is highly related to the scaled weight-age values and to the weight-age (in May) value. The weight-age/height-age index is correlated with both calcium and riboflavin. Riboflavin intake is also associated with the scaled weight-age values. Iron is related to the height increment, while Vitamin A intake is correlated with the scaled Stuart weight-age value.

Although there are few significant correlation coefficients between the anthropometric measurements and the sociopsychological attributes of the mothers, it is interesting to note that the PARI "trapped in a dull job" scale was inversely correlated with four scaled height-weight values and with sitting height and triceps skinfold thickness (Table 5.56).

When anthropometric measurements were examined in relation to selected demographic and resource characteristics of the families (Table 5.57), several showed significant relationships. The mother's marital status

Table 5.54. Intercorrelations Among Anthropometric Measurements

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. Total weight gain	1.00																						
2. Total height increment	(.33)	1.00																					
3. Weight-age, Fels	.17	.03	1.00																				
4. Height-age, Fels	.06	.13	.77	1.00																			
5. Weight-age, Stuart Meredith	.17	.07	.96	.75	1.00																		
6. Height-age, Stuart Meredith	.07	.19	.73	.96	.75	1.00																	
7. Height-weight-age	.18	.11	.79	.50	.81	.49	1.00																
8. Weight-height scale	.13	-.01	.62	.21	.61	.18	.59	1.00															
9. Weight-height ratio	.16	0	.72	(.24)	.71	.21	.66	.86	1.00														
10. Weight-age, in May	(.24)	.01	.61	.44	.58	.42	.51	.22	.29	1.00													
11. Height-age, in May	.15	.17	.43	.54	.39	.54	.26	.05	.06	.80	1.00												
12. Developmental index, wt.	.17	.02	.68	.54	.67	.51	.57	.23	.34	.86	.54	1.00											
13. Developmental index, ht.	.11	(.25)	.72	.94	.71	.94	.46	.17	.19	.48	.60	.58	1.00										
14. Index-wt age/ht age	.16	-.22	.49	.08	.49	.05	.54	.28	.39	.67	.11	.77	.06	1.00									
15. Sitting height	.04	-.05	.32	.26	.34	.22	.35	.21	.25	.28	.25	.22	.21	.16	1.00								
16. Shoulder diameter	.13	0	.32	.17	.32	.17	.36	.30	.32	.33	.32	.20	.17	.16	.65	1.00							
17. Pelvic diameter	.15	-.01	.42	.26	.43	.26	.44	.41	.43	.33	.30	.25	.25	.17	.70	.87	1.00						
18. Head circumference	.08	-.02	.15	.09	.16	.09	.19	.10	.12	.20	.18	.13	.08	.11	.43	.55	.57	1.00					
19. Chest circumference	.17	.09	.32	.18	.34	.19	.35	.29	.31	.29	.22	.24	.16	.20	.47	.59	.60	.80	1.00				
20. Index of trunk breadth	.06	-.07	.19	.09	.21	.09	.30	.24	.23	.12	.05	.12	.06	.13	.66	.68	.88	.55	.51	1.00			
21. Upper arm circumference	.18	.06	.41	.19	.40	.18	.41	.41	.46	.30	.24	.21	.16	.18	.46	.60	.63	.70	.83	.50	1.00		
22. Skinfold thickness-triceps	.05	-.08	.38	.11	.38	.07	.42	.40	.46	.31	.16	.26	.10	.31	.50	.54	.60	.30	.38	.47	.49	1.00	
23. Skinfold-subscapular	.03	-.10	.36	.14	.34	.11	.31	.47	.53	.11	.08	.09	.11	.06	.35	.42	.52	.15	.19	.40	.34	.67	1.00

Table 5.55. Correlations Between Anthropometric Measurements and Nutrient Intake

	Cal	Pro	Fat	CHO	Ca	Iron	Vit A	Thia	Ribo	Nia	Vit C
1. Total weight gain	.07	.05	0	.13	-.04	.11	.01	.15	.04	.11	.09
2. Total height increment	.20	.14	.13	.22	-.01	(.27)	.08	.19	.07	.15	.05
3. Weight-age, Fels	.08	(.24)	.07	.01	.19	.14	.21	.18	(.24)	.10	.12
4. Height-age, Fels	.05	.14	.03	.03	.09	.13	.15	.12	.13	.04	.17
5. Weight-age, Stu. Mer.	.13	(.27)	.12	.08	.22	.18	(.24)	(.23)	(.27)	.12	.14
6. Height-age, Stu. Mer.	.10	.16	.07	.08	.10	.18	.16	.19	.14	.06	.18
7. Height-weight-age	.07	.22	.08	-.01	.14	.12	.13	.16	.18	.09	.06
8. Weight-height scale	.07	.19	.07	.03	.13	.10	.08	.20	.17	.09	-.02
9. Weight-height ratio	.07	.22	.11	-.01	.15	.13	.14	.17	.19	.09	- 0
10. Weight-age, in May	.13	(.25)	.08	.11	.23	.14	.23	.15	(.25)	.21	.17
11. Height-age, in May	.12	.18	.05	.12	.12	.20	.16	.14	.14	.22	.18
12. Developmental index-wt.	.07	.21	.03	.04	.20	.08	.23	.12	.23	.11	.15
13. Developmental index-ht.	.10	.15	.06	.08	.10	.17	.17	.19	.15	.07	.19
14. Index-wt. age/ht. age	.07	.19	.05	.04	(.24)	-.02	.18	.06	(.24)	.08	.06
15. Sitting height	-.08	-.01	-.10	-.07	.07	.01	.01	-.04	.07	.01	-.01
16. Shoulder diameter	-.01	- 0	-.04	.02	-.02	.04	-.04	-.04	- 0	.06	.01
17. Pelvic diameter	.01	.02	-.01	.02	.01	.11	0	.03	.04	.05	.02
18. Head circumference	-.13	-.11	-.20	-.06	-.12	.03	-.09	-.08	-.12	.03	0
19. Chest circumference	-.08	-.02	-.14	-.03	-.06	.06	.03	-.03	-.04	.07	.02
20. Index of trunk breadth	-.09	-.09	-.08	-.06	-.06	.02	-.10	-.06	-.05	-.03	-.02
21. Upper arm circumference	-.08	.03	-.10	-.07	-.06	.07	-.03	.02	-.03	.12	.01
22. Skinfold thickness-triceps	-.08	0	-.07	-.10	.05	-.04	.02	-.01	.05	-.03	-.03
23. Skinfold thickness-subscapular	0	.08	.04	-.05	.05	.10	.01	.14	.08	.07	-.03

Table 5.56. Correlations Among Anthropometric Measurements and Sociopsychological Attributes of Mothers

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Total weight gain	+.14	-.20	+.10	+.09	+.11	0	-.10	0	-.03	+.12	-.20	-.07	-.05	+.12	-.02	-.01	.07	.02	.02	.08	.14	.02	-.22	-.15	.03
Height increment	+.17	-.09	-.04	+.15	+.20	+.12	+.01	-.03	-.04	+.03	-.01	+.01	-.05	-.08	+.02	+.05	.23	.07	-.05	-.04	.11	-.01	-.21	.02	.05
Weight-age, Fels	-.14	+.16	-.13	+.02	-.07	-.22	+.10	-.13	+.06	+.02	-.21	-.16	-.06	+.07	+.15	-.01	.03	-.14	-.08	.02	.01	.11	.05	.04	.14
Height-age, Fels	-.17	+.20	(-.24)	-.04	-.08	-.20	+.09	-.19	-.01	-.03	-.15	-.21	+.04	+.13	+.17	+.08	.05	-.14	-.15	.12	-.07	.13	-.03	.11	.16
Weight-age, Stu Mer.	-.16	+.13	-.13	-.02	-.07	(-.25)	+.10	-.15	+.08	+.03	-.20	-.19	-.08	+.07	+.14	-.03	.04	-.12	-.09	.05	-.02	.08	.02	.02	.15
Height-age, Stu Mer.	-.20	+.20	-.24	-.07	-.08	-.19	+.09	-.22	-.04	-.03	-.17	-.22	+.04	+.14	+.17	+.07	.07	-.13	-.17	.16	-.09	.11	-.03	.10	.14
Height-weight-age	-.17	+.07	-.04	+.01	+.02	-.18	+.14	-.06	+.07	+.06	-.02	-.12	-.04	-.04	+.09	-.05	.03	-.06	-.11	-.01	-.03	.19	.03	.07	.11
Weight-height scale	-.05	+.03	-.04	-.06	-.03	-.12	+.15	-.03	+.12	-.01	-.07	-.03	-.05	-.08	-.01	-.14	.02	-.14	-.06	-.07	.13	.09	.15	-.03	0
Weight-height ratio	-.01	-.02	0	+.07	+.02	-.07	+.13	-.04	+.16	+.02	-.12	-.02	-.13	-.10	+.10	-.13	-.02	-.10	0	-.09	.16	.09	.06	-.07	.06
Weight-age in May	-.14	+.09	-.03	0	-.12	(-.29)	-.02	-.05	-.05	+.04	-.20	-.12	-.03	+.17	+.14	+.07	.05	-.08	.05	.05	-.15	-.05	-.08	.08	.12
Height-age in May	-.12	+.11	-.16	-.04	-.10	(-.24)	+.01	-.09	-.08	+.05	-.19	-.12	+.03	+.16	+.11	+.10	.04	-.08	-.01	.11	-.15	0	-.11	.10	.12
Dev. index-weight	-.13	+.13	+.02	+.05	-.11	(-.25)	-.01	-.08	-.03	-.05	-.15	-.12	-.04	+.15	+.20	+.12	.09	-.07	.02	.05	-.11	-.09	-.13	.10	.12
Dev. index-height	-.17	+.18	-.22	-.05	-.07	-.21	+.07	-.21	-.02	+.04	-.17	-.20	+.03	+.12	+.19	+.10	.10	-.14	-.12	.13	-.12	.06	-.06	.12	.15
Index: wt. age/ht. age	-.10	+.03	+.14	+.06	-.08	-.19	-.02	+.03	+.03	0	-.06	-.04	-.06	+.09	+.10	+.01	.04	-.04	.08	-.04	-.07	-.09	.01	.02	.06
Sitting height	-.19	+.12	-.16	-.14	-.18	(-.26)	+.05	-.18	+.01	+.12	-.07	-.12	+.01	+.14	-.02	-.13	.05	-.13	-.14	0	-.01	.16	.04	.05	.06
Shoulder diameter	-.15	+.09	-.06	-.08	-.09	-.20	+.12	0	+.08	+.07	-.06	-.12	+.05	+.15	-.04	-.18	.03	-.11	-.03	-.10	0	.03	.11	.04	.06
Pelvic diameter	-.17	+.04	-.10	-.13	-.15	-.22	+.07	-.11	+.06	+.06	-.13	-.13	+.05	+.09	-.08	-.21	.09	-.20	-.09	-.03	-.02	.12	.16	.02	.01
Head circumference	-.09	+.08	+.01	-.06	-.07	-.11	+.10	+.02	+.01	+.07	-.02	-.05	-.01	+.11	-.04	-.18	.04	-.05	-.17	-.01	-.01	.05	.09	.09	.02
Chest circumference	-.08	+.10	+.01	-.07	-.11	-.12	+.15	-.02	0	+.05	-.05	-.10	+.02	+.13	-.03	-.18	.07	-.04	-.10	.03	-.02	.02	.01	.02	.03
Index of trunk breadth	-.08	- 0	-.06	-.06	-.12	-.16	-.01	-.13	+.02	+.04	-.11	-.09	+.04	+.09	-.06	-.15	.08	-.16	-.10	-.04	0	.12	.16	.04	-.05
Upper arm circum.	-.04	0	+.01	-.03	-.13	-.15	+.08	-.05	-.02	+.04	-.05	-.18	+.01	+.04	-.01	-.17	0	-.08	-.02	.01	.05	.07	.02	-.03	.01
Triceps skinfold	-.15	+.02	-.10	-.21	-.14	(-.29)	+.05	+.04	+.16	+.10	-.12	-.12	-.01	+.14	-.03	-.11	-.02	-.21	-.02	.01	.07	.15	.16	-.06	-.11
Subscapular skinfold	-.12	+.03	-.11	-.12	-.05	-.16	+.04	+.05	+.19	+.10	-.17	-.06	-.06	+.05	-.10	-.06	-.02	-.20	-.09	.05	.07	.17	.09	-.02	.01

PARI Scales:

1 "Parents are all-wise" scale
2 "Treating child as an equal" scale
3 "Only listen to parent" scale
4 "Unquestioned loyalty" scale
5 "Deception" scale
6 "Trapped in a dull job" scale
7 "Would like to get out" scale
8 "Children are so demanding" scale
9 "Occasional dissatisfaction" scale
10 "Frequent dissatisfaction" scale

11 Anomie
12 Powerlessness

13 Permissiveness about feeding attitude
14 Nutrition is important scale
15 Semantic differential (1)
16 Semantic differential (2)

VALUES:

17 Economy
18 Prestige
19 Health
20 Family Centrism
21 Religion
22 Friendship
23 Freedom
24 Education
25 Aesthetics

correlated negatively with six of the scaled height-weight values. The parents' occupation and education scale showed a positive association with several anthropometric measurements, namely Fels' height-age, the developmental index for height, sitting height, pelvic diameter, and triceps skinfold thickness. The socioeconomic status index (composed of parents' occupation, education and famlly income) correlated significantly with weight-age, and height-age, the developmental index for weight, sitting height, pelvic diameter and triceps skinfold thickness. The mother's ability to name the "Basic Four" food groups needed by the child daily showed a significant relationship to scaled height-age and weight-age values, and the developmental indices for height and weight. (Interestingly, the mother's performance on the nutrition knowledge test did not show similar significant correlations.)

Moderator Effects

In analyzing the correlations between the scaled height-weight values and nutrient intake, as moderated by selected family characteristics, the following relationships are indicated (Table 5.59). The weight-age value (according to both the Fels and Stuart standards) and for other scaled height- and weight-age values were

Table 5.57. Correlations Among Anthropometric Measurements and Demographic Characteristics of Families

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Total weight gain	.10	(.27)	-.08	+.16	-.14	+.12	.11	-.01	0	-.10	- 0	-.15	-.11	-.17	.01	-.07	0	-.09
Height increment	.04	.07	.01	+.04	-.20	+.07	-.23	-.22	-.09	-.16	.03	-.11	-.01	.01	-.13	-.20	-.06	-.01
Weight-age, Fels	.09	-.09	.12	(+.25)	.15	+.20	.12	.20	.06	.02	.09	-.17	-.05	-.09	-.04	.06	(.26)	.07
Height-age, Fels	-.02	-.18	.02	(-.23)	(.24)	+.19	.08	.22	-.05	.01	0	-.12	-.12	-.01	.02	.17	(.29)	.14
Weight-age, Stu. Mer.	.04	-.11	.08	(+.27)	.17	(+.24)	.10	.22	.03	.02	.06	-.19	-.07	-.06	-.03	.07	(.29)	.09
Height-age, Stu. Mer.	-.04	-.19	- 0	(+.24)	(.23)	+.20	.06	.21	-.07	.02	-.01	-.10	-.17	-.02	.03	.14	(.28)	.13
Height-weight-age	.03	-.03	.05	+.17	.06	+.16	.08	.11	.08	.06	.05	-.12	-.04	-.09	.05	0	.22	.06
Weight-height scale	.18	-.01	.20	+.11	-.02	+.14	.09	-.01	.11	-.03	.15	-.12	.06	-.17	-.04	-.05	.09	-.08
Weight-height ratio	.20	-.02	(.24)	+.13	-.05	+.14	.07	-.02	.11	-.06	.15	-.12	.05	-.13	-.12	-.10	.06	-.11
Weight-age, in May	- 0	-.02	-.07	(+.31)	.21	+.20	.16	(.31)	.02	-.13	.06	-.12	-.13	0	-.04	.01	(.25)	.16
Height-age, in May	.01	-.11	-.05	(+.33)	(.23)	+.22	.12	(.26)	-.05	-.18	.09	-.06	-.18	.02	-.06	0	.17	.14
Dev. index-weight	-.02	-.02	-.03	(+.27)	.18	+.16	.11	(25)	.03	-.11	0	-.12	-.09	.04	-.09	.08	(.28)	.13
Dev. index-height	-.05	-.18	-.02	(+.29)	(.24)	+.22	.02	.21	-.09	-.02	-.03	-.09	-.14	.02	-.02	.13	(.28)	.16
Index-wt. age/ht. age	-.01	.10	-.05	+.12	.07	+.07	.11	.20	.11	- 0	- 0	-.13	0	- 0	-.02	.02	.22	.10
Sitting height	(-.30)	-.13	(-.32)	+.12	(.25)	+.04	.07	(.26)	-.14	.02	-.22	(-.30)	-.08	.09	.15	.07	.19	.07
Shoulder diameter	-.18	-.15	-.17	+.10	.17	+.04	.15	.19	-.08	-.02	-.08	-.12	-.16	-.05	.12	.01	.11	.04
Pelvic diameter	-.16	-.10	-.18	+.14	(.25)	+.10	.13	(.25)	-.08	.01	-.12	-.19	-.17	.01	.07	.06	.09	0
Head circumference	-.10	-.06	-.15	+.08	.11	+.05	.10	.13	-.03	.04	-.05	-.13	-.11	-.07	.11	0	-.02	-.09
Chest circumference	-.04	.02	-.12	+.08	.04	+.09	.09	.06	-.02	.04	-.03	-.14	-.06	-.13	.08	-.02	.04	-.08
Index of trunk breadth	-.16	.04	(-.23)	+.02	.16	+.03	.03	.14	-.07	.06	-.19	-.21	-.11	.03	.08	.05	.01	-.05
Upper arm circumference	-.04	-.04	-.08	+.09	.08	+.04	.13	.07	-.01	.03	0	-.10	-.04	-.13	.07	-.01	.01	-.09
Triceps skinfold	-.19	-.21	-.10	+.20	(.29)	+.06	.22	(.31)	.01	-.01	-.11	-.16	-.03	-.02	.13	.08	.13	.22
Subscapular skinfold	.05	-.20	.15	-.06	.14	-.08	.23	.13	.18	-.02	.11	-.05	-.09	-.10	.09	.11	.09	.03

1. Persons in home
2. Children <5 years
3. Ordinal position
4. Marital status
5. Occupation + education
6. Income status
7. Family income
8. SES index
9. $ for food/week
10. Mother away from child
11. Family life cycle
12. Race (white/black)
13. Times moved
14. Own/rent
15. Crowding index
16. House-neighborhood
17. "Basic 4"
18. Nutr. knowledge

significantly associated with calorie intake and with fat, carbohydrate and protein in those children whose mothers indicated high agreement for the "nutrition is important" attitude. Similar trends were shown between fat intake and the developmental index for weight and the weight-age/height-age index.

There was a significant positive correlation for "low" powerlessness mothers between the height-weight age scale, Sargent's height-weight scale and the weight: height ratio and calories (as well as the calorie-providing nutrients, fat, carbohydrate and protein). The opposite trends in the relationships between these variables were evident for mothers who had agreed with items on the powerlessness scale.

Positive relationships were shown between calories (also for fat, protein, and carbohydrate) and the various height-weight scales for children whose mothers disagreed the following PARI scales: trapped in a dull job, deceptioned, unquestioned loyalty, and would like to get out. An inverse correlation was shown between calories and the energy-yielding nutrients and the scaled values for children with mothers who did not agree with the "only listen to parent" scale.

A high value on the Milbank socioeconomic status index moderated a positive correlation between calories and Sargent's height-weight scale, the weight:height

Table 5.58. Effects of Selected Moderator Variables on the Relationship Between Nutrient Intake and Anthropometric Measurements

Moderator	Independent Variable	Dependent Variable	Correlation: Moderator Score Disagreement	Correlation: Moderator Score Agreement
"Nutrition is important" attitude	Calories	Fel's weight age	-.21	.25
		Stuart weight age	-.13	.29
		Ht-wt-age	-.26	.34
		Ht-wt-scale	-.58	.38
		Weight-height ratio	-.68	.48
	Protein	Ht-wt-age	-.07	.49
		Ht-wt-scale	-.21	.45
		Weight-height ratio	-.23	.53
	Fat	Height-weight-age	-.21	.37
		Dev. index-weight	-.04	.38
		Wt-age/ht-age index	-.26	.36
	Carbohydrate	Ht-wt-age	-.31	.27
		Ht-wt scale	-.39	.27
		Weight-height ratio	-.55	.33
Powerlessness	Calories	Ht-wt-age	.34	-.26
		Ht-wt scale	.10	-.30
		Weight-height ratio	.19	-.39
	Protein	Height-weight-age	.51	-.09
		Ht-wt scale	.32	-.08
		Weight-height ratio	.39	-.09
	Carbohydrate	Height-weight-age	.26	-.30
		Weight-height ratio	.12	-.34
	Fat	Height-weight-age	.31	-.15
			High	Low
SES Index	Calories	Height-weight scale	.28	-.48
		Weight-height ratio	.25	-.45
		Dev. index for weight	-.13	.47
		Weight-age/height-age	-.18	.62
	Protein	Height-weight scale	.37	-.13
		Weight-age/height-age	.02	.50
	Carbohydrate	Height-weight scale	.20	-.32
		Weight-height ratio	.14	-.37
		Dev. index for weight	-.14	.34
		Weight-age/height-age	-.16	.40
PARI Scales:				
Trapped in a dull job	Calories	Height-weight-age	.27	-.19
		Height-weight scale	.16	-.36
		Weight-height ratio	.23	-.43
	Protein	Height-weight-age	.44	-.02
		Height-weight scale	.30	-.06
		Weight-height ratio	.34	-.04
	Carbohydrate	Height-weight-age	.22	-.26
		Height-weight scale	.13	-.25
		Weight-height ratio	.13	-.35
Deception	Calories	Height-weight-age	.15	-.35
		Height-weight scale	.11	-.31
		Weight-height ratio	.15	-.35
	Protein	Height-weight-age	.49	-.07
	Fat	Height-weight-age	.28	-.12
	Carbohydrate	Height-weight-age	.32	-.36
		Weight-height ratio	.10	-.32
Unquestioned loyalty	Calories	Height-weight-age	.28	-.21
		Weight-height ratio	.09	-.29
	Protein	Height-weight-age	.42	0
	Carbohydrate	Height-weight-age	.22	-.26
Only listen to parent	Calories	Height-weight scale	-.41	.21
		Weight-height ratio	-.39	.19
		Weight-age/height-age	.46	-.02
	Carbohydrate	Height-weight scale	-.34	.22
		Weight-height ratio	-.34	.12
Would like to get out!	Calories	Height-weight scale	.30	-.50
		Weight-height ratio	.31	-.51
		Dev. index for weight	-.02	.36
		Weight-age/height-age	-.08	.52
	Carbohydrate	Height-weight scale	.23	-.35
		Weight-height ratio	.20	-.42
		Weight-age/height-age	-.09	.33
Occasional dissatisfaction	Calories	Height-weight scale	.14	-.34
		Weight-height ratio	.21	-.41
		Dev. index for weight	-.07	.41
		Weight-age/height-age	-.14	.58
Occasional dissatisfaction	Fat	Height-weight scale	.13	-.29
	Carbohydrate	Height-weight scale	.14	-.26
		Weight-height ratio	.13	-.35
Frequent dissatisfaction	Calories	Weight-age/height-age	.03	.41
Parents are all-wise	Calories	Dev. index for weight	-.07	.41
	Carbohydrate	Dev. index for weight	-.13	.33

ratio; an opposite relationship was seen between mothers low on the SES index for the developmental index for weight and the weight-age/height-age index.

CHAPTER VI

DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

Discussion of Results

The nature of the ecological approach forces the researcher to investigate the nature of relationships which might exist between (in this case) factors which characterize the family environment and the nutritional status of the preschool child who is living and growing in that environmental setting. This discussion will focus on those relationships elucidated by the present research. Computer-assisted data analysis revealed that certain variables did not provide any additional information. Therefore, the following discussion is based on only those data which were revealed by multivariate analysis to be particularly pertinent to the problem as defined.

The nutrients were highly inter-correlated among themselves, with the exception of ascorbic acid which acted independently of the rest. The nutrients exhibited no strong correlations with the blood components. It is acknowledged that since nutrient intakes for most children either met or exceeded the RDA, such intakes could be considered limiting. Therefore, one cannot

expect to find significant correlations with the occurrence of clinical lesions. Only protein (for the energy-yielding nutrients) showed a positive correlation with several weight-for-age scales.

The literature suggested that the degree of correlation which could be expected among dietary, biochemical, and clinical data is limited. In general, dietary and biochemical data for most nutrients have been shown to be more closely related, than either of these criteria alone correlated with clinical findings (Pike and Brown, 1967:478). Such inter-relationships have been routinely sought in the nutrition surveys conducted by the Interdepartmental Committee on Nutrition for National Defense (ICNND), but these efforts have met with little success (Plough and Bridgforth, 1960).

While realizing that the three approaches to the determination of nutritional status (clinical vs dietary vs biochemical) measure different chronologies of nutritional deficiency (Figure 3), Plough and Bridgforth (1960) undertook to determine the nature of the inter-relations between these three procedures, with the expectation that each method would be comparable to the others. The following are but a few of their findings: no correlations were noted between caloric intake and height, weight, or skinfold thicknesses. Neither calories nor the parameters of body composition correlated with any of the clinical or biochemical

findings. The level of serum protein did not appear to be related to dietary protein intake. In that study, no relationships were found between dietary iron and hemoglobin or hematocrit levels.

Pearson (1966) suggested the following reasons for the poor correlations found between biochemical and clinical findings: 1) the known non-specificity of the clinical lesions; 2) the marked differences in the criteria and diagnostic expertise of different examiners; and 3) the different chronologies in the sequence of the development of nutritional deficiency signs associated with the clinical and biochemical lesions.

Beal (1970) indicated that analysis of the longitudinal data of the subjects studied in the Child Research Council study has shown no clear relationship between dietary intake of iron or protein with levels of hemoglobin or hematocrit. Likewise, Davis *et al.* (1967) concluded that a dietary survey of healthy subjects showed that no relation between iron intake and hematological status. They suggested that iron content of food is not a limiting factor in maintaining iron balance in normal individuals. Burroughs and Huenemann (1970) were unable to show consistent significant correlations between the nutrient levels and blood variables; however, they did indicate that in general, children whose weights were in the lowest percentiles

received diets low in calories and other nutrients, and more of these children had less favorable blood values.

Crumrine and Fryer (1970), studying blood components and dietary intake of preschool children, found that only protein was significantly correlated with hemoglobin concentration; they attributed this finding to the fact that as an indicator of inadequate nutrition, hemoglobin is determined by many, rather than a single, nutrient. These investigators also found significant correlations between blood values and nutrient intakes for albumin and Vitamin A, between albumin and niacin, and between the albumin:globulin ratio and fat.

In the present study, examination of the correlation matrices supplemented by the findings of the moderator programs suggested a patterning of associations between family environment characteristics, nutrient intake and the physical status of the child. Thus, emerges a typology of maternal characteristics and family patterns which, in turn, act to influence the dietary intake and consequent nutritional status of the child. The Type I mother displayed many of the following characteristics:

a. Non-authoritarian attitudes toward child rearing, indicating a basic disagreement with the items in the following scales,
   - Parents are all-wise
   - Listen only to parents
   - Unquestioned loyalty
   - Trapped in a dull job
   - Deception

   and showing agreement with the items in the "treating child as an equal" scale.

b. Low feeling of powerlessness

c. Values ranked of highest importance: family centrism, freedom, education.
Values ranked of least importance: prestige and religion.

d. High agreement with the "nutrition is important" attitude.

The Type I families were characterized by:

a. Higher socioeconomic status
higher family income
higher parental education and occupations

b. Higher score on nutrition knowledge test and number of "Basic Four" named.

c. Fewer persons in the home and fewer children under five years of age in the family.

d. Most mothers are married and living with their husbands.

e. Families were at lower stages in the family life cycle.

f. Less money is spent for food per week.

In contrast, the Type II mother exhibited many of the following characteristics:

a. Authoritarian attitudes toward child-rearing, evidenced by agreement with items on the "unquestioned loyalty" scale, and by disagreement with the "treating child as an equal" items.

b. Sense of powerlessness

c. Lower-self-concept as mother (measured by semantic differential instrument)

d. Lack of agreement with the "nutrition is important" attitude

e. Value of greatest importance: prestige, religion
Value of least importance: education

f. Lower scores on nutrition knowledge test and number of "Basic Four" named.

The Type II family was characterized by:

a. Lower socioeconomic status
   lower family income
   lower parental education and occupation rating

b. Later stages in family life cycle

c. More persons in the home and a greater number of children under five years of age in the family

d. Mother is away from the child more time

e. Greater amount of money spent for food per week

f. Increased crowding in the home

g. Increased mobility patterns.

The typology of family and maternal characteristics related, in turn, to certain patterns of nutrient intake. Children of the more affluent, non-authoritarian mothers tended to have higher intakes of calcium and ascorbic acid. On the other hand, children of mothers with more authoritarian attitudes toward child-rearing had higher intakes of calories, carbohydrate, iron and thiamin, all of which are typically provided by enriched bread and cereal products. The simple correlations between the biochemical measures and family characteristics were largely inconclusive.

The MODERATOR programs indicated the correlation between blood components or anthropometric measurements, as they were moderated (or influenced) by the various family environment characteristics. Results of this analysis revealed that for the Type I mothers (high socioeconomic status, non-authoritarian), there was a

positive correlation between calories and the energy-yielding nutrients and the various scaled height-weight for age values. In contrast, for the Type II mothers (low socioeconomic status, authoritarian) there was a positive relationship between calories and weight indices, namely the developmental index for weight and the weight-age/height-age index, but there were essentially no other significant correlations with the remaining scaled height-weight values. Such findings suggest that the children of Type II mothers may weigh more in relation to their height, while children of Type I mothers may have a more balanced physique, i.e., these children are more likely to be neither overweight or underweight. The tendency existed for children of mothers with a lower self-concept rating (characteristic of Type II) to have a higher hydroxyproline:creatinine ratio and hydroxyproline index. This finding suggests that children of Type II mothers may be growing at a more rapid rate. Whether these children weighed more for height because of a greater muscle mass or increased adipose tissue cannot be adequately determined from the data collected for this study.

Correlational analysis revealed that children of mothers with a lower self-concept (characteristic of the Type II mothers) tended to have higher hemoglobin and hematocrit values. MODERATOR further indicated that there

was a positive association between both protein and iron with hemoglobin, when moderated by variables characteristic of the Type I mothers. Such relationships may suggest that in cases where hemoglobin is at acceptable or higher levels, such as was found of children of Type II mothers, that excess dietary iron remains unabsorbed and as a result, no correlations were made apparent. For children of the more authoritarian, lower income mothers (Type II), MODERATOR showed that positive correlations existed between dietary protein and serum albumin and total serum protein levels, even though dietary protein intake exceeded 100% of the RDA for these children.

Limitations of the Present Research

1. Because of the nature of the sample selection, a bias was introduced. Information was obtained only for children whose mothers were cooperative in providing the information requested by the researcher. The "invisible poor" child, who is mistreated and possibly unwanted in the home is not likely to be attending a nursery school program or visiting a public health clinic.

2. Psychosocial data was obtained only for the mother. The focus of the present research was primarily on the dyadic relationship between the mother (as the supplier of nutrients) and the developing child rather on the transactional patterns which may be evidenced by the entire group of family members.

3. Dietary intake information was obtained by food records completed by mothers of the children in the sample. The validity of this instrument as a data-collection device is controversial.

Summary and Conclusions

Analysis of the food records revealed that for the most part, children in the present study were quite amply nourished. On the average, all nutrients, except iron, met or exceeded the Recommended Dietary Allowances. However, in terms of the few children who had intakes less than two-thirds of the RDA for any one nutrient, the nutrients which were most limiting were iron, ascorbic acid, calcium, and vitamin A. These nutrient totals were calculated exclusive of the contribution of the vitamin supplement which many of the children were taking. Snacking was quite prevalent; approximately 10% of the total protein intake and 19% of the calories were contributed by snacks.

Evaluation of blood components and various anthropometric measurements failed to reveal any evidences of gross malnutrition. In reference to the ICNND standards, all but two children had either "acceptable" or "high" values for hemoglobin and hematocrit. Total serum proteins were either acceptable or high for 97% of the children, while all children had serum albumin levels which were either acceptable or high.

When height and weight measurements of the children were studied in reference to accepted standards, it was revealed that far more children were at the highest percentiles for weight than were at the lower ends of the scales. This inequitable distribution did not hold true, however, for the height values. Such findings lead to the conclusion that more children in the sample were overweight for their age than were underweight.

An analysis of the demographic characteristics of the families in the sample indicated that a wide variation existed among the families sampled. Nearly two-thirds of the families were white, while approximately one-fourth were black; others in the sample were Mexican-American, Oriental or East Indian. The average annual family income was about $9,000, yet 13% of the families had an income of less than $4,000 per year. The parents in the sample were quite highly educated; mothers had completed an average of fourteen years of schooling while the fathers had completed approximately seventeen years. The "typical family" in the sample consisted of five persons--two adults and three children, two of whom were less than five years of age.

Using correlational and multiple-group cluster analysis procedures, a typology of family characteristics and maternal attributes was developed which bore a direct relationship to the dietary intake and resultant physical status of the children. The Type I mother

exhibited more equalitarian attitudes toward child-rearing and represented a higher socioeconomic strata. In contrast, the Type II mother was from the lower socioeconomic groups and displayed more authoritarian attitudes toward child-rearing.

This typology of maternal characteristics related directly to certain patterns of nutrient intake. Children of the more affluent, non-authoritarian mothers tended to have higher intakes of calcium and ascorbic acid, while children of the Type II mothers ate more calories, carbohydrate, iron, and thiamin.

The tendency existed for children of the more authoritarian, lower income mothers to have higher hemoglobin and hematocrit values. Yet, analysis of interactions among variables indicated that there was a positive association between both protein and iron with hemoglobin for children of the Type I mothers. Such associations suggest that in cases where hemoglobin levels are at higher levels, any dietary iron that is ingested which may not be needed remains unabsorbed, and as a result, does not contribute to any correlations with the blood value.

The primary contribution of the present research is the demonstration that multivariate analysis procedures may be effectively utilized to establish a typology of family characteristics and maternal attributes which, in turn, exerts a direct influence on the dietary intake

and the consequent nutritional status of children within particular family environmental settings.

Suggestions for Future Research

The suggestions for future research which emanate from the present study relate quite closely to the limitations previously cited.

1. The ecological approach should be applied in analyzing the nature of the relationships between nutritional status and family environment characteristics in populations of children different from the one studied. These might include the "invisible poor", the "battered" child, or the mentally retarded. Cross cultural approaches as well may be useful.

2. Children from a younger age group (e.g., one to three years of age) should be studied to determine if they are more sensitive to alterations and/or extreme conditions which may occur in the family environment.

3. Studies should be performed utilizing research techniques designed to assess transactional patterns of exchange among family members, rather than the dyadic relationship between mother and child. In any event, attempts should be made to include more members of the family in the research design than just the mother.

4. A study is recommended to determine the most accurate yet practical method (i.e., comparing the food

record vs recall vs observational techniques) for use in field studies particularly with low-income mothers.

Implications

Theory

The present research demonstrates the viability of the ecological approach in studies designed to assess the nutritional status of individuals.

Action Programs

The value of the present study to potential application in programs carried out by change agents lies both in the conceptual orientation, i.e., the ecological approach, and the typology of family characteristics which was revealed.

If more authoritarian, low-income mothers have children who consume fewer fresh fruits and vegetables, as evidenced by lower ascorbic acid intakes, techniques which would encourage an increased consumption of these foods should be emphasized in nutrition education programs. Furthermore, the entire constellation of family characteristics must be evaluated before any change programs can be effectively implemented.

BIBLIOGRAPHY

BIBLIOGRAPHY

Adelson, S. F. Changes in diets of household, 1955 to 1965. J. Home Economics 60(6):448-455, June 1968.

Allison, D. J., A. Walker and Q. T. Smith. Urinary hydroxyproline:creatinine ratio of normal humans at various ages. Clin. Chim. Acta 14:729-734, 1966.

Anastasi, A. *Psychological Testing*. New York: The Macmillan Company, 1964.

Auerswald, E. H. Interdisciplinary versus ecological approach. Family Process 7(2):202-215, Sept. 1968.

Baker, G. R. *Patterning of Family Resources for Educability: Conceptualization and Measurement in Costa Rican Families*. Unpublished Ph.D. dissertation, Michigan State University, 1970.

Battle, E. S. and J. B. Rotter. Children's feelings of personal control as related to social class and ethnic group. J. Pers. 31:482-490, Dec. 1963.

Bayer, L. M. and N. Bayley. *Growth Diagnosis*. Chicago: The University of Chicago Press, 1969.

Beal, V. A. Nutritional intake of children. I. Calories, carbohydrate, fat and protein. J. Nutr. 50(2):223-234, June 10, 1953.

Beal, V. A. Nutritional intake of children. II. Calcium, phosphorus, and iron. J. Nutr. 53(4):499-510, Aug. 10, 1954.

Beal, V. A. Nutritional intake of children. III. Thiamine, riboflavin and niacin. J. Nutr. 57(2):183-192, Oct. 10, 1955.

Beal, V. A. Nutritional intake of children. IV. Vitamins A and D and ascorbic acid. J. Nutr. 60(3):335-347, Nov. 10, 1956.

Beal, V. A. Dietary intake of individuals followed through infancy and childhood. Pediatrics 51(8):1107-1117, Aug. 1961.

Beal, V. A. and A. J. Meyers. Iron nutriture from infancy to adolescence. Am. J. Public Health 60(4):666-678, April 1970.

Becker, B. G., B. P. Indik and A. M. Beeuwkes. *Dietary Intake Methodologies - A Review.* Technical Report, UNRI Project 03188. Ann Arbor: Office of Research Administration, Nov. 1960.

Bell, R. R. Lower class Negro mothers' aspirations for their children. Social Forces 43:493-500, 1965.

Bloom, B. S. *Stability and Change in Human Characteristics.* New York: John Wiley and Sons, Inc., 1964.

Bonsnes, R. W. and H. H. Taussky. On the colorimetric determination of creatinine by the Jaffe reaction. J. Biol. Chem. 158:581-590, Mar.-May, 1945.

Bormann, F. H. and G. E. Likens. The nutrient cycles of an ecosystem. Sci. Am. 223:92-101, Oct. 1970.

Breckenridge, M. E. and M. N. Murphy. *Growth and Development of the Young Child.* 8th ed. Philadelphia: W. B. Saunders Co., 1969.

Brown, M. L., D. S. Smith, J. L. Mertz, H. M. Hill and S. F. Adelson. Diet and nutriture of preschool children in Honolulu. J. Am. Diet. Assoc. 57(1): 22-28, July 1970.

Bullen, R. Personal Communication, May 1970.

Burgess, E. W., W. L. Warner, F. Alexander and M. Mead. *Environment and Education.* Human Development Series, Vol. I. Chicago: The University of Chicago Press, 1942.

Burroughs, A. L. and R. L. Huenemann. Iron deficiency in rural infants and children. Caloric, nutrient, and milk intakes. J. Am. Diet. Assoc. 57(2):122-128, August 1970.

Chin, R. The utility of system models and developmental models for practitioners. *In:* Bennis, W. G., K. D. Benne and R. Chin, eds. *The Planning of Change.* 2nd ed. New York: Holt, Rinehart, and Winston, Inc., 1969.

Church, C. F. and H. N. Church. *Food Values of Portions Commonly Used.* Bowes and Church, 11th ed. Philadelphia: J. B. Lippincott Co., 1970.

Clark, F. A scorecard on how we Americans are eating, pp. 266-272. *In: Food For Us All.* The Yearbook of Agriculture. Washington: United States Department of Agriculture, 1969.

Cloud, H. H. *Heights, weights, triceps skinfold measurements, hematocrits and dietary intake of four-year-old children in day care centers and at home in Birmingham, Jefferson County, Alabama.* Unpublished Master's Thesis. University of Alabama, 1967.

Committee on Nutritional Anthropometry, Food and Nutrition Board, National Research Council. Recommendations concerning body measurements for the characterization of nutritional status. Hum. Biol. 28:111-123, 1956.

Committee Report. Assessment of protein nutritional status. Am. J. Clin. Nutr. 23(6):807-819, June 1970.

Crispin, S., E. Kerrey, H. M. Fox and C. Kies. Nutritional status of preschool children. II. Anthropometric measurements and interrelationships. Am. J. Clin. Nutr. 21(11):1280-1284, Nov. 1968.

Cross, H. J. and Kawash, G. T. A short form of PARI to assess authoritarian attitudes toward child rearing. Psychol. Rep. 23:91-98, 1968.

Crumrine, J. L. and B. A. Fryer. Protein components of blood and dietary intake of preschool children. J. Am. Diet. Assoc. 57(6):509-512, Dec. 1970.

Darling, F. F. The ecological approach to the social sciences. Am. Sci. 39(2):244-256, April 1951.

Darling, F. F. and R. F. Dasmann. The ecosystem view of human society. Impact of Science on Society 19(2): 109-121, 1969.

Davenport, E. *Calculating the Nutritive Value of Diets.* A manual if instructions for the use of punch cards for machine tabulation. United States Department of Agriculture, ARS Publication No. 62-10-1, September 1964.

Davis, R. H., A. Jacobs and R. Rivlin. Dietary iron and hematological status of normal subjects. Brit. Med. J. No. 5567, pp. 711-712, Sept. 16, 1967.

Deacon, R. E. and F. Maloch. Proposed framework for home management. J. Home Economics 58:31-35, Jan. 1966.

Dierks, E. C. and L. M. Morse. Food habits and nutrient intakes of preschool children. J. Am. Diet. Assoc. 47: 292-296, Oct. 1965.

Dixon, W. J. and F. J. Massey. *Introduction to Statistical Analysis*. 3rd ed. New York: McGraw-Hill Book Company, 1969.

Douglas, J. W. B. The height of boys and girls and their home environment. Mod. Prob. Pediat. 7:178-182, 1962.

Dow, D. and P. V. C. Pinto. Determination of serum albumin on the SMA-12/30 (hospital model) using bromo-cresol green. Clin. Chem. 15(10):1006-1008, 1969.

Drash, A., D. Heese and J. A. Brasel. Clinical material: Anthropometric and developmental analysis, pp. 60-83. *In:* Cheek, D. B. *Human Growth: Body Composition, Cell Growth, Energy, and Intelligence*. Philadelphia: Lea and Febiger, 1968.

Dubos, R. *So Human An Animal*. New York: Charles Scribner and Sons, 1968.

Dugdale, A. E., S. T. Chen and G. Hewitt. Patterns of growth and nutrition in childhood. Am. J. Clin. Nutr. 23(10):1280-1287, Oct. 1970.

Duvall, E. M. *Family Development*. 3rd ed. Philadelphia: J. B. Lippincott Co., 1967.

Dyer, D. M. *Students' Wives' Values as Reflected in Personal and Family Activities*. Unpublished Master's Thesis. Michigan State University, 1962.

Emerson, G. A. Nutritonal status, U.S.A. J. Nutr. 91(Suppl. 1):51-54, 1967.

Eppright, E. S., H. M. Fox, B. A. Fryer, G. H. Lamkin and V. M. Vivian. The North Centrial Regional Study of diets of preschool children. 2. Nutrition knowledge and attitudes of mothers. J. Home Economics 62(5):327-332, May 1970.

Eppright, E. S., M. B. Patton, A. L. Marlott and M. L. Hathaway. Dietary study methods. V. Some problems in collecting dietary information about groups of children. J. Am. Diet. Assoc. 28:43-48, Jan. 1952.

_____. *Evaluation of a Camping Experience for Low-Income Mothers and Children in Kent County, Michigan. A Preliminary Report.* Expanded Nutrition Program, Michigan Cooperative Extension Service. Unpublished Paper written at Michigan State University, East' Lansing, Michigan, Sept. 1969.

Evans, F. C. Ecosystem as the basic unit in ecology. Science 123:1127-1128, June 30, 1956.

Filer, L. J. The USA today--Is it free of public health nutriton problems? Anemia. Am. J. Public Health 59(2):327-338, Feb. 1969.

Fomon, S. J. *Prevention of Iron-Deficiency Anemia in Infants and Children of Preschool Age.* U. S. Department of Health, Education, and Welfare. Public Health Service Publication No. 2085. Washington, D.C.: Government Printing Office, 1970.

Food and Nutrition Board, National Academy of Sciences, National Research Council. *Recommended Dietary Allowances.* 7th ed., rev. Washington, D. C.: National Academy of Sciences Publication No. 1694, 1968.

Fox, H. M., B. A. Fryer, G. H. Lamkin, V. M. Vivian and E. S. Eppright. The North Central Regional Study of diets of preschool children. I. Family environment. J. Home Economics 62(4):241-245, April 1970.

Fried, R. and M. F. Mayer. Socioeconomic factors accounting for growth failure in children living in an institution. J. Pediatr. 33:444-456, 1948.

Garn, S. M. Anthropometry in clinical appraisal of nutritional status. Am. J. Clin. Nutr. 11(11): 418-432, Nov. 1962.

Goldsmith, G. A. and W. G. Unglaub. Progress Report, Office of Economic Opportunity, Period July 1, 1968 to Sept. 30, 1968. Appendix III, Unpublished.

Greulich, W. W. Growth of children of the same race under different environmental conditions. Science 127:515-516, 1958.

Gross, I. and E. W. Crandall. *Management for Modern Families.* 2nd ed. New York: Appleton-Century-Crofts, 1963.

Gyorgy, P. Introduction. Malnutrition is a problem of ecology. Bibl. Nutr. Diet. No. 14, pp. 1-6, 1970.

Gyorgy, P. and O. L. Kline, ed.s *Malnutrition Is A Problem of Ecology*. Bibl. Nutr. Diet. No. 14. New York: S. Karger, 1970.

Haiman, P. Personal communication. February 1970.

Hanlon, J. J. An ecologic view of public health. Am. J. Public Health 59:4-11, Jan. 1969.

Hardy, M. C., A. Spohn, G. Austin. S. McGiffert, E. Mohr and A. B. Peterson. Nutritional and dietary inadequacies among city children from different socioeconomic groups. J. Am. Diet. Assoc. 19:173-181, March 1943.

Harman, H. H. *Modern Factor Analysis*. 2nd ed., rev. Chicago: University of Chicago Press, 1967.

Haughton, J. G. Nutritional anemia of infancy and childhood. Am. J. Public Health 53:1121-1126, July, 1963.

Havelock, R. G. *Planning for Innovation Through Dissemination and Utilization of Knowledge*. Center for Research on Utilization of Scientific Knowledge. Ann Arbor: Institute for Social Research, The University of Michigan, 1971.

Havighurst, R. J. and B. L. Neugarten. *Society and Education*. Boston: Allyn and Bacon, Inc., 1942.

Hendel, G. M., M. G. Burk and L. A. Lund. Socioeconomic factors influence children's diets. J. Home Economics 57(3):205-208, 1965.

Hernandez, O., L. Murray and B. Doumas. Automated determination of serum albumin with bromcresol green. Clin. Chem. 13(8):701, 1967.

Hill, R. L. and D. A. Hansen. The identification of conceptual frameworks utilized in family study. Mar. and Fam. Liv. 22:299-311, 1960.

Hillman, R. W. and H. S. Smith. Hemoglobin patterns in low income families. Public Health Rep. 83:61-67, 1968.

Hook, N. C. and B. Paolucci. The family as an ecosystem. J. Home Economics 62(5):315-318, May 1970.

Hootman, R. H., M. B. Haschke, C. Roderuck and E. S. Eppright. Diet practices and physical development of Iowa children from low income families. J. Home Economics 59(1):41-44, Jan. 1967.

Huenemann, R. L. and D. Turner. Methods of dietary investigation. J. Am. Diet. Assoc. 18:562-568, Sept. 1942.

Hundley, J. M., O. Mickelsen, N. Mantel, R. N. Weaver and R. C. Taber. Height and weight of first-grade children as a potential index of nutritional status. Am. J. Public Health 45(1):1454-1461, Nov. 1955.

Hunter, J. E. and R. J. Chesser. MODERATOR: A family of computer programs designed to show simultaneously the moderating effects and nonlinear relationships among a set of variables. Unpublished paper written at Michigan State University, East Lansing, 1971.

Hunter, J. E. and S. H. Cohen. PACKAGE: A system of computer routines for the analysis of correlational data. Educ. Psychol. Meas. 29:697-700, 1969.

Interdepartmental Committee on Nutrition for National Defense. *Manual for Nutrition Surveys*. 2nd ed. Washington, D. C.: U. S. Government Printing Office, 1963.

Jackson, R. L. Effect of malnutrition on growth of the preschool child, pp. 9-21. *In: Preschool Child Malnutrition--Primary Deterrent to Human Progress*. Washington, D. C.: National Academy of Sciences-National Research Council, Publ. No. 1282, 1966.

Jacobs, I. Iron deficiency anemia in infancy and childhood. Gen. Prac. 21:93-97, 1960.

Jaffee, L. D. *An investigation of some factors related to delinquency proneness*. Unpublished Master's Thesis, The Ohio State University, 1959.

Jaffee, L. D. and N. A. Polansky. Verbal inaccessibility in young adolescents showing delinquent trends. J. Health Hum. Behav. 3:105-111, Summer 1962.

Jelliffe, D. B. *The Assessment of the Nutritional Status of the Community*. Geneva: World Health Organization, 1966.

Jessor, R. and S. Richardson. Psychosocial deprivation and personality development, pp. 1-87. *In: Perspectives on Human Deprivation: Biological, Psychological and Sociological.* National Institute of Child Health and Human Development, National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare, 1968.

Kallen, D. J. Nutrition and society. J.A.M.A. 215:94-100, Jan. 4, 1971.

Kartman, L. Human ecology and public health. Am. J. Public Health 57:737-750, May 1967.

Katz, D. and R. L. Kahn. *The Social Psychology of Organizations.* New York: John Wiley and Sons, Inc., 1966.

Kelsay, J. L. A compendium of nutritional status studies and dietary evaluation studies conducted in the United States, 1957-1967. J. Nutr. 99(Suppl. 1, part 2):123-166, Sept. 1969.

Kerlinger, F. N. *Foundations of Behavioral Research.* New York: Holt, Rinehart, and Winston, Inc., 1964.

Kerrey, E., S. Crispin, H. M. Fox and C. Kies. Nutritional status of preschool children. I. Dietary and biochemical findings. Am. J. Clin. Nutr. 21(11): 1274-1279, Nov. 1968.

Kish, L. *Survey Sampling.* New York: John Wiley and Sons, Inc., 1965.

Klipstein, F. A. Nutritional anemia among America's poor. Ann. Intern. Med. 68:1125-1127, May 1968.

Kluckholn, C. Values and value orientations in the theory of action, pp. 394-425. *In:* T. Parsons and E. Shils, eds. *Toward a Theory of Action.* Cambridge, Mass.: Harvard University Press, 1969.

Kohlmann, E. L. and F. Smith. Assessing values related to home and family life. J. Home Economics 62(9): 656-660, Nov. 1970.

Kravitz, H. Results of "Operation Head Start" in Chicago. III. Med. J. 129:590-591, 1966.

Krehl, W. A. and R. E. Hodges. The interpretation of nutrition survey data. Am. J. Clin. Nutr. 17: 191-199, 1965.

Leverton, R. M. Rose's foundations for nutritional evaluation. J. Am. Diet. Assoc. 37:553-557, 1960.

Lewin, K. Forces behind food habits and methods of change, pp. 35-65. *In: The Problem of Changing Food Habits*. Washington, D. C.: National Academy of Sciences--National Research Counsil, Bull. No. 108, 1943.

Lowe, C. U. National nutritional survey of preschool children. Pediatrics 39(4):485-487, April 1967.

Lowenberg, M. E., E. N. Todhunter, E. D. Wilson, M. C. Feeney and J. R. Savage. *Food and Man*. New York: John Wiley and Sons, Inc., 1968.

Lund, L. A. Study of children's food consumption behavior. Paper presented at the meeting of the American Home Economics Association, June 27, 1967.

Lund, L. A. and M. C. Burk. *A Multidisciplinary Analysis of Children's Food Consumption Behavior*. Ag. Ext. Station Tech. Bull. No. 265, University of Minnesota, 1969.

Malina, R. M. Growth and physical performance of American Negro and white children. Clin. Pediat. 8(8):476-483, Aug. 1969.

Malina, R. M. Skinfolds in American Negro and white children. J. Am. Diet. Assoc. 59(1):34-40, July 1971.

McCammon, R. W., ed. *Human Growth and Development*. Springfield, Ill.: C. C. Thomas, Publ., 1970.

McCance, R. A. Food, growth and time. Lancet 2:7257-7258, 1962.

McClelland, C. Q. Height and weight of Head Start and suburban children in Cleveland, Summer 1965. *In:* Selection Committee on Nutrition and Human Needs, U. S. Senate. *Nutrition and Human Needs*, Part II: USDA, HEW, and OEO Officials, Jan. 8, 9, 10, 1969, p. 590.

McGanity, W. J. Nutrition survey in Texas. Tex. Med. 65:40-49, March 1969.

McHale, J. Global ecology: Toward the planetary society. Am. Behav. Sci. 11(6):29-33, July-August 1968.

McKay, H. E. Human ecology research station. Unpublished report of activities, June 1968 to June 1969. Cali, Colombia, and the Council for Intersocietal Studies, Northwestern University, Evanston, Illinois, 1969.

Metheny, N. Y., F. E. Hunt, M. B. Patton and H. Heye. The diets of preschool children. I. Nutritional sufficiency findings and family marketing practices. J. Home Economics 54(4):297-302, April 1962.

Metheny, N. Y., F. E. Hunt, M. B. Patton and H. Heye. The diets of preschool children. II. Factors in food acceptance. J. Home Economics 54(4):303-308, April 1962.

Mickelsen, O., L. S. Sims, R. P. Boger and E. Earhart. The prevalence of anemia in Head Start children. Mich. Med. 69(13):569-575, July 1970.

Miller, J. G. The nature of living systems. Behav. Sci. 16:277-301, July 1971a.

Miller, J. G. Living systems: the group. Behav. Sci. 16:302-398, July 1971b.

Mitchell, H. S. Nutrition in relation to stature. J. Am. Diet. Assoc. 40:521-524, June 1962.

Mohanram, M., A. Anasuya, B. S. N. Rao and S. G. Srikantia. Urinary hydroxyproline and protein nutrition. Lancet 1:102-103, Jan. 11, 1969.

Morgan, A. F., ed. *Nutritional Status, U.S.A.* Calif. Ag. Ext. Bull. No. 769, 1969.

Morse, E. H., M. M. Clayton and L. DeG. Cosgrove. Mothers' nutrition knowledge. J. Home Economics 59(8):667-668, Oct. 1967.

Nelson, W. E., ed. *Textbook of Pediatrics.* 8th ed. Philadelphia: W. B. Saunders Co., 1964.

Nunnally, J. C. Psychometric Theory. New York: McGraw-Hill Book Co., 1967.

Nye, F. I. and F. M. Berardo. *Emerging Conceptual Frameworks in Family Analysis.* New York: The Macmillan Company, 1966.

O'Brien, D., F. A. Ibbott and D. O. Rodgerson. *Laboratory Manual of Pediatric Micro-Biochemical Techniques.* 4th ed. New York: Harper and Row, Publ. 1968.

Osgood, C., G. Suci and P. Tannenbaum. *The Measurement of Meaning.* Urbana, Ill.: The University of Illinois Press, 1957.

Owen, G. M., P. J. Garry, K. M. Kram, C. E. Nelson and J. M. Montalvo. Nutritional status of Mississippi preschool children: A pilot study. Am. J. Clin. Nutr. 22:1444-1458, Nov. 1969.

Owen, G. M. and K. M. Kram. Nutritional status of preschool children in Mississippi: Food sources of nutrient in the diets. J. Am. Diet. Assoc. 54(6):490-494, June 1969.

Owen, G. M., C. E. Nelsen and P. J. Garry. Nutritional status of preschool children: Hemoglobin, hematocrit, and plasma iron values. J. Pediatr. 76(5): 761-763, May 1970.

Paolucci, B. Contributions of a framework of home management to the teachings of family relationships. J. Mar. and Family 28:338-342, Aug. 1966.

Patton, R. G. and L. I. Gardner. Influences of family environment on growth: The syndrome of maternal deprivation. Pediatrics 30:957-962, 1962.

Pearson, H. A., I. Abrams, D. J. Fernbach, S. P. Gyland and D. A. Hahn. Anemia in preschool children in the United States of America. Pediatr. Res. 1:169-172, 1967.

Pearson, W. M. Assessment of nutritional status: Biochemical methods, pp. 265-315. *In*: G. H. Beaton and E. W. McHenry, eds. *Nutrition: A Comprehensive Treatise.* Vol. III. New York: Academic Press, 1966.

Pearson, W. M. Evaluation of nutritional status in population groups, pp. 562-583. *In:* M. G. Wohl and R. S. Goodhart, eds. *Modern Nutrition in Health and Disease.* 4th ed. Philadelphia: Lea and Febiger, 1966.

Pike, R. L. and M. L. Brown. *Nutrition: An Integrated Approach.* New York: John Wiley and Sons, Inc., 1967.

Plough, I. C. and E. B. Bridgforth. Relations of clinical and dietary findings in nutrition surveys. Pub. Health Rep. 75(8):699-706, Aug. 1960.

Polansky, N. A. Powerlessness among rural Appalachian youth. Rural Soc. 34(2):219-222, June 1969.

Prockop, D. J. and S. Udenfriend. A specific nethod for the analysis of hydroxyproline in tissues and urine. Anal. Biochem. 1:228-239, 1960.

Rafalski, H. and M. Mackiewicz. An epidemiological study of physical growth of children in rural districts of Poland, pp. 72-81. *In:* N. S. Schrimshaw and J. E. Gordon, eds. *Malnutrition, Learning and Behavior.* Cambridge: The M. I. T. Press, 1968.

Rao, K. V. and D. Singh. An evaluation of the relationship between nutritional status and anthropometric measurements. Am. J. Clin. Nutr. 23(1):83-93, Jan. 1970.

Read, M. S. Nutrition and ecology: crossroads for research. *Malnutrition Is A Problem of Ecology.* Bibl. Nutr. Diet. No. 14, pp. 202-218, 1970.

The Reader's Digest Great Encyclopedic Dictionary. Pleasantville, N. Y.: The Reader's Digest Association, 1968.

Ricci, E. M. Environmental factors in nutrition and behavior. Paper presented at the 53rd Annual Meeting of the American Dietetic Association, Cleveland, Ohio, Oct. 8, 1970.

Rice, R. R. The effects of Project Head Start and differential housing environments upon child development. The Family Coordinator 18(1):32-38, Jan. 1969.

Robertson, E. C. The nutrition of children and adolescents. *In:* G. H. Beaton and E. W. McHenry, eds. *Nutrition: A Comprehensive Treatise,* Vol. III. New York: Academic Press, 1966.

Rodkey, F. L. Direct spectrophotometric determination of albumin in human serum. Clin. Chem. 11(4):478-487, 1965.

Rotter, J. and M. Seeman. Powerlessness Scale. Columbus, Ohio: Ohio State University, Department of Sociology (mimeographed), 1959.

Sanjur, D. and A. D. Scoma. Food habits of low-income children in northern New York. J. Nutr. Educ. 2(3):85-95, Winter 1971.

Sargent, D. W. *An Evaluation of Basal Metabolic Data for Children and Youth in the United States.* U. S. Department of Agriculture, Home Economics Research Report No. 14, Washington, D. C.: U. S. Government Printing Office, 1961.

Schaefer, A. E. and O. C. Johnson. Are we well fed? The search for the answer. Nutrition Today 4(1):2-11, Spring 1969.

Schaefer, E. S. and R. Q. Bell. Development of a parental attitude research instrument. Child Dev. 29(3):339-361, Sept. 1958.

Schendel, H. E., J. D. L. Hansen and J. F. Brock. A comparative study of biochemical indices used in evaluating dietary protein in young children. S. Africa Med. J. 34:791, Sept. 10, 1960.

Seeman, M. On the meaning of alienation. Amer. Soc. Review 24:783-791, Dec. 1959.

Select Committee on Nutrition and Human Needs, U. S. Senate. *Nutrition and Human Needs*, Part II: USDA, HEW and OEO Officials, Jan. 8, 9, 10, 1969.

Skidmore, K. Study of Head Start preschool children's food habits. Baltimore, Maryland: Unpublished report, 1965.

Smith, D. S. and M. L. Brown. Anthropometry in preschool children in Hawaii. Am. J. Clin. Nutr. 23(7):932-939, July 1970.

Srole, L. Social integration and certain corollaries: An exploratory study. Amer. Soc. Review 21:709-716, Dec. 1956.

Stine, O. C., J. B. Saratsiotis and O. F. Furno. Appraising the health of culturally deprived children. Am. J. Clin. Nutr. 20(10):1084-1095, Oct. 1967.

Stoch, M. D. and P. M. Smyth. Does undernutrition during infancy inhibit brain growth and subsequent intellectual development? Arch. Dis. Child. 38:546-552, 1963.

Stott, L. S. H. *Child Development. An Individual Longitudinal Approach.* New York: Holt, Rinehart and Winston, Inc., 1967.

Tryon, R. C. and D. E. Bailey. *Cluster Analysis.* New York: McGraw-Hill Book Co., 1970.

Unglaub, W. G. Results of National Nutrition Survey in Louisiana. Select Committee on Nutrition and Human Needs, U. S. Senate. *Nutrition and Human Needs.* Part III: The National Nutrition Survey, Jan. 22, 23, 27, and 28, 1969, pp. 923-958.

U. S. Bureau of the Census. *U. S. Census of Housing, 1960, States and Small Areas,* pp. 240-258. Vol. I, Part I. U. S. Government Printing Office, 1963.

U. S. Bureau of the Census. *U. S. Census of Population: 1960.* Subject Reports-Socioeconomic Status. Final Report PC(2)-5C. Appendix I. Washington, D. C.: U. S. Government Printing Office, 1967.

U. S. Department of Agriculture. *Nutritive Value of Foods.* Home and Garden Bulletin No. 72. Washington, D. C.: U. S. Government Printing Office, September 1964.

U. S. Department of Health, Education and Welfare. *Suggested Guidelines for Evaluation of the Nutritional Status of Preschool Children.* Welfare Administration, Children's Bureau. Washington, D. C.: U. S. Government Printing Office, 1966, rev. 1967.

Verghese, K. P., R. B. Scott, G. Teixeira and A. D. Ferguson. Studies in growth and development. XII. Physical growth of North American Negro children. Pediatrics 44(2):243-247, Aug. 1969.

Vernon, P. E. and G. W. Allport. A test for personal values. J. Abnormal Soc. Psychol. 26:231-248, 1931.

Wakefield, L. M. *Selected nutritional, clinical and sociological measurements of preadolescent children of independent low-income families.* Unpublished Ph.D. dissertation. The Ohio State University, 1965.

Wakefield, L. M. and S. B. Merrow. Interrelationships between selected nutritional, clinical and sociological measurements of preadolescent children from independent low-income families. Am. J. Clin. Nutr. 20(4):291-296, 1967.

Warner, W. L., M. Meeker and K. Eells. *Social Class in America.* A Manual of Procedures for the Measurement of Social Status. Gloucester, Mass.: Peter Smith, 1949.

Watt, B. K. and A. L. Merrill. *Composition of Foods-raw, processed and prepared.* U. S. Department of Agriculture, Agricultural Research Service, Agricultural Handbook No. 8. Washington, D. C.: Govermnent Prniting Office, 1963.

Washington Heights Mental Health Survey, Milbank Memorial Fund Quarterly, Jan. 1969, p. 291.

Watson, E. H. and G. H. Lowrey. *Growth and Development of Children.* 5th ed. Chicago: Year Book Medical Publishers, Inc., 1967.

Whitehead, R. G. Hydroxyproline creatinine ratio as an index of nutritional status and rate of growth. Lancet 2:567-570, Sept. 18, 1965.

Whitten, C. F., M. G. Pettit and J. Fischhoff. Evidence that growth failure from maternal deprivation is secondary to undereating. J.A.M.A. 209:1675-1682, Sept. 15, 1969.

Widdowson, E. M. Mental contentment and physical growth. Lancet 1:1316-1318, 1951.

Wright, B. and S. Tuska. *From Dream to Life in the Psychology of Becoming a Teacher.* University of Chicago Cooperative Research Project No. 1503, 1966.

Yater, A., K. Olivier and A. Barclay. Factor analytic study of PARI responses of mothers of Head Start children. Psychol. Rep. 22:383-388, 1968.

Young, C. M., F. W. Chalmers, H. N. Church, M. M. Clayton, R. E. Tucker, A. W. Wertz and W. D. Foster. A comparison of dietary study methods. I. Dietary history vs seven-day-record. J. Am. Diet. Assoc. 28:124-128, Feb. 1952.

Zee, P., T. Walters and C. Mitchell. Nutrition and poverty in preschool children. J.A.M.A. 213(5): 739-742, Aug. 3, 1970.

Zuckerman, M., B. B. Ribback, I. Monashkin and J. A. Norton. Normative data and factor analysis on the Parental Attitude Research Instrument. J. Consult. Psychol. 22:165-172, 1958.

APPENDICES

APPENDIX A

Correspondence

1. Letter to mothers, December 1969.
2. Letter to mothers, February 1970.
3. Letter to mothers, May 1970.
4. Permission request for blood tests.
5. Letter to teachers scheduling measurements.
6. Letter of thanks and appreciation.

APPENDIX A-1

Letter to mothers, December 1969

Michigan State University
Department of Foods and Nutrition

December, 1969

Dear

As part of an ongoing project to study the growth and eating habits of preschool children, we request your help in completing the attached form.

We would like you to record everything that your child eats from the time he gets up in the morning until he goes to bed at night--for a day when he is not attending Nursery School. Since accuracy of information is important to the success of the project, please be as descriptive and as accurate about the quantities and types of food eaten as possible.

Your cooperation is most appreciated. Thank you!

Very truly yours,

Mrs. Laurie Sims
Graduate Assistant

Portia Morris
Associate Professor
Foods and Nutrition

LS:PM/gjn

Enclosure

APPENDIX A-2

Letter to mothers, February 1970

MICHIGAN STATE UNIVERSITY
Department of Foods and Nutrition

February, 1970

Dear

As you recall, last term you cooperated on a study of the growth and eating habits of preschool children by completing a one-day's food intake record for your child. This information has been most helpful.

We are now requesting your further cooperation to complete our study. In order to learn not only what children eat, but why they eat it, we feel it is important to also learn about the children's families. This study should answer several fundamentally important questions, & you alone, as a parent of a preschool child can supply the information we need.

Enclosed are a set of questionnaires designed to let us know about how you feel about certain important topics. There are no right or wrong answers. All participants will be assigned a code number and responses will be analyzed by a computer, so you may be sure that all answers will be kept strictly confidential.

These forms will be collected at the time you have agreed upon for the interview on _____ at _____.

Your cooperation is most appreciated. Thank you!

Sincerely,

_____
Student Interviewer

Mrs. Laurie Sims
Graduate Assistant

Mrs. Portia M. Morris
Associate Professor
Foods & Nutrition

Enclosures

APPENDIX A-3

Letter to mothers, May 1970

MICHIGAN STATE UNIVERSITY
Department of Foods and Nutrition

May, 1970

Dear

As you recall, you have cooperated with us this year on a study of the physical growth and eating habits of young children by completing a one day's food intake record for your child. This information has been most helpful, and we are again requesting your help one more time.

Please complete the attached food record form again. (Only by averaging several day's meals can we determine a representative intake for your child.)

We would like you to record everything that your child eats from the time he gets up in the morning until he goes to bed at night--for a day when he is not attending Nursery School. Since accuracy of information is important to the success of the project, please be descriptive and accurate about the quantities and types of food eaten (e.g., whether fresh, frozen or canned) and how the food was cooked (fried, boiled, broiled). Brand names are always helpful!

Please return the completed forms in the attached envelope by June 1, 1970. Your continuing cooperation is most appreciated. Thank you!

Very truly yours,

Mrs. Laurie Sims
Graduate Assistant

Portia Morris
Associate Professor
Foods and Nutrition

LS:PM/gjn

Enclosure

APPENDIX A-4

Permission Request for Blood Tests

MICHIGAN STATE UNIVERSITY East Lansing, Michigan 48823

Family and Child Study Unit College of Home Economics

April 16, 1970

Dear

In conjunction with the ongoing study of the physical growth and eating habits of preschool children, it is important for us to assess your child's growth by several methods. These include food intake records, height and weight measurements, and a simple blood test.

We are asking that you complete and return the enclosed permission form allowing us to obtain one drop of blood by pricking the finger of your child. This procedure is painless and will be carried out by a registered medical technologist from the Olin Health Center on campus. This work will be done the latter part of May, and you are invited to be present if you so desire. You will later be informed of the exact date and time.

If any medical problems are detected, you will be informed and referral will be then made to your family physician.

Please return the signed form to us by May 1, 1970. Your cooperation is greatly appreciated. Thank you.

Sincerely,

Robert P. Boger, Chairman
Preschool Research Committee

APPENDIX A-5

Letter to Teachers Scheduling Measurements

MICHIGAN STATE UNIVERSITY East Lansing, Michigan 48823
College of Home Economics
Department of Foods and Nutrition Home Economics Building

April 27, 1970

To:

From: Laurie Sims

During the weeks of May 4-8 and May 11-15, I plan to take the third, and final, set of physical measures on the nursery school children.

In addition to the usual height and weight measurements, this set will also include skinfold thickness measures as well as several diameters and circumferences of the body.

The finger prick blood sample will (hopefully!) be taken the last two weeks of May (May 18-22, and May 25-29). I shall inform you later of the specific time.

I shall contact you later this week to arrange a time for these measurements when it will be most convenient for your class. Thank you for your cooperation.

APPENDIX A-6

Letter of Thanks and Appreciation

June 9, 1970

Dear

Now that the data for your study are nearly complete, the time has come to thank each of you for your help and cooperation this past year.

As you may know, there are many misconceptions about the eating habits of preschool children and the factors influencing food intake. We hope that by this comprehensive study we will be able to make a meaningful contribution to knowledge in this area.

This study was possible only with the cooperation of a great many people--parents, teachers, children and others. We extend to each of you our heartfelt thanks. We will be happy to share with you our findings following completion of the data analysis next year.

Sincerely,

(Mrs.) Laurie Sims
Graduate Student

Dr. Portia M. Morris
Associate Professor

APPENDIX B

Guidelines for Interviewers

APPENDIX B

Guidelines for Interviewers

1. Set up appointment with mother of child. Explain that you are an MSU student who is involved with the study dealing with the physical growth and eating habits of preschool children. Suggest that in order to learn not only what children eat, but why they eat it, it's important to learn something about their families. Since she is a parent, only she can supply the information and insights about children which we need to know.

   Set up an appropriate time when you can talk with her. Explain that you will be sending ahead a few short forms which you would like her to complete before you get there.

2. Conduct the interview. Record the information concisely and accurately. Try to make the respondent feel as much at ease as possible.

   Pick up the completed questionnaire forms which you had previously mailed. Check to see that all items have been correctly filled out. There should be six separate forms:
   1) Parent Attitudes
   2) "Now, we would like you..."
   3) "Some statements concerning nutrition..."
   4) Homemaker Values
   5) Parent Opinions Scale
   6) "Read each of the statements..."

   Leave the "Food Record" form to be filled out. Remind the mother that she is to record a one-day's food intake for a day when her child is not attending nursery school, and that she should return the form within one week. (A stamped self-addressed envelope is attached to the form for her convenience in returning it.) Emphasize that accuracy is extremely important and that she should record only what the child actually eats and not what she thinks he should be eating.

   Thank her for her time and generosity in supplying the information we need.

3. Return all completed forms to me.

Appendix B (cont'd)

4. You may call me anytime if questions or problems arise:

   Home: 351-3895
   Nutrition "Grad Room" (108 Home Ec.):353-2937

5. Your rate of pay is $1.90 per hour (maximum allowed for student employment) plus mileage. Record all mileage accrued.

Thanks--and good luck!

Laurie Sims

APPENDIX C

Instruments

1. Food Record Recording Form

2. Home Interview Schedule

3. Attitude-Measuring Questionnaires

   a. Parent Attitudes
   b. Homemaker Values
   c. Parent Opinions Scale
   d. Powerlessness
   e. Nutrition Knowledge and Attitudes Test
   f. Semantic Differential Instrument

APPENDIX C-1

Food Record Recording Form

RECORD OF FOOD EATEN IN ONE DAY

Name_____ N.S. Code_____

Date Recorded:_____ Code No._____

SUGGESTIONS FOR RECORDING INFORMATION:

Milk, fruit juice and other liquids:
Record in terms of measuring cup or ounces. (1 measuring cup equals 8 ounces.)

Butter: Record as level teaspoons. (1 average pat equals 1 level teaspoon.)

Sugar: Record as level teaspons.

Egg: Note whether egg, or yolk or white only.

Cereals and vegetables:

Record in terms of measuring cup or tablespoons. (1/2 measuring cup equals 4 heaping tablespoons equals 8 level tablespoons.)

Fruit or vegetable:
If whole, give size (as small, medium, or large.) If sliced or canned, express in terms of measuring cup or tablespoons, as above. Note whether fresh, frozen, or canned.

Meat:
Record as ounces or level tablespoons, if possible. (1 ounce equals 2 level tablespoons.) Note how cooked, e.g., fried, boiled, broiled.

Other foods:
Record as accurately as possible in terms of ordinary household measures. Note flavor of a baked product and whether it was iced. Brand names are always helpful.

Appendix C-1 (cont'd.)

COMPLETE RECORD OF THE DAY'S FOOD

BREAKFAST: Time _____a.m.

Did child eat alone? _____
If not, with whom? _____

Fruit or juice, (circle one): Kind_____ Amt._____

Cereal: Kind_____ Amt._____

Milk on cereal: Amt._____oz. Sugar_____tsp.

Bread: Kind_____ No. slices_____

Butter or Margarine, (circle one used): _____tsp.

Other spread: Kind_____ Amt._____

Egg: How cooked?_____ Amt._____

Bacon or other meat: Kind_____ Amt._____

Milk: Kind_____ Amt._____oz.

Other beverage: Kind_____ Amt._____oz.

Other foods: (Specify)

Kind:_____ Amt._____
_____ Amt._____
_____ Amt._____
_____ Amt._____

BETWEEN BREAKFAST AND NOON MEAL:

Food (Kind)	Amount	Time	Where	With whom?

Appendix C-1 (cont'd.)

NOON MEAL: Time_____

Did child eat alone?_____
If not, with whom?_____

Soup: Kind_____ Amt._____

Meat or Main Dish: Kind_____ Amt._____

Potato: How cooked?_____ No. and size_____

Vegetables: Kind_____ Amt._____

Sandwich: Filling: Kind_____ Amt._____
Bread: Kind_____ Amt._____

Butter/Margarine, (circle) on bread, etc. _____tsp.

Salad dressing: Kind_____ Amt._____

Milk: Kind_____ Amt._____oz.

Other beverage: Kind_____ Amt._____oz.

Dessert: Kind_____ Amt._____

Other Foods: (Specify)

Kind:_____ Amt._____
_____ Amt._____
_____ Amt._____
_____ Amt._____

BETWEEN NOON AND EVENING MEALS:

Food (Kind)	Amount	Time	Where	With whom?

Appendix C-1 (cont'd.)

EVENING MEAL Time_____

Did child eat alone?_____
If not, with whom?_____

Meat or Main Dish: Kind_____ Amt._____

Potato: How cooked?_____ No. and size_____

Vegetables: Kind_____Amt._____
Kind_____Amt._____
Kind_____Amt._____

Bread: Kind_____ No. slices_____

Butter or Margarine (circle one) on bread, etc._____tsp.

Gravy:_____Amt._____

Salad dressing: Kind_____Amt._____oz.

Milk or
Other beverage: Kind_____Amt._____oz.

Dessert: Kind_____Amt._____

Other Foods:

Kind:_____Amt._____
_____Amt._____

BETWEEN EVENING MEAL AND BEDTIME:

Food (kind)	Amount	Time	Where	With whom?

Is this day's intake usual?_____ More than usual?_____
Less than usual?_____
Vitamin supplements: Kind_____Amt._____
If any of the above meals were not eaten at home,
indicate which:_____where?_____

APPENDIX C-2

Home Interview Schedule

NUTRITION INTERVIEW

Child's name_____ Parent's name_____
Address:_____

Preschool: LPS = 1 SNS = 2
Other = 3

_____

Identification number_____

Sex 1 Male Phones: Home_____
2 Female Office_____

Birthdate Interviewer:_____
(Month, day, year)_ _-_ _-__

Interview appointment information:

_____

_____

* * * * * *

INTRODUCTION:

We are conducting a study to learn more about the growth and eating habits of preschool children. In order to learn not only what children eat, but why they eat it, we need to know certain things about the children's families. This study should answer several important questions, and you alone, as a parent of a young child, can supply the information we need!

There are no "right" or "wrong" answers to the questions you will be asked. All participants will be assigned a code number and responses will be analyzed by a computer, so you may be sure that your answers will be kept confidential. Please answer the questions as frankly and accurately as possible.

Appendix C-2 (cont'd.)

FAMILY RECORD

How many persons live in your household?

_____

PLEASE DO NOT WRITE IN THIS SPACE — CODE:

Total number persons in household _____
Total number persons in family unit _____
Total number of adults in household _____
Number of adults other than parents in household _____
Total number children in family unit _____
Number children 5 years or younger in home _____
Ordinal position of participating child _____
Parent marital status _____
Family parental status _____

HOUSEHOLD CHARACTERISTICS

Family Members (names)	Relationship to Participating Child	Age (If child under 1 year give birthdate)	Sex	State of Health	Education (Highest no. years school completed)	Occupation	Number hours worked per week
Head:							
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							

Appendix C-2 (cont'd.)

Other persons living in household. Ask: "Are there any non-relatives living in your home?"

12. _____

13. _____

14. _____

(For each member of household age 6 or above, ask, "Is _____ in school now?" If NO, ask "Does _____ have a paid job?" If NO, ask "What is _____ doing now?")

Appendix C-2 (cont'd.)

10. "Are you now married? If No, ask, "Have you ever been married?

____ 1. Married and living with husband
____ 2, Married, but husband temporarily absent (e.g., in Army, jail, etc.)
____ 3. Separated
____ 4. Widowed
____ 5. Divorced
____ 6. Single, never married

11. "Do you now have a paid job?"

____ 1. No, not working and not looking for work (housewife)
____ 2. No, not working but looking for work
____ 3. No, retired or disabled
____ 4. No, full-time student
____ 5. Yes, employed part-time (less than 35 hours per week)
____ 6. Yes, employed full time (35 hours per week or more)

12. (If applicable only, ask) "What about your husband? Is he now employed?"

____ 1. No, not working and not looking for work
____ 2. No, not working but looking for work
____ 3. No, retired or disabled
____ 4. No, full-time student
____ 5. Yes, employed part-time (less than 35 hours per week)
____ 6. Yes, employed full time (35 hours per week or more)

Does your husband have steady work? _____

If response to question is Yes, ask, "What is your job?" or, "What kind of work do you do?"
Specify: _____
_____

13. "What is your husband's (his) job?"
Specify: _____

14. How far did you go in school? (Record as number school years completed.)
_____

15. (If applicable ask:) How far did your husband go in school?" _____
_____

---

16. How many hours each week is __X__ cared for by someone else?

No. hrs/week	Where
_____	Within own home
_____	Home of relatives
_____	Home of someone else
_____	Nursery school
_____	Other, specify: _____

Appendix C-2 (cont'd.)

17. About how much money in all does your family make (or get)? _____
(Record verbatim answer, including whether amount given is per week, month, or year._____
_____
_____

18. "Would you tell me where most of your money comes from?" (DO NOT PROBE). Specify:_____

19. "Some people believe that food habits are related to religious affiliation: what is yours?"

0. None
1. Protestant
2. Catholic
3. Jewish
4. Mixed
5. Other, specify:_____

20. "How long has your family lived at this address?" (Record answer verbatim)_____

21. "How many times have you moved within the last three years?"
____ (Actual number of moves)

22. "Do you own or rent your house?"

1. Own the house
2. Rent from private agency or person
3. Rent from public housing
4. MSU-student married housing

23. "How many rooms are there in this house?" (Exclude bathroom, utility rooms, halls and other areas unsuitable for sleeping or general living purposes. Include porch if used for living at least 9 months of the year.)
_____ Number of rooms.

24. "Do other persons regularly sleep in the same room as _X_?"
____
0. No
1. Yes How many?_____

Appendix C-2 (cont'd.)

"I would like to find out about the following items you have in your home and their condition." (If more than one of a particular appliance is present, place an appropriate check for the one in the best condition.)

Do you have a _____"	Not present (1)	Yes, but not in op. condition (2)	Yes, working, but not satis. (3)	Yes works well (4)
26. Telephone, Number in home				
27. Radio, Number in home				
28. Television, Number in home				
29. Automobile or truck, Number in home				
30. Refrigerator				
31. Freezer (as separate unit, not part of refrigerator				
32. Range (with oven)				
33. Hotplate (or range with no oven)				

HEATH RECORD. "We would like some information about your child's health record and medical history."

34. Birth Weight _____ 35. Was __X__ 1. Premature? 2. Full term?

36. Did you receive prenatal care during your pregnancy with __X__?

37. Ask: "How old were you when you were first pregnant?____

38. "How old were you when you were pregnant with __X__? _____

	Mother	Father
39. Present height	_____	_____
40. Present weight	_____	_____

41. Which method was used in feeding __X__ as an infant?

1. Breast-fed
2. Bottle-fed
3. Both breast and bottle
4. Did not receive any milk

Approximately how long was __X__ fed by the above method(s)?

42. Bottle _____months
43. Breast _____months

Appendix C-2 (cont'd.)

44. Does _X_ ever drink from a bottle now? 1. No 2. Yes
45. Does _X_ use a pacifier now? 1. No 2. Yes

46. Is _X_ allergic to any foods?
    1. No
    2. Yes
    If so, which foods is _X_ allergic to now?

    1. Milk
    2. Eggs
    3. Meat
    4. Fruit, specify which:_____
    5. Combination of foods:_____
    6. Other, specify:_____

47. Is _X_ on a special diet now?
    1. No
    2. Yes
    Why is he on this diet?
    1. Weight reduction (own prescription)
    2. Weight reduction (physician's prescription)
    3. For gaining weight
    4. Other specify:_____

48. Has _X_ ever been anemic?
    1. No
    2. Yes
    At what age was anemia present?
    1. Before 6 months
    2. 6 months to 1 year
    3. 1 to 2 years
    4. 3 to 4 years (recently)

49. Was medication prescribed for the anemia?
    0. Not applicable ("No" above)
    1. No
    2. Yes
    3. Don't remember

50. Have you ever consulted a physician about feeding problems with _X_ ?
    1. No
    2. Yes
    At what age?
    1. 1-6 months old
    2. 6 months to 1 year old
    3. 1 to 2 years old
    4. 3 to 4 years old (recently)
    5. Combination of above

Appendix C-2 (cont'd.)

51. Do you give _X_ a vitamin/mineral supplement?
    1. No
    2. Yes

    Name:_____
    1. Multivitamin
    2. Vitamin-mineral
    3. Multivitamin plus iron
    4. Single vitamin (e.g. Vitamin C)
    5. Group of vitamins (e.g. B complex, ADEC, etc.)
    6. Iron
    7. Other, specify:_____

52. How often is this given:
    0. Not applicable ("No" above)
    1. Daily
    3-6 times a week
    3. Once a week
    4. Only occasionally

53. Do you give _X_ any other kind of supplement or health food (e.g. wheat germ, cod liver oil, etc.)?
    1. No
    2. Yes

    Kind:_____
    Reason:_____

54. If you do give any supplements, on whose recommendation?
    0. Not applicable (none given)
    1. Physician
    2. Friend or relative
    3. On your own

55. Do any members of your immediate family have any disease or condition (e.g. diabetes, kidney disease) which requires a special diet?
    1. No
    2. Yes

    Who?_____ Condition_____

56. How much sleep (including naps) does _X_ get (on the average) each day?
    1. Less than 8 hours
    2. 8-9 hours
    3. 10-12 hours
    4. 13-15 hours
    5. More than 15 hours

57. When was the last time that _X_ was examined by a physician?
    1. Less than 1 mo. age
    2. 1-6 months ago
    3. 7-12 months ago
    4. More than 1 year ago
    5. Never

Appendix C-2 (cont'd.)

58. What was the reason for X last seeing a physician?
    1. Don't know
    2. Routine checkup
    3. Immunizations
    4. Illness
    5. Injury

59. Has X ever been examined by a dentist?
    1. No
    2. Yes

    When was the last time?
    1. Less than 1 month ago
    2. 1-6 months ago
    3. 7-12 months ago
    4. More than 12 months ago
    5. Never

60. What was the reason for his seeing the dentist?
    1. Don't know
    2. Routine checkup
    3. Tooth filled
    4. Tooth extraction
    5. Injury

61. Does X have any filled teeth?
    1. No 2. Yes

HOUSEHOLD MEAL PROACTICES

"Some people believe that food habits are related to mealtime practices. The following questions have to do with the mealtime practices of your family." How often does your total family eat meals together during the major part of the week?

Meal	Never (1)	Less than 1/2 the time (2)	1/2 the time or more (3)	Almost always (4)
62. Breakfast				
63. Noon meal				
64. Evening meal				
65. Other, (including snacks)				

66. Do children eat at the same time as the adults in your family?
    1. Yes, almost always
    2. Usually
    3. Only occasionally (4-6 times a week)
    4. Rarely
    5. Never

Appendix C-2 (cont'd.)

67. Which of the following describes _X_'s attitude toward food or meals?
    1. Enjoys eating
    2. Attitude varies
    3. Indifferent to food
    4. Has to be urged to eat
    5. Presents an eating problem

68. How important do you think it is that a child eats everything he has been served on his plate?
    1. Not at all
    2. Slightly
    3. Moderately
    4. Considerably
    5. Extremely

69. What is your usual action when _X_ dawdles at his food or refuses food served to him?
    1. Insist that he finish his meal promptly.
    2. Insist that he complete a certain portion of each food.
    3. Threaten punishment, e.g. withholding of dessert, if food is not eaten.
    4. Promise reward, e.g. dessert for completion of food.
    5. Tell child there will be nothing to eat until the next meal, then remove food.
    6. Coax, but do not force eating.
    7. Say nothing at the time; talk to child later about it.
    8. Say nothing to child; do not like arguments at the table.
    9. Say nothing; do not think this is important.

SNACKS

70. Does _X_ eat in the morning before breakfast?
    How often? 1. Every day
    2. 2 to 3 times/week
    3. Less than once a week
    4. Never

71. Does _X_ eat between breakfast and lunch?
    How often? 1. Everyday
    2. 2 to 3 times/week
    3. Less than once a week
    4. Never

72. Does _X_ eat between lunch and dinner?
    How often? 1. Everyday
    2. 2 to 3 times a week
    3. Less than once a week
    4. Never

73. Does _X_ eat between dinner and bedtime?
    How often? 1. Everyday
    2. 2 to 3 times/week
    3. Less than once a week
    4. Never

Appendix C-2 (cont'd.)

74. Does X ever miss any meals?
    1. Yes
    2. No
    Which does he miss most often? 1. Breakfast
    2. Lunch
    3. Dinner

75. If so, why does X miss meals?
    0. Does not apply ("No" above)
    1. Lack of time
    2. Lack of appetite
    3. Too tired to eat
    4. Illness

76. At what time of day does X seem to be the most hungry?
    1. Morning 2. Afternoon 3. Evening

77. Would you describe X 's appetite in the past 3 months as:
    1. Excellent 2. Good 3. Fair 4. Poor

78. Does X feed himself?
    0. No
    1. Yes
    79. Does he use a spoon? 1. No 2. Yes
    80. Drink from a cup or glass? 1. No 2. Yes
    81. Use a fork? 1. No 2. Yes
    82. Use a knife? 1. No 2. Yes

83. What foods does X like particularly well? Itemize specific foods: _____

_____

_____

84. What is X 's favorite food? Specify: _____

85. What foods does X dislike? Itemize: _____

86. Does X refuse to eat any foods?
    0. No
    Yes
    What are they? Specify: _____

When planning meals for your family, are you influenced by the following?

	No (1)	Yes (2)
87. Cost of the food		
88. Time required for preparation		
89. Likes of the family		
90. Your own likes		
91. Health needs of family		
92. Nutritive value of food		

93. Which do you believe is the most important influence? (Circle number above)

Appendix C-2 (cont'd.)

94. How does your family generally accept new foods or new methods of preparation?
    1. Enthusiastically
    2. Willingly
    3. Cautiously
    4. Reluctantly
    5. Not at all

95. Would you consider your child's mealtime pattern to be: (Or Does your child eat at the same time every day?)
    1. Regular
    2. Irregular
    0. No
    1. Yes (usually)

What time does _X_ usually eat?

96. Breakfast_ _:_ _ 97. Lunch _ _:_ _ 98. Dinner _ _:_ _

99. Are all meals usually eaten at home?
    0. Yes
       No.

Which meals are eaten elsewhere?
    1. One meal such as Breakfast, Lunch, or Dinner
    2. Two meals such as Breakfast and lunch, or Lunch and dinner, or Breakfast and dinner
    3. All meals

100. Where are these meals usually eaten?
    1. Relative's home
    2. Babysitter's home
    3. Restaurant
    4. Home of friends, neighbors

Do you think _X_:

	No (1)	Yes (2)
101. Eats too little food		
102. Eats too much food		
103. Chooses a limited variety of foods		
104. Eats too few fruits and vegetables		
105. Dawdles with his food		
106. Eats too much meat		
107. Eats too little meat		
108. Drinks too much milk		
109. Drinks too little milk		
110. Eats too many sweets		

FOOD PURCHASING

113. Who in the family usually decides what foods to buy?
    1. Mother only
    2. Father only
    3. Mother and father together
    4. Mother & children
    5. Entire family

Appendix C-2 (cont'd.)

114. Who usually does the grocery shopping?
   1. Mother alone
   2. Father alone
   3. Mother & father together (no children)
   4. Mother and children
   5. Father and children
   6. Entire family
   7. Non-family member

115. How often does your family buy groceries?
   1. Daily
   2. 2-3 times a week
   3. Major shopping weekly, other foods as needed
   4. Once a week
   5. Once every 2-3 weeks
   6. Once a month
   7. Varies, no pattern

116. In what kind of store do you do most of your shopping?
   1. Neighborhood store; small independent market
   2. Supermarket or discount store
   Other

117. Why do you shop there? (order by no.)
   1. Can buy on credit
   2. Don't know
   3. Lower food prices
   4. More convenient and/or personal loyalty
   5. Offer trading stamps or other sales promotions
   6. Combination of better quality and lower prices
   7. Better quality and/or variety and/or sells ethnic foods

118. About how much money did you spend for food last week? $_____

How often do you generally use the following foods?

	Never 1	Rarely 2	Occasionally 3	Nearly all the time 4	All the time 5
119. Frozen meat pies					
120. Frozen "TV" dinners					
121. Canned soups, stews					
122. Frozen dessert pies					
123. Cake, muffin mixes, inc. prepared mixes such as Bisquick					
124. Instant coffee					
125. Ready-to-eat cereal					
126. Pie crust mix					
127. Pudding mix					
128. Other, specify:_____					

Appendix C-2 (cont'd.)

129. Do you receive Federal Food Stamps at the present time?
1. No; not eligible
2. No; eligible but do not participate (to next item)
3. Yes

130. If eligible & answered No (#2), why do you not use stamps?
1. Family applied, but told "not eligible"
2. Family applied; eligibility not yet determined
3. Family chose not to participate temporarily, plans to reapply
4. Cannot afford them
5. Do not know enough about them
6. Inconvenient, transportation problems
7. Family says, "do not need them"

131. If Yes (#3), do you buy any foods now that you did not buy before you got food stamps? Or do you buy more of any foods now than you did before?
1. No
2. Yes
Which ones? Specify:_____

NUTRITION EDUCATION

132. What foods do you think you should serve your child every day? (Record answer verbatim; probe for specific foods)

_____

_____

133. "Have you ever had any classes or attended any group activities concerned with food and nutrition?"
0. No
Yes.
Which?
1. Junior high school
2. Senior high school
3. Professional training (e.g. nurse's)
4. Adult education classes
5. Public health classes, clinics
6. Prenatal classes
7. Youth group: eg. 4-H, Girl Scouts
8. Course in cooking

134. "Which do you believe has been the most helpful to you in preparing your family's meals?" (Circle number above)

Appendix C-2 (cont'd.)

135. "There are many people from whom homemakers can get information concerning needs of families. Which of the following persons has influenced you the most?" (Circle number.)
0. No one
1. Mother or other relative
2. Friends or neighbors
3. Physician
4. Dentist
5. Nurse
6. Home economist, dietitian, or nutritionist
7. Combination of above

136. "If you wanted to know more above the nutritive value of various fruits or vegetables, what sources of information do you think you would find most helpful?" (Circle number of the most helpful.)
1. Cookbooks
2. Books (other than cookbooks), extension bulletins
3. Food articles in magazines or newspapers
4. Food advertisements in magazines or newspapers
5. Radio
6. TV
7. Neighbors and friends
8. Mother or other relatives
9. Members of immediate family (husband, children)
10. County extension agent or home economist
11. Teacher

Appendix C-2 (cont'd.)

COMPLETE THIS PAGE AFTER YOU LEAVE THE HOME

INTERVIEWER'S OBSERVATIONS

To Interviewer: Code one as appropriate:

The dwelling is a:

1. Single house, one family
2. Duplex or row house, one unit for each family
3. Converted single house, converted rowhouse, multi-family
4. Apartment (privately owned; garden-type)
5. Trailer
6. Apartment (public housing; garden-type - housing project)
7. Apartment (privately owned; multi-story)
8. Apartment (public housing; multi-story - housing project)

When interviewing, did you observe:

	Yes	No	Not Applicable
Bed in living room?			
Rug on living room floor?			
Clean/neat home?			
Bed made?			
Temperature adequate/comfortable?			
Bad smell in house/room?			
**********	**********		
Did children appear sick? (runny eyes, sores, etc.)			
Did children appear clean?			
Did you see mother (or caretaker) hit a child?			
Did mother yell at a child?			
Did mother offer you anything to eat or drink?			
Did mother ask you for any help or information?			

Were accessories visible in the home?

framed pictures	1. No	2. Yes
green plants	1. No	2. Yes
decorative accessories	1. No	2. Yes

Appendix C-2 (cont'd.)

Evaluate the general state of cleanliness and housekeeping condition of the home, the furnishings, and appliances:

1. very dirty and unkept
2. dirty and unkept
3. fairly clean and orderly
4. very clean and orderly

Appendix C-2 (cont'd.)

APPRAISAL OF A "SAMPLE OF THE IMMEDIATE NEIGHBORHOOD" OF THE DWELLING

```
          [d]          X = dwelling in which interview was
                           conducted
     [a]  [X]  [c]     a,b,c,d = dwelling, structures or
                                 lots adjacent to or facing X
          [b]
```

Comments: _____

_____

Evaluation of the structure or lot:

Land Use				Condition		
Vacant	Residential	Non-residential	Description of non-residential use	Sound	Dilapidated	Deteriorating
a						
b						
c						
d						

Structural observation of exterior:
1. Poor quality
2. Fair quality
3. Good quality
4. Excellent quality

Rate the person interviewed as to cooperativeness:

____ 1. Very cooperative. Appeared friendly and relaxed with interviewer. No defensiveness. Volunteered information readily. Showed interest in the study and became involved in the interview.

____ 2. Cooperative. Appeared friendly and relaxed with the interviewer. Answered questions readily, but did not volunteer information beyond that requested. May or may not have shown interest in the study.

____ 3. Slightly uncooperative. Generally answered questions readily, but may have shown some defensiveness; maintained distance from interviewer.

Appendix C-2 (cont'd.)

____ 4. Uncooperative. Tenseness and defensiveness in answering questions. Expressed reservations about amount of time spent. An undercurrent of resistance to the interview. Little interest in the study.

____ 5. Very uncooperative. Explicit resistance to the interviewer or the interview. No interest in the study.

____ 6. Much of the information obtained may be unreliable because person interviewed seemed so concerned with making a "good impression" that questions may not have been answered validly.

ANY OTHER COMMENTS:

APPENDIX C-3a

Parent Attitudes

Read each of the statements below and then rate them as follows:

A	a	d	D
strongly agree	mildly agree	mildly disagree	strongly disagree

Indicate your opinion by drawing a circle around the "A" if you strongly agree, around the "a" if you mildly agree, around the "d" if you milding disagree, and around the "D" if you strongly disagree.

There are no right or wrong answers, so answer according to your own opinion. It is very important to the study that all questions be answered. Many of the statements will seem alike, but all are necessary to show slight differences of opinion.

	Agree	Disagree
1. Children should be allowed to disagree with their parents if they feel their own ideas are better.	A a	d D
2. When a parent asks a child to do something the child should always be told why.	A a	d D
3. A child should be taught that there are many other people he will love and respect as much or more than his own parents.	A a	d D
4. Children should never learn things outside the home which make them doubt their parents' ideas.	A a	d D
5. Having to be with the children all the time gives a woman the feeling her wings have been clipped.	A a	d D
6. Parents very often feel that they can't stand their children a moment longer.	A a	d D
7. There's no excuse wasting a lot of time explaining when you can get kids doing what you want by being a little clever.	A a	d D

Appendix C-3a (cont'd.)

	Agree	Disagree
8. Children have every right to question their parents' views.	A a	d D
9. A child should grow up convinced his parents always know what is the right thing to do.	A a	d D
10. One of the worst things about taking care of a home is that a woman feels that she can't get out.	A a	d D
11. Most parents can spend all day with the children and remail calm and even tempered.	A a	d D
12. Children should be encouraged to tell parents about it whenever they feel family rules are unreasonable.	A a	d D
13. Parents should adjust to the children sometimes rather than always expecting the children to adjust to the parents.	A a	d D
14. Most children soon learn that their parents were mistaken in many of their ideas.	A a	d D
15. A young mother feels "held down" because there are lots of things she wants to do while she is young.	A a	d D
16. There is no excusing someone who upsets the confidence a child has in his parents' ways of doing things.	A a	d D
17. The things children ask of a parent after a hard day's work are enough to make anyone lose his temper at times.	A a	d D
18. Often you have to fool children to get them to do what they should without a big fuss.	A a	d D
19. If a parent is wrong he should admit it to his child.	A a	d D
20. Most young mothers are bothered more by the feeling of being shut up in the home than by anything else.	A a	d D

Appendix C-3a (cont'd.)

	Agree	Disagree
21. A child soon learns that there is no wisdom than that of his parents.	A a	d D
22. A parent should keep control of his temper even when children are demanding.	A a	d D
23. A child's ideas should be seriously considered in making family decisions.	A a	d D
24. In a well-run home, children should have things their own way as often as the parents do.	A a	d D
25. One of the bad things about raising children is that you aren't free enough of the time to do just as you like.	A a	d D
26. Loyalty on the part of children to their parents is something that the parents should earn.	A a	d D
27. A parent should never be made to look wrong in a child's eyes.	A a	d D
28. It's natural for a parent to "blow his top" when children are selfish and demanding.	A a	d D
29. It's best to trick a child into doing something he doesn't want to do instead of having to argue with him.	A a	d D
30. Husbands should know how "hemmed in" a woman feels staying in the home a great deal.	A a	d D
31. A good parent can tolerate criticism of himself even when the children are around.	A a	d D
32. Loyalty to parents comes before anything else.	A a	d D
33. Raising children is an easy job.	A a	d D
34. When a child is in trouble he ought to know he won't be punished for talking about it with is parents.	A a	d D

Appendix C-3a (cont'd.)

	Agree	Disagree
35. It isn't fair that men have a chance for interesting work and women mostly have to do the hard job of keeping the home.	A a	d D
36. As much as it is reasonable, a parent should try to treat a child as an equal.	A a	d D
37. A parent should not expect to be more highly esteemed than other worthy adults in their children's eyes.	A a	d D
38. It's best for the child if he never gets started wondering whether his parents' view are right.	A a	d D
39. It's a rare parent who can be even tempered with his children all day.	A a	d D
40. Raising children is very much harder than most jobs men do.	A a	d D
41. You have to fool children into doing many things because they wouldn't understand anyway.	A a	d D
42. When a child thinks his parent is wrong he should say so.	A a	d D
43. More parents should teach their children to have unquestioning loyalty to them.	A a	d D
44. Most parents never get to the point where they can't stand their children.	A a	d D
45. A child has a right to his own point of view and ought to be allowed to express it.	A a	d D
46. Children are too often asked to do all the compromising and adjustment and that is not fair.	A a	d D
47. Loyalty to parents is an overemphasized virtue.	A a	d D
48. The child should not question the thinking of his parents.	A a	d D
49. Raising children is a nerve-racking job.	A a	d D

Appendix C-3a (cont'd.)

	Agree	Disagree
50. When a child is doing something he shouldn't do, one of the best ways of handling it is to just get him interested in something else.	A a	d D
51. A child should be encouraged to look for answers to his questions from other people even if the answers contradict his parents'.	A a	d D
52. A child should always love his parents above everything else.	A a	d D
53. There is no reason why a day with the children should be upsetting.	A a	d D

APPENDIX C-3b

Homemaker Values

Below is a list of value descriptions. Most people hold several or all of these values in varying degrees. Please read all nine value descriptions. Now select the value that describes you BEST; put a "1" in the blank preceding this description. Put a "2" in front of the one that describes you NEXT BEST. From the remaining seven descriptions, select the one that is LEAST LIKELY to describe you. Put a (✓) in the blank preceding it.

____ 1. I WANT TO GET THE MOST FOR MY MONEY. I shop around for bargains. I try not to waste things, money, or time. I consider myself economical.

____ 2. I WANT THE THINGS MY FAMILY DOES TO BE SOCIALLY ACCEPTABLE AND INFLUENTIAL. I would always want my family to do things that other people like and would want to copy. I want other people to respect my house and family. I want to be admired by other people.

____ 3. I LIKE TO DO THINGS THAT KEEP MY FAMILY HEALTHY AND GOOD-NATURED. I want to prevent illness in my family and avoid accidents. I see that the family gets nutritious meals and arrange the house and activities so they get enough rest.

____ 4. I LIKE TO DO THINGS WITH MY FAMILY BECAUSE I THINK IT'S IMPORTANT FOR FAMILY MEMBERS TO BE TOGETHER BOTH IN WORK AND PLAY. I want to help my family be content. I arrange the home atmosphere so that family members can be with each other in work and play.

____ 5. I LIKE THE THINGS THAT I DO TO AGREE WITH THE TEACHINGS AND BELIEFS OF MY RELIGION. I arrange it so that my family can practice our religion--attend religious services, hear prayers, and the like. I teach my family to be honest and kind to other people.

____ 6. I ENJOY MY FRIENDS AND LIKE TO DO THINGS FOR THEM. I like to be around people. I like to get together with my friend. I think it is important to have close friends.

____ 7. I WANT LOTS OF FREEDOM TO DO THE THINGS I WANT TO DO. I would prefer to come and go as I please. I would like to do things as I want, without restrictions of daily duties. I take the time to do things that interest me.

Appendix C-3b (cont'd.)

____ 8. I LIKE TO DO THINGS THAT INCREASE MY EDUCATION AND FITNESS FOR PRESENT AND FUTURE TIMES. I want to know what is going on around me. I want my family to be interested in learning. I arrange house and activities for new experiences for my family. Reading material is available for all the family.

____ 9. I WANT TO HAVE THINGS ATTRACTIVE AND ORDERLY. I would like my surroundings to be harmonious. I enjoy working with pretty things. I arrange it so that my family can express themselves artistically.

APPENDIX C-3c

Parent Opinions Scale

We'd like your opinion on a few different things. Tell me if you strongly agree, agree, disagree, or strongly disagree with each statement by circling the number.

	Strongly Agree	Agree	Unde-cided	Dis-Agree	Strongly Disagree
1. In spite of what some people say, the lot of the average man is getting worse.	1	2	3	4	5
2. It's hardly fair to bring children into the world with the way things look for the future.	1	2	3	4	5
3. Nowadays a person has to live pretty much for today and let tommorow take care of itself.	1	2	3	4	5
4. These days a person doesn't really know who he can count on.	1	2	3	4	5
5. There's little use writing to public officials because often they aren't really interested in the problems of the average man.	1	2	3	4	5

APPENDIX C-3d

Powerlessness

Read each of the statements below and then rate them as follows:

A	a	d	D
strongly agree	mildly agree	mildly disagree	strongly disagree

Indicate your opinion by drawing a circle around the "A" if you strongly agree, around the "a" if you mildly agree, around the "d" if you mildly disagree, and around the "D" if you strongly disagree.

Below are a number of statements about various topics. They have been collected from many groups of people and state some of their opinions. There are no right or wrong answers; for every statement there are large numbers of people who agree and disagree. Please show whether you agree or disagree as follows:

	Agree	Disagree
1. I think we will always have wars between countries no matter what we do to try to stop it.	A a	d D
2. If you are a success you will usually have more good breaks than bad breaks.	A a	d D
3. Many times I feel that it does not do any real good to think about what to do. You might just as well flip a coin.	A a	d D
4. A man who gets a good job is just lucky to be at the right place at the right time.	A a	d D
5. I don't understand why other people act the way toward me that they do.	A a	d D
6. Much of what happens to me is probably a matter of chance and luck.	A a	d D
7. I feel I have little influence over the way other people act.	A a	d D
8. It is very hard to figure out what the future will be.	A a	d D

Appendix C-3d (cont'd.)

	Agree	Disagree
9. The ordinary person has very little control over what the politician does in office.	A a	d D
10. The things that happen to most people are outside their own control.	A a	d D
11. It isn't wise to plan too far ahead because most things turn out to be a matter of good or bad fortune anyhow.	A a	d D
12. I don't see how you can really tell how other people are going to act.	A a	d D
13. When things are going well for me I usually think of it as a run of good luck.	A a	d D
14. Most people don't realize how much their lives are influenced by things that happen just accidently.	A a	d D
15. I have usually found that what is going to happen will happen no matter what I do or think about it.	A a	d D
16. Most of the things that have disappointed me in my life have come because my luck ran out.	A a	d D
17. I don't really believe the saying that a person can be "The master of his fate."	A a	d D
18. Success is mostly a matter of getting good breaks.	A a	d D
19. What happens in the world seems to be beyond the control of most people.	A a	d D
20. I feel that most people can't really be held responsible for themselves since no one has much choice about where he was born or raised.	A a	d D
21. Many times the way people act has absolutely no reason behind it.	A a	d D
22. Success in working with people depends much more on the way they feel than on what I do.	A a	d D

Appendix C-3d (cont'd.)

	Agree	Disagree
23. Many times I feel that I have little influence over the things that happen to me.	A a	d D
24. Sometimes I feel that I don't have enough control over the way my life is going.	A a	d D
25. To get ahead you have to gamble on things that you are not sure of.	A a	d D

PLEASE SEE THAT YOU HAVE GIVEN YOUR OPINION FOR EACH QUESTION

APPENDIX C-3e

Nutrition Knowledge and Attitudes Test

Some statements concerning nutrition are given below. Please indicate whether or not you think a statement is true or false. Circle "T" for true and "F" for false. After you have reached this decision indicate how certain you are about the answer. If you are very confident of your decision, circle "1"; if you are very doubtful, circle "5". Circle other numbers to indicate degrees of certainty between these extremes.

Please be sure to respond twice to every statement:	True or False	How sure are you? Very Confident		Pretty Sure		Very Doubtful
1. Protein-rich foods, such as meat, milk and eggs, provide liberal amounts of several nutrients needed for the growth of small children.	T F	1	2	3	4	5
2. It is better not to include orange juice and milk in the same meal because the orange juice causes the milk to curdle in the stomach.	T F	1	2	3	4	5
3. By the end of the first year babies should have learned to use a variety of foods besides milk because a one-sided milk diet may be inadequate for total growth and development.	T F	1	2	3	4	5
4. School age children need multiple vitamin pills every day to ensure good health.	T F	1	2	3	4	5
5. Chemicals now used to bleach flour are harmful to human beings.	T F	1	2	3	4	5
6. When children have enough food to satisfy their appetites their diets are certain to be nutritionally adequate.	T F	1	2	3	4	5
7. A good nutritional practice is to eat a wide variety of types of foods from day to day.	T F	1	2	3	4	5

Appendix C-3e (cont'd.)

	True or False	How sure are you? Very Confident		Pretty Sure		Very Doubtful
8. Citrus fruits include strawberries, raspberries, and blueberries.	T F	1	2	3	4	5
9. Skim milk contains about the same amounts of the body-building minerals and protein as whole milk.	T F	1	2	3	4	5
10. No reducing diet should contain bread or potatoes.	T F	1	2	3	4	5
11. Most fat children and adults have a glandular disturbance.	T F	1	2	3	4	5
12. Milk is a food needed mainly for infants and growing children.	T F	1	2	3	4	5
13. Apples are an excellent source of Vitamin C.	T F	1	2	3	4	5
14. Foods enriched with Vitamin D help to ensure the normal development of bones and the prevention of rickets.	T F	1	2	3	4	5
15. Gelatin, or "Jello" desserts are a good source of protein.	T F	1	2	3	4	5
16. All people should use a low-fat, low-cholesterol diet to prevent heart disease and strokes.	T F	1	2	3	4	5
17. Cheese is constipating.	T F	1	2	3	4	5
18. A glass of lemonade can be substituted for a glass of orange juice so far as the Vitamin C in the two products is concerned.	T F	1	2	3	4	5
19. Grape juice is an important source of nutrients which guard against anemia.	T F	1	2	3	4	5

Appendix C-3e (cont'd.)

	True or False	How sure are you? Very Confident		Pretty Sure		Very Doubtful
20. The green leafy and yellow vegetables are stressed in daily food plans because they help to ensure meeting the Vitamin A needs of the individual.	T F	1	2	3	4	5
21. Healthy, active, young children require some concentrated sweets each day for energy needs.	T F	1	2	3	4	5
22. Pasteurization destroys much of the food value of milk.	T F	1	2	3	4	5
23. The "Basic Four" includes (1) Dairy Foods (2) Meat & Eggs (3) Breads & Cereals (4) Fruits & Vegetables.	T F	1	2	3	4	5

ATTITUDE TOWARD NUTRITION AND EATING HABITS OF CHILDREN

If the statement describes how you feel about your child's nutrition or eating habits, circle the "A" if you strongly agree, the "a" if you mildly agree, the "d" if you mildly disagree and the "D" if you strongly disagree.

	Agree		Disagree	
1. I let the child choose whatever he wants for breakfast.	A	a	d	D
2. Children's foods have so many vitamins added that I don't have to bother about nutrition.	A	a	d	D
3. I feel the foods my child eats now will affect his future health.	A	a	d	D
4. As long as the child doesn't pick the same thing constantly, I feel it is all right to let him select his own food.	A	a	d	D
5. As long as my child is not sick, I guess I must be feeding him right.	A	a	d	D

Appendix C-3e (cont'd.)

	Agree	Disagree
6. Nutrition is important, and one should not be careless about it.	A a	d D
7. Even if I give vitamins, I feel that I should be concerned about my child's diet.	A a	d D
8. Children are more likely to eat well if they select the meat for the meal.	A a	d D
9. If my child says, "Let's have ____ for lunch," I feel that I should do so.	A a	d D
10. I feel that if the child drinks milk, I don't have to worry about nutrition.	A a	d D
11. Because the children are fussy about what they eat, I feel it is necessary to let them pick what they want for meals.	A a	d D
12. As long as the doctor doesn't say anything to me about nutrition, I don't think I need to worry about it.	A a	d D
13. I feel that as long as my child is gaining weight, I don't have to worry about his nutrition.	A a	d D
14. I just don't have time to think much about nutrition.	A a	d D
15. Nutrition is not so important as long as my child eats a lot.	A a	d D
16. I believe a child should be allowed to choose what he wants for breakfast and lunch, even if it means a little more preparation for me.	A a	d D
17. I am concerned about getting my child to eat nutritious foods throughout the day.	A a	d D
18. Children should be allowed to eat whatever they want.	A a	d D
19. Nutrition is not so important if my child has plenty of liquids.	A a	d D

Appendix C-3e (cont'd.)

	Agree	Disagree
20. Young children don't grow correctly when they have improper diets.	A a	d D
21. I believe that a child should not be permitted to have a diet which is deficient in protein, minerals and vitamins.	A a	d D

APPENDIX C-3f

Semantic Differential Instrument

Now, we would like you to think about yourself and how you might describe yourself as a mother. On the next page are some pairs of words used by many people in describing themselves. Each pair of words is separated by a broken line. Somewhere on the broken line please place an "X". Put the "X" where you now feel or see yourself to be.

If you feel that one or the other end of the line is extremely like what you are like as a mother, place your X as follows:

warm _X_:___:___:___:___:___:___ cold

or

warm ___:___:___:___:___:___:_X_ cold

If one end is quite closely like what you are like as a mother, place your X as follows:

warm ___:_X_:___:___:___:___:___ cold

or

warm ___:___:___:___:___:_X_:___ cold

If one end is only slightly like what you are like as a mother, place your X as follows:

warm ___:___:_X_:___:___:___:___ cold

or

warm ___:___:___:___:_X_:___:___ cold

If you do not feel either one way or the other, place your X as follows:

warm ___:___:___:_X_:___:___:___ cold

Remember, you are describing yourself to yourself. Do as well as you can in describing yourself.

Please be sure to mark each line with an X.

Appendix C-3f (cont'd.)

MYSELF AS MOTHER

happy	___:___:___:___:___:___:___	sad
strange	___:___:___:___:___:___:___	familiar
unusual	___:___:___:___:___:___:___	usual
cruel	___:___:___:___:___:___:___	kind
sharp	___:___:___:___:___:___:___	dull
high	___:___:___:___:___:___:___	low
comfortable	___:___:___:___:___:___:___	uncomfortable
good	___:___:___:___:___:___:___	bad
enjoyable	___:___:___:___:___:___:___	distasteful
negative	___:___:___:___:___:___:___	positive
valuable	___:___:___:___:___:___:___	worthless
worst	___:___:___:___:___:___:___	best
dislike	___:___:___:___:___:___:___	like
relaxed	___:___:___:___:___:___:___	tense
hesitant	___:___:___:___:___:___:___	eager
easy	___:___:___:___:___:___:___	hard
unfair	___:___:___:___:___:___:___	fair
active	___:___:___:___:___:___:___	passive
fast	___:___:___:___:___:___:___	slow
insecure	___:___:___:___:___:___:___	secure
weak	___:___:___:___:___:___:___	strong
interesting	___:___:___:___:___:___:___	boring
heavy	___:___:___:___:___:___:___	light
warm	___:___:___:___:___:___:___	cool
mean	___:___:___:___:___:___:___	nice
neat	___:___:___:___:___:___:___	sloppy

soft	___:___:___:___:___:___:___	hard
impulsive	___:___:___:___:___:___:___	stable
clean	___:___:___:___:___:___:___	dirty
plain	___:___:___:___:___:___:___	fancy
loud	___:___:___:___:___:___:___	quiet
woman-like	___:___:___:___:___:___:___	man-like

APPENDIX D

Guidelines for Data Coding

1. Coding Form for Food Records
2. Coding Guide for All Variables
3. Identification Codes for Derived Scales

APPENDIX D-1

Coding Form for Food Records

INPUT:

Card 1
COLUMN

1	Card number
2	Preschool identification code
3-5	Child identification number
6	Sex of child 1 = male, 2 = female
7	Vitamin supplement 1 = no, 2 = yes
8	Mother's assessment of child's intake for the day 1 = less than usual, 2 = usual; 3 = more than usual
9-10	Total number of food items consumed
11-16	Food Identification Number
17-19	Units food consumed (e.g. 100= 1 serv; 050 = 1/2 serv.)
20-21	Time consumed - (code)
22	Meal (1) or snack (2)
23	With whom eaten: 1 = alone 2 = all of family 3 = some of family 4 = friends, other
24	Where eaten 1 = home; 2 = elsewhere
25-38	
39-52	
53-66	
67-80	Repeat columns 11-24 for each food item consumed

APPENDIX D-2

Coding Guide For All Variables

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
	1	1	Card number	
	1	2-4	Child's I.D. number	080-290
			DIETARY DATA	
1	1	5-6	Vitamin supplement?	1. = no, 2. = yes
2	1	7-11	Calories (number)	800.-3000.
3	1	12-17	Protein (gm)	30.00-150.00
4	1	18-23	Fat (gm)	20.00-150.00
5	1	24-29	Carbohydrate (gm)	100.00-300.00
6	1	30-36	Calcium (mg)	200.00-1500.00
7	1	39-41	Iron (mg)	5.00-18.00
8	1	42-48	Vitamin A (I.U., tenths)	200.00-1000.00
9	1	49-52	Thiamin (mg)	0.75-1.50
10	1	53-56	Riboflavin (mg)	0.75-1.50
11	1	57-61	Niacin (mg)	5.00-15.00
12	1	62-67	Vitamin C (mg)	20.00-150.00
13	1	68-73	Calories, as % RDA	50.00-250.00
14	1	74-79	Protein, as % RDA	50.00-250.00
15	2	5-10	Calcium, as % RDA	50.00-250.00

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
16	2	11-16	Iron, as % RDA	50.00-150.00
17	2	17-22	Vitamin A, as % RDA	50.00-250.00
18	2	23-28	Riboflavin, as % RDA	50.00-350.00
19	2	29-34	Niacin, as % RDA	50.00-200.00
20	2	35-41	Vitamin C, as % RDA	50.00-300.00
21	2	42-47	% Cal eaten at meals	50.00-100.00
22	2	48-52	% Cal eaten at snacks	0.00-50.00
23	2	53-58	% Cal eaten alone	0.00-100.00
24	2	59-64	% Cal eaten with all family	0.00-100.00
25	2	65-70	% Cal eaten with some of family	0.00-100.00
26	3	5-10	% Cal eaten with others	0.00-100.00
27	3	11-16	% Cal eaten at home	0.00-100.00
28	3	17-22	% Cal eaten elsewhere	0.00-100.00
29	3	23-28	% protein eaten at meals	0.00-100.00
30	3	29-34	% protein eaten at snacks	0.00-100.00
31	3	35-40	% protein eaten alone	0.00-100.00
32	3	41-46	% protein eaten with all family	0.00-100.00
33	3	47-52	% protein eaten with some of family	0.00-100.00
34	3	53-58	% protein eaten with others	0.00-100.00

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
35	3	59-64	% protein eaten at home	0.00-100.00
36	3	65-70	% protein eaten elsewhere	0.00-100.00
			Number of Servings of:	
37	3	71-74	Dairy products	0.00-9.00
38	3	75-79	Protein foods	0.00-10.00
39	4	5-8	Vegetables	0.00-9.00
40	4	9-12	Fruits	0.00-9.00
41	4	13-16	Grain products	0.00-13.0
42	4	17-20	Fats and oils	0.00-9.00
43	4	21-24	Sugar products	0.00-9.00
44	4	25-28	Milk and milk products	0.00-9.00
45	4	29-32	Ice cream	0.00-9.00
46	4	33-36	Cheese	0.00-9.00
47	4	37-40	Meat and poultry	0.00-9.00
48	4	41-44	Eggs	0.00-9.00
49	4	45-48	Legumes	0.00-9.00
50	4	49-52	Nuts	0.00-9.00
51	4	53-56	Meat mixtures	0.00-9.00
52	4	57-60	Potatoes	0.00-9.00
53	4	61-64	Green & yellow vegetables	0.00-9.00
54	4	65-68	Tomatoes	0.00-9.00

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
55	4	69-72	Other vegetables	0.00-9.00
56	4	73-76	Vegetables	0.00-9.00
57	4	77-80	Citrus fruits	0.00-9.00
58	5	5-8	Dried fruits	0.00-9.00
59	5	9-12	Other fruits	0.00-9.00
60	5	13-16	Whole grain, enr. products	0.00-9.00
61	5	17-20	Nonenriched grain products	0.00-9.00
62	5	21-24	Grain mixtures	0.00-9.00
63	5	25-28	Sugar, syrups	0.00-9.00
64	5	29-32	Soft drinks	0.00-9.00
65	5	33-36	Fluid milk	0.00-9.00
66	5	37-40	Milk drinks	0.00-9.00
67	5	41-44	Frozen desserts	0.00-9.00
68	5	45-48	Beef	0.00-9.00
69	5	49-52	Pork	0.00-9.00
70	5	53-56	Veal and lamb	0.00-9.00
71	5	57-60	Liver	0.00-9.00
72	5	61-64	Luncheon meats, various	0.00-9.00
73	5	65-68	Poultry	0.00-9.00
74	5	69-72	Fish	0.00-9.00
75	5	73-76	Cereals, enriched	0.00-9.00
76	5	77-80	Bread, enriched	0.00-9.00

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
77	6	5-8	Baked goods, enriched	0.00-9.00
78	6	9-12	Cereals, nonenriched	00.0-13.0
79	6	13-16	Breads, nonenriched	00.0-13.0
80	6	17-20	Baked goods, nonenriched	00.0-13.0
81	6	21-24	Sugars	00.0-13.0
82	6	25-28	Syrups	00.0-13.0
83	6	29-32	Jellies	00.0-13.0
84	6	33-36	Candy	00.0-13.0
85	6	37-40	Soft drinks	00.0-13.0
86	6	41-44	Chocolate	00.0-13.0
87	6	45-49	% cal as carbohydrate	20.00-70.00
88	6	50-53	No. cal as carbohydrate	400-1200
89	6	54-58	% cal as fat	20.00-60.00
90	6	59-62	No. cal as fat	400-1200
91	6	63-67	% cal as protein	5.00-25.00
92	6	68-70	No. cal as protein	200-800
94	7	5	Sex of child	1 = male; 2 = female
95	7	6	Preschool I.D.	1 = LPS; 2 = SNS
96	7	7		1 = Cristo Rey 2 = Other

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
97	7	8-9	Age of child (in months, as of 9/1/69)	30-64
			BLOOD DATA:	
100	7	10-13	Hemoglobin (gm/100 ml)	10.0-14.0
101	7	14-17	Hematocrit (PCV)	32.0-41.0
102	7	18-21	Serum albumin (gm/100 ml)	4.00-6.00
103	7	22-25	Total serum proteins (gm %)	6.00-8.50
			ICNND CLASSIFICATION:	
104	7	26	Hemoglobin	1. Deficient (<10.0) 2. Low (10.0-10.9) 3. Acceptable (11.0-12.4) 4. High (≥12.5)
105	7	27	Hematocrit	1. Deficient (<30.0) 2. Low (30.0-33.9) 3. Acceptable (34-36.9) 4. High (≥37.0)
106	7	28	Serum albumin	1. Deficient (<2.8) 2. Low (2.8-3.51) 3. Acceptable (3.52-4.24) 4. High (≥4.25)
107	7	29	Total serum proteins	1. Deficient (<6.0) 2. Low (6.0-6.4) 3. Acceptable (6.5-6.9) 4. High (≥7.0)

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
			ANTHROPOMETRIC DATA:	
109	7	33-37	Weight (lbs) as of 11-69	25.00-50.00
110	7	38-41	Height (ins) in 11-69	30.0-50.0
111	7	42-46	Weight (lbs) in 3-70	25.00-50.00
112	7	47-50	Height (ins) in 3-70	30.0-50.0
113	7	51-54	Increments in weight from 11-69 to 3-70 (lbs)	0.00-5.00
114	7	55-57	Increments in height from 11-69 to 3-70 (ins)	0.0-5.0
115	7	58-62	Weight (lbs) in 5-70	25.00-55.00
116	7	63-66	Height (ins) in 5-70	25.0-55.0
117	7	67-70	Increments in weight from 3-70 to 5-70 (lbs)	0.00-5.00
118	7	71-73	Increments in height from 3-70 to 5-70 (ins)	0.0-5.0
119	7	74-77	Increments in weight from 11-69 to 5-70 (lbs)	0.00-7.00
120	7	78-80	Increments in height from 11-69 to 5-70 (ins)	0.0-8.0
121	8	5-8	Sitting height (ins) (5-70)	15.0-40.0
122	8	9-12	Shoulder width (BA) bi-acromial, mm	15.0-25.0
123	8	13-16	Pelvic width (BC) bi-cristal, mm	10.0-25.0
124	8	17-20	Head circumference (ins)	10.0-25.0

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
125	8	21-24	Chest circumference (ins)	15.0-30.0
126	8	25-27	Index of trunk breadth, BC/BA, mm	0.50-0.99
127	8	28-30	Upper arm circumference (ins)	5.0-8.0
128	8	31-33	Skinfold thickness, triceps, cm	1.0-2.5
129	8	34-36	Skinfold thickness, subscapular, cm	0.4-2.0
	8	38-40	Hydroxyproline:creatinine ratio	0.50-
	8	41-44	Hydroxyproline index	1.00-5.00
			CURRENT FAMILY SETTING (DEMOGRAPHIC DATA):	
158	9	11-12	Total no. persons in household	1-20
159	9	13-14	Total no. persons in family unit	1-20
160	9	15	Total no. adults in household	1-9
161	9	16	No. adults, other than parents, in household	
162	9	17-18	Total no. children in family unit	1-20
163	9	19	No. children 5 years or younger in household	1-9

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
164	9	20-21	Ordinal position of child	1-20
165	9	22	Time span between subject child and next younger	
166	9	23-24	Time span between subject child and next older	
167	9	25-26	Time span (average years) between births in family	No. years
168	9	27	Parent (i.e., mother): Marital Status	1. Married & living with husband 2. Married, but husband temporarily absent (e.g., in Army, jail) 3. Separated 4. Widowed 5. Divorced 6. Single, never married
169	9	28-29	Education of mother (as no. school years completed)	0-25
170	9	30-31	Education of father	0-25
171	9	32-33	Occupation of father	Code according to: U. S. Census Rating Scale
172	9	34-35	Occupation of mother	
173	9	36	Employment status of father	1. Not working and not looking for work 2. Not working, but looking for work 3. Not working; retired or disabled

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
				4. Not working; full-time student 5. Employed part-time (less than 35 hrs/week) 6. Employed full-time (more than 35 hrs/week)
174	9	37	Does father have steady work?	1. = no; 2 = yes
175	9	38	Employment status-mother	Code: 1-6 (Per #166)
176	9	39-40	Total hours/week child is cared for by someone other than the mother	0-60
177	9	41	Stage in family life cycle	1. Beginning families (married couple without children) 2. Childbearing families (oldest child, birth to 30 months) 3. Families with preschool children (oldest 30 mo. to six years) 4. Families with school children (oldest child 6 to 13 years) 5. Families with teenagers (oldest child is 13-20 years) 6. Families as launching centers (first child gone to last child leaving home) 7. Families in the middle years (empty next to retirement) 8. Aging families (retirement to death of both spouses)

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
178	9	42	Race (ethnicity)	1. White 2. American Negro (mixed) No code = other
179	9	43	Race (ethnicity)-(cont'd)	No code = other
180	9	44-48	Family income (annual)	Record as absolute value: $ per year
181	9	49	Source of family income	(Source: Warner) 1. Inherited wealth 2. Earned wealth 3. Profits and fees 4. Salary, commission 5. Hourly wages 6. Private relief 7. Public welfare
182	9	50	Religion	
183	9	51	Religion	
184	9	52	Religion	
185	9	53-54	Mobility: Time at present address	Number of years
186	9	55	No. times moved within the last 3 years	Number of times moved
187	9	56	Type of dwelling unit	1. Single house, one family 2. Duplex or row house, one unit per family 3. Converted single house, converted row house, multi-family

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
				4. Apartment (privately owned; garden-type) 5. Trailer 6. Apartment (public housing; garden-type; housing project) 7. Apartment (privately owned; multi-story) 8. Apartment (public housing; multi-story; housing project)
188	9	57	Own or rent?	1. Own the house 2. Rent from private agency or person 3. Rent from public housing 4. MSU-student married housing
189	9	58-60	No. rooms in house used for living purposes/no. persons living in house	0.5-5.0
190	9	61	No. persons sleeping in same room as subject	
191	9	62	Visible accessories in home: framed pictures	1 = no; 2 = yes
192	9	63	Green plants	1 = no; 2 = yes
193	9	64	Decorative accessories	1 = no; 2 = yes
194	9	65	Interviewer's evaluation of general state of cleanliness and housekeeping condition of the home	1. Very dirty and unkept 2. Dirty and unkept 3. Fairly clean and orderly 4. Very clean and orderly

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
195	9	66	Structural observation of exterior of house	1. Poor quality 2. Fair quality 3. Good quality 4. Excellent quality
196	9	67	Appraisal of immediate neighborhood: Land use	1. Residential 2. Mixed residential & non-residential
197	9	68	Condition	1. Sound 2. Deteriorating 3. Dilapidated
			Condition of Family Possessions:	
198	9	69	Telephone	1. Not present 2. Present, but not in operating condition 3. Present, but not working satisfactorily 4. Present, works well
199	9	70	Radio	Code: 1-4 (Per #198)
200	9	71	Television	Code: 1-4 (Per #198)
201	9	72	Automobile, truck	Code: 1-4 (Per #198)
202	9	73	Refrigerator	Code: 1-4 (Per #198)
203	9	74	Freezer (separate unit, not part of refrigerator)	Code: 1-4 (Per #198)
204	9	75	Range with oven	Code: 1-4 (Per #198)
205	9	76	Hotplate or range with no oven	Code: 1-4 (Per #198)

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
			MEDICAL HISTORY:	
206	9	77-79	Birth weight of child	Record as absolute value, in ounces
207	10	6	Status of child at birth	1. Premature 2. Full term
208	10	7	Mother received prenatal care during pregnancy?	1 = no; 2 = yes
209	10	8-9	Mother's age at first pregnancy	Absolute value - years
210	10	10-11	Mother's age when pregnant with subject child	Absolute value - years
211	10	12-13	Mother's present height	Absolute value - inches
212	10	14-16	Mother's present weight	Absolute value - lbs.
213	10	17-18	Father's present height	Absolute value - inches
214	10	19-21	Father's present weight	Absolute value - lbs.
215	10	22	Method used in feeding child as an infant	1. Breast fed 2. Bottle fed 3. Both breast and bottle 4. Did not receive milk
216	10	23-24	Age at weaning	As months (6-18)
217	10	25	Child drinks from bottle at present?	1 = no; 2 = yes
218	10	26	Child uses pacifier at present?	1 = no; 2 = yes
219	10	27	Child has food allergy?	1 = no; 2 = yes

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
220	10	28	Child on special diet?	1 = no; 2 = yes
221	10	29	Child ever anemic?	1 = no; 2 = yes
222	10	30	Age when anemia was present	1. Before 6 months 2. 6 mos. to 1 year 3. 1 to 2 years 4. 3 to 4 years (recently)
223	10	31	History of feeding problem?	1 = no; 2 = yes
224	10	32	Age at which feeding problems occurred	1. 1 to 6 months 2. 6 most to 1 year 3. 1 to 2 years 4. 3 to 4 years (recently) 5. Combination of above
225	10	33	Child receives vitamin supplement?	1 = no; 2 = yes
226	10	34	Type given	
227	10	35	Other supplement, health food given?	1 = no; 2 = yes
228	10	36	Recommendation for vits. or other supplements	1. Physician 2. Friend or relative 3. On parent's own 0. Not applicable
229	10	37	Immediate family has disease condition requiring special diet?	1 = no; 2 = yes
230	10	38	Amount sleep/day child gets	1. Less than 8 hours 2. 8 to 9 hours 3. 10-12 hours 4. 13 to 15 hours 5. More than 15 hours

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
231	10	39	Last medical exam	1. Less than 1 mo ago 2. 1 to 6 mos ago 3. 7 to 12 mos ago 4. More than 1 year ago 5. Never seen by physician
232	10	40	Reason for last seeing physician	1. Don't know 2. Routine checkup 3. Immunizations 4. Illness 5. Injury
233	10	41	Last dental exam	1. Less than 1 mo ago 2. 1 to 6 mos ago 3. 7 to 12 mos ago 4. More than 12 mos ago 5. Never seen by dentist
234	10	42	Reason for last seeing dentist	1. Don't know 2. Routine checkup 3. Immunications 4. Illness 5. Injury
235	10	43	Presence of filled teeth	1 = no; 2 = yes
			MEAL PRACTICES:	
			Amount of time entire family eats together:	
236	10	44	Breakfast	1. Never 2. Less than 1/2 time 3. About 1/2 time 4. Almost always

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
237	10	45	Noon meal	Code: 1-4 (Per #236)
238	10	46	Evening meal	Code: 1-4 (Per #236)
239	10	47	Other (e.g., snacks)	Code: 1-4 (Per #236)
240	10	48	Do children eat at same time as adults in family?	1. Yes, almost always 2. Usually 3. Only occasionally 4. Rarely 5. Never
241	10	49	Child's attitude toward food or meals	1. Enjoys eating 2. Attitude varies 3. Indifferent to food 4. Has to be urged to eat 5. Presents an eating problem
242	10	50	Mother's opinion of importance of child's eating everything on plate	1. Not important at all 2. Slightly important 3. Moderately important 4. Considerably important 5. Extremely important
243	10	51	Mother's usual action when child dawdles with food or refuses food served to him	1. Insists that he finish the meal promptly 2. Insists that he complete a certain portion of each food 3. Threatens punishment, e.g., withholding of dessert if food is not eaten 4. Promises reward 5. Tells child there will be nothing to eat till next meal, then removes food

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
				6. Coaxes, but does not force eating 7. Says nothing at the time; talks to child later about it 8. Says nothing to child' does not like arguments at the table 9. Says nothing; does not think this is important
244	10	52	Frequency of child's snacks before breakfast	1. Every day 2. 2 to 3 times/week 3. Less than once a week 4. Never
245	10	53	Frequency of snacks between breakfast and lunch	1. Every day 2. 2 to 3 times/week 3. Less than once a week 4. Never
246	10	54	Frequency of snacks between lunch and dinner	Code: 1-4 (Per #236)
247	10	55	Frequency of snacks between dinner and bedtime	Code: 1-4 (Per #236)
248	10	56	Any meals ever missed?	1. Yes 2. None missed
249	10	57	Reason for missing meal	1. Lack of time 2. Lack of appetite 3. Too tired to eat 4. Illness

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
250	10	58	Time of day child seems most hungry	1. Morning 2. Afternoon 3. Evening
251	10	59	Description of child's appetite in past 3 mos.	1. Excellent 2. Good 3. Fair 4. Poor
252	10	60	Does child feed himself?	1 = no; 2 = yes
253	10	61	Does child use a spoon?	1 = no; 2 = yes
254	10	62	Does child drink from a cup or glass?	1 = no; 2 = yes
255	10	63	Does child use a fork?	1 = no; 2 = yes
256	10	64	Does child use a knife?	1 = no; 2 = yes
257	10	65	Child's favorite food	1. Meat 2. Milk, dairy prod. 3. Fruit 4. Vegetables 5. Eggs 6. Bread, cereals, pasta prod. 7. Sweets
258	10	66	Food child dislikes most; refuses to eat	Code: 1-7 (Per #257)
259	10	67	Mother's opinion: most important influence on meal planning	1. Cost of the food 2. Time required for preparation 3. Likes of the family 4. Mother's likes 5. Health needs of family 6. Nutritive value of food

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
260	10	68	Family acceptance of new foods	1. Enthusiastic 2. Willing 3. Cautious 4. Reluctant 5. Will not accept new foods at all
261	10	69	Assessment of child's meal-time pattern	1. Regular 2. Irregular
262	10	70	Meals eaten at places other than at home	1. One meal 2. Two meals 3. More than two meals
263	10	71	Where are these meals eaten?	1. At a relative's home 2. Babysitter's home 3. At a restaurant 4. Friend, neighbor's home
			Mother's opinion of whether child:	
264	10	72	eats too little food	1 = no; 2 = yes
265	10	73	eats too much food	1 = no; 2 = yes
266	10	74	chooses a limited variety of foods	1 = no; 2 = yes
267	10	75	eats too few fruits & veg.	1 = no; 2 = yes
268	10	76	dawdles with his food	1 = no; 2 = yes
269	10	77	eats too much meat	1 = no; 2 = yes
270	10	78	eats too little meat	1 = no; 2 = yes

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
271	10	79	drinks too much milk	1 = no; 2 = yes
272	10	80	drinks too little milk	1 = no; 2 = yes
273	11	6	eats too many sweets	1 = no; 2 = yes
			FOOD PURCHASING:	
274	11	7	Family member who decides foods to purchase	1. Mother only 2. Father only 3. Mother & father together 4. Mother & children 5. Entire family
275	11	8	Person responsible for grocery shopping	1. Mother alone 2. Father alone 3. Mother & father together (No children) 4. Mother & children 5. Father & children 6. Entire family 7. Non-family member
276	11	9	Frequency of grocery shopping	1. Daily 2. 2 to 3 times/week 3. Major shopping weekly, other foods as needed 4. Once a week 5. Once every 2-3 weeks 6. Once a month 7. Varies, no pattern
277	11	10	Type of store in which most shopping is done	1. Neighborhood or small independent market 2. Supermarket or discount store No code = other

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
278	11	11	Reason for shopping at that particular store	1. Can buy on credit 2. Don't know 3. Lower food prices 4. More convenient and/or personal loyalty 5. Offer trading stamps, other sales promotions 6. Combination of better quality & lower prices 7. Better quality and/or variety and/or sells ethnic foods
279	11	12-13	Approx. amount spent for food by family in previous week	Absolute value - $
280	11	14	Frequency of use: Frozen meat pies	1. Never 2. Rarely 3. Occasionally 4. Nearly all the time 5. All the time
281	11	15	Frequency of use: Frozen TV dinners	1. Never 2. Rarely 3. Occasionally 4. Nearly all the time 5. All the time
282	11	16	Canned soups, stews	Code: 1-5 (Per #281)
283	11	17	Frozen dessert pies	Code: 1-5 (Per #281)

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
284	11	18	Cake, muffin mixes, etc.	Code: 1-5 (Per #281)
285	11	19	Instant coffee	Code: 1-5 (Per #281)
286	11	20	Ready-to-eat cereal	Code: 1-5 (Per #281)
287	11	21	Pie crust mix	Code: 1-5 (Per #281)
288	11	22	Pudding mix	Code: 1-5 (Per #281)
289	11	23	Family receives Federal Food Stamps at present?	1. No, not eligible 2. No, eligible but do not participate 3. Yes
290	11	24	Reason-if family is eligible but does not participate	1. Family applied, but told "not eligible" 2. Family applied, eligibility not yet determined 3. Family chose not to participate temporarily; plans to reapply 4. Cannot afford them 5. Do not know enough about them 6. Inconvenient; transportation problems 7. Family says, "do not need them"
291	11	25	If receiving Food Stamps are additional foods purchased	1. = no; 2 = yes

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
			NUTRITION EDUCATION:	
292	11	26	Mother's assessment of foods child should have every day	1. One of Basic 4 mentioned 2. 2 of Basic 4 mentioned 3. 3 of Basic 4 mentioned 4. All groups mentioned
293	11	27	Classes attended concerned with food & nutrition: rated "most helpful"	1. Junior high school 2. Senior high school 3. Professional training (e.g., nurses) 4. Adult education classes 5. Public health classes, clinics 6. Prenatal classes 7. Youth groups, e.g., 4-H, Scouts 8. Course in cooking
294	11	28	Person most influential re: food needs of family	1. Mother, other relative 2. Friends, neighbors 3. Physician 4. Dentist 5. Nurse 6. Home economist, dietitian, nutritionist 7. Combination of above
295	11	29-30	Source of information considered most helpful	1. Cookbooks 2. Books (other than .) 3. Magazines, newspapers 4. Advertisements in magazines, papers 5. Radio 6. TV

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
				7. Neighbors, friends 8. Mother, other relative 9. Immediate family (husband, children) 10. County extension agent, home economist 11. Teacher
	11	31-32	Score on "Nutrition Knowledge" test	0-23 correct responses Key: True = Items #1,3,7,9,14,20,23 False = Items #2,4-6,8,10-13, 15-19,21,22
	11	35-36	Average calories/kg body weight	050-200
	11	38-40	gm protein/kg body weight	0.5-5.0
	11	41	Income classification	1. <$4000 2. $4000-6999 3. $7000-9999 4. $10,000-12,999 5. $13,000-15,999 6. $16,000-19,999 7. $20,000 and over
	11	42	Income classification	1. <$5000 2. $5000-9999 3. $10,000-14,999 4. $15,000-19,999 5. $20,000 and above
	12	6-51	Nutrition Knowledge Test alternating item and degree of certainty response	True (1) - False (2) 1-5 (very sure to very doubtful)

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
	12	52-72	Attitudes about child feeding	1-4 (strongly agree to strongly disagree)
			Key to scoring test:	Items
			Correct true responses	#1,3,7,9,14,20,23
			Correct false responses	#2,4,5,6,8,10,11,13,15,16, 17,18,19 21,22
			Scales:	Items
			1) "permissiveness about feeding children"	#1,4,8,9,11,16,18
			2) "permissiveness" (item wording reversed)	#2,5,10,12,13,14,15,19
			3) "importance of good nutrition for the child"	#3,6,7,17,20,21
	13	6-58	Items from "Parent Attitude Research Instrument"	1-4 (strong agree to strongly disagree)
			Scales:	Items
			1) Rejection of the home-making role	#5,10,15,20,25,30,35,40
			2) Excluding outside influences	#4,16,27,38,48
			3) Irritability	#6,17,28,39,49
			4) Deification	#9,21,32,43,52

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
			5) Deception	#7,18,29,41,50
			6) Encouraging verbalization	#1,12,23,34,45
			7) Equalitarianism	#2,13,24,35,46
			8) Deification (reversed)	#3,14,26,37,47
			9) Excluding outside influences (reversed)	#8,19,31,42,51
			10) Irritability (reversed)	#11,22,33,44,53
	13	59-63	Anomie Scale	1-5 (strong agree to strongly disagree)
	13	66-67	Socioeconomic Status Scale	3-13 Key: Milbank Memorial Fund Quarterly, Jan. 1969
			Education	Score
			Some college	5
			High school graduate	4
			Some high school	3
			Grammar school graduate	2
			Some grammar school	1
			Occupation	
			Professional & managerial	4
			Clerical and sales	3
			Craftsmen and foremen	2
			Household & serv. workers	1
			Family Income	
			$7500 or more	4
			$5000-$7499	3
			$3000-$4999	2
			Less than $3000	1

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
	14	6-30	Powerlessness Scale	1-4 (strongly agree to strongly disagree)
	14	31-62	Semantic Differential Instrument (reflect items #2,3,4,10, 12,13,15,17,20,21,23,25, 28,31	1-7
	14	63-80	Homemaker Values	-2 = least important No code = other +1 = second most important +2 = most important
		63-64	A. Economy	
		65-66	B. Prestige	
		67-68	C. Health	
		69-70	D. Family Centrism	
		71-72	E. Religion	
		73-74	F. Friendship	
		75-76	G. Freedom	
		77-78	H. Education	
		79-80	I. Aesthetics	
	16	6	Weight-age, as of 11-69 (Fels)	Fels Percentiles: 1. 3rd 6. 75th 2. 5th 7. 90th 3. 10th 8. 95th 4. 25th 9. 97th 5. 50th
	16	7	Weight-age, as of 3-70 (Fels)	Fels Percentiles: Code 1-9 as above
	16	8	Weight-age, as of 5-70 (Fels)	Code 1-9 as above

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
	16	9	Height-age, as of 11-69 (Fels)	Code 1-9 as above
	16	10	Height-age, as of 3-70 (Fels)	Code 1-9 as above
	16	11	Height-age, as of 5-70 (Fels)	Code 1-9 as above
	16	12	Weight-age, as of 11-69	Stuart Percentiles: 1. 3rd 5. 75th 2. 10th 6. 90th 3. 25th 7. 97th 4. 50th
	16	13	Weight-age, as of 3-70	Stuart Percentiles: Code 1-7 as above
	16	14	Weight-age, as of 5-70	Code 1-7 as above
	16	15	Height-age, as of 11-69	Code 1-7 as above
	16	16	Height-age, as of 3-70	Code 1-7 as above
	16	17	Height-age, as of 5-70	Code 1-7 as above
	16	18	Height-weight-age, as of 11-69	Per Smith & Brown, 1970 1. Underweight 2. Small 3. Average 4. Large 5. Overweight
	16	19	Height-weight-age, as of 3-70	Smith & Brown Code 1-5 as above
	16	20	Height-weight-age as of 5-70	Code 1-5 as above

Appendix D-2 (Cont'd)

VAR. NO.	CARD	COL. NO.	VARIABLE NAME	RANGE OF VALUES
	16	21	Weight-height scale, as of 11-69	Sargent, 1961 1. Underweight 2. Slender 3. Normal 4. Stocky 5. Overweight 6. Obese
	16	22	Weight-height scale, as of 3-70	Sargent Code 1-6 as above
	16	23	Weight-height scale, as of 5-70	Code 1-6 as above
	16	24-27	Index: weight-height ratio as of 11-69	Rao & Singh, 1970 0.50-2.00
	16	28-31	Weight-height index as of 3-70	0.50-2.00
	16	32-35	Weight-height index as of 5-70	0.50-2.00
	16	36-37	Weight-age as of 5-70 (Chron. age at which mmt. crosses 50th percentile of Stuart standard)	30-90 (mo.)
	16	38-39	Height-age, as of 5-70	30-90 (mo.)
	16	40-42	Developmental Index, for weight, as of 5-70	WA/CA x 100 (60-100)
	16	43-45	Development Index, for height, as of 5-70	HA/CA x 100 (60-100)
	16	46-50	Development Index: WA/HA	0.75-1.50

APPENDIX D-3

Identification Codes for Derived Scales

CARD NO.	VAR. NO.	VARIABLE NAME
1	1	Calories
	2	Protein
	3	Fat
	4	Carbohydrate
	5	Calcium
	6	Iron
	7	Vitamin A
	8	Thiamin
	9	Riboflavin
	10	Niacin
	11	Ascorbic acid
2	21	Parents are all-wise scale (PARI)
	22	Treating child as an equal scale (PARI)
	23	Only listen to parent scale (PARI)
	24	Unquestioned loyalty scale (PARI)
	25	Deception scale (PARI)
	26	Trapped in a dull job scale (PARI)
	27	Anomie scale
	28	Would like to get out! scale (PARI)
	29	Children are very demanding scale (PARI)
	30	Occasional dissatisfaction scale (PARI)
	31	Frequent dissatisfaction scale (PARI)
	32	Socio-economic status index
3	41	Sex of child
	42	Age of child (in months)
	43	Hemoglobin
	44	Hematocrit
	45	Serum albumin
	46	Serum proteins
	47	Change in weight of child
	48	Change in height of child
4	51	Weight-age, Fels
	52	Height-age, Fels
	53	Weight-age, Stuart-Meredith
	54	Height-age, Stuart-Meredith
	55	Height-weight-age
	56	Weight-height scale (Sargent)
	57	Weight-height^2 ratio
	58	Weight-age, in May
	59	Height-age, in May
	60	Developmental index for weight
	61	Developmental index for height
	62	Weight-age/height-age, developmental index

Appendix D-3 (cont'd.)

CARD NO.	VAR. NO.	VARIABLE NAME
5	71	Sitting height
	72	Shoulder width
	73	Pelvic width
	74	Head circumference
	75	Chest circumference
	76	Index of trunk breadth
	77	Upper arm circumference
	78	Skinfold thickness for triceps
	79	Sucscapular skinfold thickness
	80	Hydroxyproline: creatinine ratio
	81	Hydroxyproline index
6	91	Permissiveness attitude about child's eating habits scale
	92	Nutrition is very important for the child scale
	93	powerlessness scale
	94	Semantic differential (1)
	95	Semantic differential (2)
	96	Values: Economy
	97	Prestige
	98	Health
	99	Family centrism
	100	Religion
	101	Friendship
	102	Freedom
	103	Education
7	104	Aesthetics
8	111	Child premature or full term?
	112	Mother received prenatal care?
	113	Mother's age when pregnant with child
	114	Mother's present height
	115	Mother's present weight
	116	Father's present height
	117	Father's present weight
	118	Child bottle or breast fed?
	119	Age at weaning
	120	Infantile behavior scale
	121	Child has ever been anemic?
	122	Feeding problems scale
	123	Child receives vitamin supplement?
9	124	Child received other supplement or health food?
	125	Amount sleep per day
	126	Last medical exam
	127	Reason for last seeing physician
	128	Dental record
	129	Amount of time that family eats together
	130	Children eat at the same time as parents?
	131	Mother's opinion about eating everything on child's plate

Appendix D-3 (cont'd.)

CARD NO.	VAR. NO.	VARIABLE NAME
10	132	Mother's action when child dawdles or plays with food
	133	Frequency of snacking scale
	134	Time of day when child seems most hungry
	135	Child uses spoon?
	136	Child uses fork?
	137	Child uses knife?
	138	Child's favorite food
	139	Food child refuses to eat
	140	Most important influence on the mother's meal planning
	141	Family acceptance of new foods
	142	Meal pattern of child--regular or irregular?
12	151	Total number of persons in home
	152	Number of children five years or younger in home
	153	Ordinal position of child
	154	Mother's marital status
	155	Parents' occupation and education scale
	156	Income status scale
	157	Family income
	158	Mother away from child scale
	159	Stage in family life cycle
	160	Race: white vs. black
	161	Number of times moved in last three years
	162	Own or rent dwelling?
	163	Crowding index: rooms in house/persons in family
13	164	Condition of house and neighborhood scale
	165	Child's birth weight
	166	Mother's opinion that child eats too many sweets
	167	Person who decides foods to buy
	168	Frequency of grocery shopping
	169	Amount of money spent for food per week
	170	Frequency of use: convenience foods scale
	171	Family receives food stamps?
	172	Number of Basic Four named
	173	Score on Nutrition Knowledge test
	174	Calories/kg body weight
	175	Gm protein/kg body weight

APPENDIX E

Correlation Matrices

1. Multiple Group Analysis for Development of New PARI Scales

2. Final Inter-Scale Matrix

FACTOR INTERCORRELATIONS AND LOADING MATRIX

	15	85	32	84	81	14	31	55	51	53	52	62	54	82	13	11	12	33	35	34	75	73	42	44	43	41	105	104	103
15	100																												
85	53	100																											
32	39	48	100																										
84	48	36	35	100																									
81	29	32	33	43	100																								
14	43	37	27	21	29	100																							
31	38	37	42	19	25	32	100																						
55	-36	-27	-21	-31	-42	-28	-18	100																					
51	-41	-25	-17	-45	-49	-27	-28	45	100																				
53	-28	-3	0	-28	-22	-13	-2	33	29	100																			
52	-24	-28	-18	-41	-18	-17	-1	34	28	44	100																		
62	-28	-16	-16	-36	-28	-14	-13	36	18	27	30	100																	
54	-12	-11	-9	-24	-13	-11	9	26	21	10	20	21	100																
82	-25	-19	-16	-41	-13	-18	-18	23	21	6	21	46	12	100															
13	53	47	32	38	22	43	37	-32	-37	-10	-21	-9	-16	-20	100														
11	36	34	31	12	12	45	33	-12	-30	-16	-24	-7	-9	-5	44	100													
12	32	28	12	5	28	34	23	-9	-25	-12	-3	5	2	2	38	42	100												
33	52	46	51	33	38	43	63	-17	-38	-4	-16	-16	-13	-12	38	46	34	100											
35	42	42	38	28	29	36	59	-1	-31	5	-1	-1	-8	-8	37	37	37	71	100										
34	43	41	41	18	15	43	37	-6	-27	-22	-21	-6	-9	10	32	50	35	48	45	100									
75	20	21	28	17	12	10	27	-4	-18	-3	-6	-8	-9	-8	10	8	28	30	28	31	100								
73	17	15	24	21	24	7	18	-11	-31	-10	-12	-3	-13	-7	-5	9	18	34	24	28	23	100							
42	17	9	18	-1	20	23	27	-8	-15	-14	-5	-8	4	-8	7	19	27	35	24	18	5	12	100						
44	32	16	8	4	-6	12	39	-18	-20	-29	-14	-27	-5	-14	17	15	9	29	31	23	19	5	49	100					
43	16	17	5	15	21	13	22	-24	-19	-21	-22	-15	4	-9	19	11	16	24	16	24	2	12	45	26	100				
41	8	4	11	-9	6	25	39	4	-1	-5	-18	-10	-1	-9	6	22	12	41	33	34	4	4	34	34	25	100			
105	21	30	13	8	7	32	24	-2	-4	7	10	8	-8	-1	12	23	8	27	18	15	-6	7	18	15	10	22	100		
104	31	23	12	1	12	44	28	3	-13	-1	1	-2	1	-10	17	35	21	30	33	36	13	10	22	21	21	36	51	100	
103	29	14	24	10	12	36	22	-17	-24	-4	-5	-7	-19	3	13	41	16	34	27	30	8	10	11	12	4	19	41	44	100
101	19	45	10	7	16	38	27	10	-13	7	-7	-2	-10	-4	21	28	23	25	37	34	12	13	4	14	14	24	41	37	21
102	9	16	-8	10	9	12	11	-8	-15	6	-7	-8	-9	-1	10	6	-6	10	14	5	-7	-7	1	15	9	15	28	35	26
5	-1	-17	-11	-13	14	11	14	8	-2	6	17	19	3	0	4	19	19	21	-9	-9	1	-4	11	2	4	7	22	25	13
3	13	-7	4	3	15	28	11	3	-11	-3	-7	2	16	-10	11	29	28	9	8	15	-11	3	3	-4	19	19	15	37	28
7	-1	-4	-5	-1	8	28	11	1	-11	-3	4	1	1	-7	15	7	4	9	6	-1	-12	3	-11	1	1	6	16	15	26
4	3	-15	-4	-9	23	19	2	8	-3	9	29	18	22	5	2	9	14	3	6	-11	-12	-2	12	-14	-8	-8	4	9	15
6	-9	1	-3	-24	6	-2	3	7	-9	7	8	18	-4	3	10	-2	-8	2	11	-7	9	-8	7	5	12	-2	-3	3	2
1	-29	-35	-21	-15	-4	8	-17	24	12	4	19	18	18	21	-22	-18	8	-20	-15	-3	-6	-25	2	-12	-6	9	-10	-2	-2
2	-14	-21	-15	-24	-1	9	-8	4	2	-1	20	9	1	3	-12	-2	-4	-4	-9	2	-13	-3	15	4	3	12	12	9	21
22	-14	-3	-13	-21	9	14	1	7	-2	1	7	3	3	11	-8	8	19	-2	-4	-7	6	-7	22	7	-2	9	11	17	21
23	9	-3	2	-8	18	19	-7	-9	-11	-11	0	6	4	7	11	11	26	14	9	6	9	2	23	8	14	9	-9	6	21
25	2	-7	-6	-7	3	9	-4	-8	-15	2	2	-8	3	-6	14	10	12	11	8	11	7	-3	10	22	9	10	2	21	7
24	-21	-22	-8	-16	2	-13	-20	6	8	5	14	12	13	14	-12	-21	-1	-8	-8	-19	-19	-10	24	-12	2	9	-16	-8	-17
91	3	-4	3	11	18	-22	-21	-5	4	-4	-11	5	2	11	-15	-23	-5	-13	-13	-7	-2	-10	16	5	13	5	-9	-13	-17
21	-1	1	-3	-18	17	-9	-8	9	1	-14	11	-3	13	2	8	-11	11	-4	9	-2	-4	-4	5	9	1	2	-5	-2	-14
95	-14	-13	-19	-17	-21	-24	-17	7	9	-11	-1	-4	-5	-4	-9	-18	-5	-25	-23	-2	-1	-12	18	21	-9	-6	-17	-1	-24
94	13	3	-24	-18	-18	-12	-1	-1	2	-14	2	-11	-1	5	-3	-7	-2	-10	-1	14	8	-8	3	31	6	13	-7	7	-2
92	-11	-20	-35	-4	-16	-2	-15	4	7	-15	-18	-18	-6	8	-9	-8	-6	-22	-33	-11	11	-9	-17	3	-4	-6	-7	-11	-9
72	-2	1	-4	13	-18	-10	-8	-9	9	-7	-9	-16	-12	-12	-4	-18	-13	-14	-21	-2	21	-16	-23	-15	-4	-12	-18	-13	-13
83	17	6	2	11	2	7	-6	-15	-14	-13	-9	-18	-11	-8	38	12	19	-3	5	6	21	-7	13	11	-9	-7	-12	-7	-6
93	4	-8	3	2	7	-3	-12	18	-8	-8	14	1	-3	3	-17	-7	-6	-2	7	-2	-7	-14	11	-3	-8	4	8	16	3
8	18	18	-4	-1	-6	21	4	-6	-17	-12	4	-2	2	-3	17	13	13	19	17	21	8	-7	20	35	27	13	33	27	24
61	9	8	16	5	25	17	-8	-5	-16	-6	-8	-8	-3	4	23	37	21	8	13	18	10	29	18	-13	9	19	1	4	12
65	2	18	3	5	4	-11	-6	-15	5	-7	-13	-4	-22	0	-1	3	-7	-9	-19	3	25	3	0	1	1	-8	10	-7	4
64	-2	-2	-4	18	7	6	-17	-17	-6	-20	-10	-25	-6	-22	2	-4	-4	-16	-12	-1	-6	14	-2	-5	7	-4	-5	-2	-1
63	21	29	26	13	10	24	-7	-11	-13	-14	-17	-12	-10	-12	17	23	10	10	17	14	8	11	2	10	6	1	13	14	19
74	9	19	7	7	7	12	16	-10	-13	0	-10	-19	-7	-21	11	18	12	19	21	18	18	7	19	18	20	7	3	4	-8
71	-6	8	3	-7	6	-3	-8	11	4	-13	-8	-8	2	4	12	20	6	9	9	11	-3	-7	7	-2	13	13	-5	-10	-13
62	-7	-8	-7	-19	3	9	-4	-9	-2	-12	-2	-3	-3	6	12	9	1	-1	-1	10	-19	-27	15	3	24	11	-12	-7	-8
101	43	49	41	25	25	42	38	-18	-39	-8	-17	-3	-23	-16	32	44	23	40	48	58	10	25	23	20	18	26	47	48	31
102	75	72	78	65	61	62	63	-46	-49	-19	-38	-31	-19	-31	57	43	33	68	57	49	29	27	24	23	27	18	29	32	32
103	-46	-27	-23	-41	-41	-29	-17	78	59	58	64	66	58	54	-35	-23	-9	-27	-7	-19	-13	-23	-13	-30	-26	-9	2	-7	-16
104	51	43	32	28	26	52	48	-21	-39	-16	-21	-4	-8	-10	77	80	78	90	67	58	16	8	22	16	19	17	19	31	38
105	52	47	58	29	32	48	58	-11	-42	-12	-16	-10	-13	-9	33	43	39	81	77	72	61	59	27	31	22	33	19	35	36
106	32	16	14	3	15	26	44	-17	-19	-24	-21	-21	1	-14	17	23	28	45	36	35	11	12	79	73	68	67	23	35	16
107	31	36	19	18	16	44	32	-4	-20	2	-3	-3	-12	-6	23	38	18	36	37	34	7	12	16	22	16	33	74	76	66
108	2	-12	-6	-13	19	21	12	8	-10	4	15	16	11	-8	13	17	16	6	8	-4	-8	-2	6	-3	10	6	16	20	24
109	-27	-35	-22	-37	-3	3	-15	17	8	2	24	16	7	19	-21	-12	-2	-19	-14	-1	-11	-17	11	-5	-2	10	1	4	12
110	-1	-6	-7	-16	8	17	-5	1	-13	-4	4	8	4	6	8	13	25	11	6	4	8	-4	34	16	9	15	2	20	8
111	-9	-12	-8	-7	17	-20	-21	8	2	-6	7	6	14	12	-13	-29	2	-12	-8	-13	-12	-11	21	1	7	2	-14	-11	-22
112	-8	-13	-35	-17	-21	-17	-19	4	8	-10	-4	-19	-6	1	-10	-19	-6	-26	-26	8	8	-13	-2	25	-3	5	-14	-2	-14
113	18	22	18	9	13	16	-18	-17	-12	-22	-10	-22	-21	-16	28	23	16	8	7	22	16	-3	19	8	23	11	4	4	8

	101	102	5	3	7	4	6	1	2	22	23	25	24	91	21	95	94	92	72	83	93	8	61	65	64	63	74	71	45	501
101	100																													
102	41	100																												
5	12	9	100																											
3	19	23	44	100																										
7	21	13	37	40	100																									
4	7	2	45	42	29	100																								
6	15	8	29	6	32	23	100																							
1	-19	-10	24	25	18	23	15	100																						
2	4	2	38	28	30	39	18	31	100																					
22	12	12	23	11	3	12	23	20	9	100																				
23	1	-7	9	4	8	22	26	26	13	29	100																			
25	12	22	27	14	4	22	21	16	20	48	28	100																		
24	-17	6	9	-1	-5	19	22	29	24	32	20	36	100																	
91	-5	-10	-1	-9	5	4	12	12	19	16	15	23	36	100																
21	4	1	1	2	1	6	-0	20	21	21	10	21	27	23	100															
95	-18	-1	-1	-6	-12	-2	4	22	11	11	14	15	15	23	14	100														
94	0	11	-1	-1	-1	-6	17	15	13	11	8	17	4	19	25	48	100													
92	-23	-5	-3	14	3	-11	-8	19	-9	17	3	-6	-19	2	-9	31	18	100												
72	-18	-10	-14	-30	-18	-26	-4	-19	-22	-19	-7	-12	-16	5	-22	-8	-8	14	100											
83	-18	-13	6	-5	-9	3	7	6	-2	7	11	14	16	7	1	21	14	13	8	100										
93	9	16	1	10	7	11	5	6	-8	12	-7	23	13	23	10	17	24	-5	-2	-6	100									
8	27	22	23	22	17	7	11	4	25	5	13	43	7	-3	15	2	8	2	-6	-4	12	100								
61	5	-15	4	5	2	9	17	4	3	6	32	2	8	11	2	-6	-13	-6	-3	9	-5	-10	100							
65	-5	-5	2	-12	-21	-12	8	-12	-10	5	-6	-14	-16	-0	-15	5	1	20	26	-7	-3	-1	20	100						
64	-5	-7	-4	-4	4	-3	-4	-3	12	-23	10	-3	-8	1	3	6	-8	-3	10	10	-16	7	9	-2	100					
63	21	-1	-11	1	-5	1	12	-23	-2	-4	20	-1	-19	-12	2	-1	-5	-6	-3	8	6	19	24	11	19	100				
74	9	-13	1	-12	-6	-13	-5	-19	2	-23	8	7	-16	-13	-7	-10	-2	-13	20	11	-7	24	10	2	25	14	100			
71	3	-11	7	-8	-8	-11	9	-6	1	-6	11	-8	-2	-4	-9	-3	6	5	14	11	-1	2	11	17	15	5	26	100		
45	-10	-8	11	-15	4	-4	11	11	3	-6	7	1	8	-3	5	-3	3	-14	-1	7	1	-6	-8	-6	2	-20	11	17	100	
501	48	32	4	27	21	8	4	-11	13	5	6	16	-18	-5	-1	-11	-2	-17	-27	10	9	28	10	-13	-4	40	13	-13	-6	100
502	35	14	-1	14	6	3	-8	-38	-17	-7	4	-2	-19	-3	-2	-27	-10	-22	-4	8	8	9	17	3	-8	25	17	8	-5	55
503	-4	-10	11	-2	-3	21	8	25	9	7	-2	-6	15	8	5	-2	-4	-9	-13	-19	8	-8	-11	-13	-27	-23	-21	-2	-4	-29
504	31	6	19	29	11	11	3	-14	-8	8	21	15	-15	-10	-8	-14	-5	-10	-12	26	-13	18	27	-2	-2	21	17	10	8	42
505	35	4	-5	7	1	-5	2	-19	-8	-4	10	10	-19	-13	-3	-18	1	-18	-9	6	-5	17	23	1	-6	17	28	6	-11	51
506	19	13	8	13	-1	-3	8	-4	12	12	17	28	4	14	6	9	10	-8	-19	3	4	33	12	1	-2	7	22	11	17	31
507	48	46	23	19	25	11	7	-12	14	15	-3	19	-15	-15	-4	-16	3	-16	-21	-16	15	38	2	-1	-6	22	-8	-18	-18	64
508	22	16	74	48	78	71	96	31	44	21	21	26	13	4	3	-5	3	-2	-27	1	10	24	11	-10	-3	-1	-11	-3	2	18
509	-10	-5	38	32	29	38	21	21	21	18	25	22	32	17	25	20	18	8	-23	3	-1	18	4	-13	6	-15	-11	-3	9	1
510	11	12	27	13	7	25	31	28	19	76	71	76	40	25	23	27	16	6	-17	14	13	28	18	-7	-7	7	-3	2	1	12
511	-8	-8	5	-2	1	13	16	28	28	32	21	38	75	73	49	24	22	-12	-15	11	24	9	10	-14	1	-13	-16	-7	5	-11
512	-19	3	-2	3	-4	-9	6	25	8	18	11	21	0	28	13	84	75	67	0	22	16	5	-12	12	1	-5	-11	4	-6	-18
513	6	-0	6	-12	-8	-9	16	-11	8	-11	22	14	-5	3	-2	7	8	2	39	35	18	33	38	37	43	44	57	42	93	12

APPENDIX E-1

Item Names: PARI Scales

15 The child should not question the thinking of his parents
85 Child should look for answers from other people even if controdict parents
32 Child soon learns that there is no greater wisdom than parents
84 When a child thinks his parent is wrong he should say so
81 Children have every right to question their parents views
14 Its best for the child if he never gets started wondering whether his parents views are okay
31 Child should grow up convinced parents know what is right thing to do
55 Child has right to own point of view and ought to be allowed to express it
51 Children should be allowed to disagree with parents if own ideas are better
53 A childs ideas should be seriously considered in making family decisions
52 Children should be encouraged to tell parents if family rules are unreasonable
62 Parents should adjust to children sometimes
54 When child is in trouble, should know he wo't be punished for talking with parents
82 If a parent is wrong he should admit it to his child
13 Parent should never be made to look wrong in childs eyes
11 Children should never learn things outside home which make them doubt parents ideas
12 There is no excusing someone who upsets the confidence a child has in his parents
33 Loyalty to parents comes before anything else
35 Child should always love his parents above everything sele
34 More parents should teach childrentto have unquestioning loyalty to them
75 Loyalty to parents is an overemphasized virtue
73 Parents should earn loyalty from children
42 Often you have to fool children to get them to do what they should
44 You have to fool children into doing many things because they wouldn't understand
43 It's best to trick a child into doing something he doesn't want to do
41 There's no excuse wasting time explaining when you can be a little clever
105 Little use in writing public officials because don't care about average man'
104 These days a person doesn't really know who he can count on
103 Today people has to live pretty much for today and let tomorrow take care of itself
101 The lot of the average man is getting worse
102 Because of the future it us hazardly fair to bring children into it
5 One of bad things about raising children is that you aren't free enough to do as like

Appendix E-1 (Cont'd)

3	Young mother feels held down because there are lots of things she wants to do while young
7	It isn't fair that men have a chance for interesting work and most women to do jobs of home
4	Most young mothers are bothered more by feeing of being shut up in home
6	Husbands should know how hemmed in a woman feels staying at home a lot
2	One of worst things about care of a home is women feels can't get out
1	Having to be with child all the time gives women feeling wings are clipped
25	Raising children is a nerve racking job
22	The things children ask a parent after a hard days work are enough to make any lose temper
23	Its natural for parent to blow his op when children are selfish and demanding
95	There is no reason why a day with the children should be upsetting
94	Most parents never get to the point where they can't stand their children
92	A parent should keep control of his temper even when child is demanding
24	Its a rare parent who can be even tempered with his children all day
91	Most parents can spend all day with their children and remain calm and even tempered
21	Parents very often feels that they can't stand their children a moment longer
72	Children soon learn that parents were wrong about many of their ideas
83	A good parent can tolerate criticism even when children are around
93	Raising children is an easy job
8	Raising children is very much harder than most jobs men do
61	When parent asks child to do something, child should always be told why
65	Children are too often asked to do all the compromising and adjustment
64	As much as reasonable, parent should try to treat child as an equal
63	In well-run homes children should have things their own way as often are parents
74	Parents should not expect to be more esteemed than oother worth adults by child
71	Child should be taught that will love and respect many other people besides parents
45	When child does something he shouldn't, bet him interested in something else

Appendix E-1 (Cont'd)

Multiple Groups Program	Becomes
GRPC (111)	501
GRPC (15,85,32,84,81,14,31)	502
GRPC (55,51,53,52,62,54,82)	503
GRPC (13,11,12)	504
GRPC (11,35,34,75,73)	505
GRPC (42,44,43,41)	506
GRPC (105,104,103,101,102)	507
GRPC (5,3,7,4,6)	508
GRPC(1,2)	509
GRPC (22,23,25)	510
GRPC (24,91,21)	511
GRPC (95,94,92)	512
GRPC (72,83,83,8,61,65,64,63,74,71, 45)	513

Standard Score Coefficient Alphas

100 79 71 69 74 69 74 71 47

59 55 59 41

Appendix E-2. Final Inter-Scale Matrix

	1	2	3	4	5	6	7	8	9	10	11	21	22	23	24	25
1	100															
2	79	100														
3	91	75	100													
4	91	58	67	100												
5	63	74	57	51	100											
6	65	67	58	56	35	100										
7	38	50	34	31	51	44	100									
8	73	66	68	63	48	62	38	100								
9	68	82	61	56	91	47	53	66	100							
10	56	64	47	50	19	62	22	59	39	100						
11	34	21	19	41	12	32	29	34	13	31	100					
21	+11	+ 4	+15	+ 7	-13	+11	+ 2	+10	-8	+13	-14	100				
22	-25	-18	-23	-25	- 9	-36	-12	-26	-16	-21	+ 1	+45	100			
23	+10	+13	+15	+ 4	+ 4	+15	+ 1	+15	+ 7	+11	-18	-53	+26	100		
24	- 3	- 4	+ 1	- 5	-12	+ 4	- 1	- 5	-11	- 0	- 6	-66	+24	-45	100	
25	- 3	-10	- 3	- 1	- 9	+ 1	- 8	- 3	-10	-11	- 0	-32	+19	-20	-43	100
26	-12	- 9	- 5	-17	-24	- 6	- 8	- 5	-22	- 5	-27	-37	+ 8	-24	-39	-28
27	-13	- 9	- 8	-15	-15	-10	- 2	-10	-15	- 2	- 9	- 3	- 5	-14	- 2	-11
28	-20	-14	-20	-18	- 8	-12	+ 7	-21	-10	-10	-15	+27	-17	+17	+14	- 8
29	- 1	- 6	- 1	+ 0	- 1	- 7	- 3	- 9	- 7	- 8	+ 2	+ 4	+ 0	-17	- 4	-24
30	+ 7	- 6	+ 6	+ 9	+ 3	- 8	- 7	- 3	+ 2	- 2	- 2	+11	- 7	+17	+16	-10
31	- 9	- 9	-12	- 5	- 8	+ 3	+ 3	-14	- 9	- 2	+ 5	+26	+ 5	+18	+19	- 4
32	- 6	- 6	-11	+ 1	+13	-16	0	- 9	10	-15	25	55	-35	36	52	31
41	-13	- 2	-11	+16	- 5	- 2	1	-18	- 4	- 4	- 8	-12	1	- 0	-18	3
42	15	14	10	16	14	11	6	10	12	20	6	12	1	7	12	9
43	16	13	18	12	5	6	- 4	22	9	8	5	6	- 7	- 8	6	-14
44	- 0	8	6	- 8	2	2	-21	11	- 3	9	-2	6	-12	- 3	6	1
45	10	18	4	11	9	19	19	1	12	13	20	7	3	11	22	16
46	1	10	- 1	0	- 6	15	5	- 4	3	21	7	2	- 3	- 1	- 3	1
47	7	5	- 0	13	- 4	11	1	15	4	11	9	-14	20	-10	- 9	-11
48	20	14	13	22	- 1	27	8	19	7	15	5	-17	9	4	-15	-20
51	8	24	7	1	19	14	21	18	24	10	12	14	-16	13	- 2	7

Appendix E-2 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	21	22	23	24	25
52	5	14	3	3	9	13	15	12	13	4	17	17	-20	24	4	8
53	13	27	12	8	22	18	24	23	27	12	14	16	-13	13	2	7
54	10	16	7	8	10	18	16	19	14	6	18	20	-20	24	7	8
55	7	22	8	- 1	14	12	13	16	18	9	6	17	- 7	4	- 1	- 2
56	7	19	7	3	13	10	8	20	17	9	- 2	5	- 3	4	6	3
57	7	22	11	- 1	15	13	14	17	19	9	- 0	1	2	0	- 7	- 2
58	13	25	8	11	23	14	23	15	25	21	17	14	- 9	3	- 0	12
59	12	18	5	12	12	20	16	14	14	22	18	12	-11	16	4	10
60	7	21	3	4	20	8	23	12	23	11	15	13	-13	- 2	- 5	11
61	10	15	6	8	10	17	17	19	15	7	19	17	-18	22	5	7
62	7	19	5	4	24	- 2	18	6	24	8	6	10	- 3	-14	- 6	8
71	- 8	- 1	-10	- 7	7	1	1	- 4	7	1	- 1	19	-12	16	14	18
72	- 1	- 0	- 4	2	- 2	4	- 4	- 4	- 0	6	1	15	- 9	6	8	9
73	1	2	- 1	2	1	11	0	3	4	5	2	17	- 4	10	13	15
74	-13	-11	-20	- 6	-12	3	- 9	- 8	-12	3	0	9	- 8	- 1	6	7
75	- 8	- 2	-14	- 3	- 6	6	3	- 3	- 4	7	2	8	-10	- 1	7	11
76	- 9	- 9	- 8	- 6	- 6	2	-10	- 6	- 5	- 3	- 2	8	0	6	6	12
77	- 8	3	-10	- 7	- 6	7	- 3	2	- 3	12	1	4	0	- 1	3	13
78	- 8	- 0	- 7	-10	5	- 4	2	- 1	5	- 3	- 3	15	- 2	10	21	14
79	0	8	4	- 5	5	10	1	14	8	7	- 3	12	- 3	11	12	5
80	- 4	5	-24	8	6	- 9	7	6	18	17	3	6	19	8	3	- 1
81	- 0	11	-24	13	3	- 0	10	18	24	33	9	10	20	18	9	- 1
91	- 8	-20	- 9	- 3	-21	- 7	-23	- 4	-18	- 1	+ 1	+19	-15	+12	+17	- 4
92	+11	+15	+ 3	+15	+30	+ 3	+ 5	+ 5	+27	+ 4	+17	+33	-23	+16	+41	+41
93	- 3	- 8	+ 3	- 7	-13	- 1	+ 6	+ 3	-11	- 1	-22	-42	+27	-30	-40	-40
94	+ 1	+11	+ 2	- 3	+12	+ 6	+ 8	+ 1	+ 9	- 1	+17	- 3	-27	+ 2	-12	+ 4
95	+ 0	- 1	+ 3	- 3	- 3	- 1	- 1	+10	- 2	0	+17	-18	-16	- 9	-28	- 3
96	12	0	9	14	- 7	12	11	11	- 3	9	3	-22	13	3	-14	-14
97	- 2	- 4	- 1	- 2	-13	- 0	- 7	- 4	-14	4	- 8	+32	- 9	+37	+43	+29
98	7	2	8	7	- 0	0	- 7	4	- 0	12	-10	+17	-27	+11	+ 7	+ 1
99	- 5	8	- 5	- 7	8	- 6	5	- 1	6	- 5	2	-31	+14	-21	-33	-20

Appendix E-2 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	21	22	23	24	25
100	- 4	3	- 8	- 2	3	- 2	- 2	- 4	5	1	1	+24	- 6	+15	+23	+16
101	-13	-16	- 9	-14	-12	- 8	- 5	- 1	-11	-20	-10	+ 8	-11	- 6	+ 5	+10
102	- 8	-11	- 7	- 6	- 2	- 3	- 3	- 9	- 6	-16	- 0	-24	+ 8	-19	-31	-23
103	- 2	1	- 3	- 1	5	0	5	- 2	7	- 1	16	-38	+32	-26	-23	-10
104	13	13	13	10	7	12	1	2	10	5	12	-11	+15	- 6	+ 1	- 4
111	- 8	1	- 8	-10	8	- 6	6	- 6	4	- 3	2	- 6	+10	- 1	+ 2	- 8
112	10	5	5	13	3	5	- 6	8	4	10	9	-13	- 5	- 2	-31	-22
113	-13	-14	-11	-11	-14	-21	- 1	- 6	- 7	- 5	0	- 4	+ 9	+ 4	+10	+ 3
114	14	19	12	12	16	15	20	12	19	13	15	- 9	+ 3	-10	- 7	-24
115	8	17	12	2	5	18	22	12	5	13	8	+27	-23	+14	+27	+15
116	3	3	3	3	5	0	- 7	9	8	8	2	-24	+13	-18	- 9	-38
117	3	8	3	2	12	0	11	4	12	- 2	- 2	-21	+ 7	- 8	- 5	-21
118	21	13	26	13	- 7	24	- 3	23	- 1	32	2	+26	-20	+17	+16	+11
119	- 1	- 1	- 5	2	-11	- 1	- 8	4	- 5	10	10	+19	+ 6	+30	+19	+ 9
120	- 4	- 3	- 4	- 3	-11	- 5	1	-12	-11	6	23	-13	+10	-17	-10	-14
121	-17	-11	-18	-14	-17	- 6	- 3	-19	-18	- 8	-14	+17	+ 6	+15	+24	+25
122	-17	-24	-20	-10	-17	-24	-20	-18	-18	-14	-13	+ 3	+ 2	+ 5	+ 0	+16
123	8	3	5	9	3	2	1	3	0	- 4	11	+13	+12	+11	+ 7	+ 3
124	1	6	- 9	9	9	- 1	- 5	-11	9	10	1	+ 6	- 4	+ 9	+ 3	- 1
125	- 0	- 1	- 1	0	- 0	2	- 1	1	0	- 2	2	+ 9	- 4	- 7	+15	-10
126	4	2	5	3	- 1	- 4	- 0	4	2	5	13	- 2	- 6	-10	+ 5	+12
127	- 1	- 6	1	0	-11	-10	-14	1	- 8	- 1	1	- 5	+ 5	- 2	- 5	+ 8
128	- 2	8	0	- 6	6	2	- 6	- 1	7	- 3	-24	+15	- 8	+18	+18	+14
129	9	10	9	6	- 3	7	- 9	6	3	8	14	- 5	+11	+ 0	- 1	- 6
130	- 1	- 6	- 3	4	-12	7	- 2	- 1	-10	5	-10	+15	-19	+11	+ 4	+17
131	1	4	2	- 1	- 4	14	1	- 4	- 9	3	-10	+48	-30	+28	+44	+27
132	- 2	- 0	1	- 3	8	-14	8	3	7	-12	2	-14	+15	+ 1	-19	-12
133	-18	0	-11	-26	- 3	3	- 9	- 7	- 3	- 5	-23	-15	-11	- 6	-16	- 1
134	16	9	15	14	4	7	-11	15	4	8	- 9	+19	- 2	- 0	+ 6	- 5
135	- 8	- 3	-13	- 3	11	- 7	10	-10	3	-19	17	-25	+11	-10	- 3	+ 7
136	7	- 4	3	12	2	- 3	-12	4	3	4	4	-30	+18	- 5	-30	-34

Appendix E-2 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	21	22	23	24	25
137	- 0	8	1	- 5	21	2	14	3	16	- 2	13	-19	+17	- 8	-17	-12
138	-13	-15	-21	- 3	- 8	-15	- 7	2	- 3	-11	- 6	-11	+ 9	-17	-14	1
139	5	7	7	1	2	0	- 6	10	7	18	- 2	+ 8	- 5	+ 9	- 2	- 8
140	9	13	7	9	11	12	11	1	16	21	- 0	+11	- 7	+ 3	- 4	- 6
141	- 6	-10	- 9	- 1	-10	-15	-12	- 5	-10	- 5	-16	+11	- 9	+12	+ 2	+10
142	1	- 3	- 2	5	6	- 8	1	- 0	1	- 9	- 3	+20	-12	+23	+ 8	+20
151	1	4	3	- 2	- 5	9	14	5	- 4	8	- 4	+29	-15	+16	+38	+35
152	12	12	9	12	6	15	- 3	8	4	14	4	+31	-26	+22	+28	+14
153	- 3	- 0	2	- 6	- 8	- 0	18	7	- 3	3	-11	+20	- 7	+10	+28	+24
154	5	3	8	3	- 9	- 2	-13	2	- 5	2	-21	+29	-11	+17	+18	-12
155	-10	-10	-10	- 7	7	-18	- 4	-11	6	-15	12	-48	+32	-43	-49	-37
156	1	4	5	- 3	- 6	3	-10	9	- 0	9	-21	+10	- 8	+26	+ 9	- 5
157	-10	-11	- 5	-11	- 8	-16	-10	- 2	- 8	-11	19	-33	+16	-12	-31	-21
158	- 6	-10	0	-10	-14	-14	-16	- 4	-13	-10	- 5	+ 1	- 2	+13	-11	-14
159	- 6	- 3	- 2	- 9	-17	2	6	6	- 8	8	-11	+14	-11	+ 5	+22	+21
160	12	12	20	2	- 5	10	1	19	2	13	-10	+19	- 4	+25	+11	-10
161	- 8	7	-14	- 4	11	2	- 3	- 2	13	9	- 6	0	-25	14	+ 2	- 9
162	- 6	1	- 5	- 7	8	4	1	- 8	4	6	- 8	-13	- 5	-11	- 7	- 8
163	2	- 7	- 1	5	- 3	-14	- 9	6	1	- 8	10	-12	+12	- 8	-20	-16
164	2	- 1	0	6	14	-13	- 8	4	14	-10	10	-20	+15	-16	-16	-27
165	-18	-13	-23	-12	- 4	-10	- 4	-11	- 9	-11	13	-17	+11	-24	- 3	- 8
166	8	- 4	9	9	-10	9	- 3	0	- 9	3	- 0	+14	-11	+ 4	+12	+14
167	- 1	12	1	- 7	3	10	0	9	7	14	3	-12	- 0	+ 1	- 6	+ 4
168	18	17	16	17	24	12	10	17	22	12	- 8	- 1	- 4	- 7	- 8	-35
169	1	7	8	- 7	- 3	1	2	2	1	13	- 9	+17	-12	+20	+11	+25
170	12	- 6	10	16	- 2	- 1	8	9	1	5	7	+ 3	+13	- 2	+ 9	+ 7
171	8	12	11	2	0	8	13	12	3	10	- 5	+25	-16	+15	+21	+19
172	16	15	6	22	19	11	- 3	12	20	10	22	25	-17	12	22	22
173	6	5	- 3	13	20	- 8	3	- 1	19	1	15	44	-18	38	42	45
174	82	59	75	77	45	47	23	55	50	46	23	-20	23	-14	- 2	- 0
175	66	82	65	49	59	51	35	51	66	53	10	-11	17	-19	2	8

Appendix E-2 (Cont'd)

	26	27	28	29	30	31	32	41	42	43	44	45	46	47	48	51
26	100															
27	-27	100														
28	- 5	-46	100													
29	- 7	-28	-28	100												
30	+19	- 9	-35	-40	100											
31	+11	+ 2	-20	-22	-16	100										
32	60	16	1	10	- 9	-14	100									
41	- 4	2	8	1	10	1	- 5	100								
42	18	8	- 2	- 5	4	-15	25	8	100							
43	16	- 2	- 5	- 7	- 3	-16	14	-17	6	100						
44	- 4	- 8	- 1	- 6	1	4	- 6	-12	- 8	45	100					
45	- 4	-10	-19	- 8	-16	-14	0	- 0	-18	-16	-23	100				
46	-13	- 4	- 9	9	5	-11	- 7	18	- 3	4	-10	37	100			
47	- 0	2-	10	- 0	3	-12	- 1	- 2	11	16	3	-11	- 6	100		
48	-12	1	- 1	3	4	- 3	-22	-18	-10	6	1	4	3	33	100	
51	22	21	-10	13	- 6	- 2	20	11	6	29	14	2	0	-17	3	100
52	20	15	- 9	19	1	3	22	10	- 5	19	13	- 5	-11	6	13	77
53	25	20	-10	15	- 8	- 3	22	- 4	3	32	12	2	- 4	17	7	96
54	19	17	- 9	22	4	3	21	- 1	- 3	23	16	-12	-12	7	19	73
55	18	2	-14	6	- 7	- 6	11	- 4	8	29	24	- 1	- 5	18	11	79
56	12	7	-15	3	-12	1	- 1	- 5	4	27	12	6	5	13	- 1	62
57	7	12	-13	4	-16	- 2	- 2	- 2	1	- 0	27	12	7	16	0	72
58	29	20	2	5	5	- 4	31	10	49	28	8	- 6	- 1	24	1	61
59	24	19	- 1	9	8	- 5	26	12	59	21	7	-19	- 8	15	17	43
60	25	15	1	8	3	5	25	6	1	29	13	7	1	17	2	68
61	21	17	- 7	21	2	4	21	3	- 4	24	17	- 8	-10	11	25	72
62	19	6	2	- 3	- 3	- 0	20	2	10	22	4	15	8	16	-22	49
71	26	7	- 5	18	- 1	-12	26	4	17	11	8	13	- 8	4	- 5	32
72	20	6	-12	0	- 8	- 7	19	12	32	27	- 3	4	- 1	13	0	32
73	22	13	- 7	11	- 6	- 6	25	7	21	28	9	- 1	- 6	15	- 1	42
74	11	2	-10	- 2	- 1	- 7	- 3	2	18	7	13	- 5	- 3	8	- 2	15

Appendix E-2 (Cont'd)

	26	27	28	29	30	31	32	41	42	43	44	45	46	47	48	51
75	12	5	-15	2	- 0	- 5	6	- 4	15	17	7	- 0	- 3	17	9	32
76	16	11	1	13	- 2	- 4	14	5	1	4	13	- 5	- 8	6	- 7	19
77	15	5	- 8	5	2	- 4	7	10	21	27	19	-13	- 7	18	6	41
78	29	12	- 5	- 4	-16	-10	31	5	16	19	-10	13	- 4	5	- 8	38
79	16	17	- 4	- 5	-19	-10	13	16	4	19	- 0	7	6	3	-10	36
80	12	15	7	16	5	-19	7	17	6	14	17	23	24	25	-10	10
81	24	19	4	14	5	-28	17	8	27	12	12	12	13	33	- 5	35
91	+ 8	-26	-15	- 8	-12	- 2	-13	- 1	+ 3	+ 3	+15	+ 6	- 8	- 5	- 5	- 6
92	+39	+33	+13	+13	11	- 9	+37	- 0	+10	+ 2	- 9	+ 3	+ 0	+12	- 8	+ 7
93	-54	-26	- 6	-22	+ 6	+10	-45	+ 8	- 3	-11	- 2	- 5	+ 1	- 7	+ 1	-16
94	+ 1	+12	+19	+22	+26	+23	+15	+10	- 5	-27	-11	+ 2	+16	- 2	+ 2	+15
95	- 6	+ 3	+29	+18	+24	+30	+ 0	+ 7	- 6	-27	-10	-17	- 2	- 1	+ 5	- 1
96	- 1	10	13	7	- 4	2	- 9	5	- 8	- 7	- 1	- 8	- 6	7	23	3
97	+36	+10	- 2	+15	- 4	+19	-27	-10	- 7	5	- 6	- 5	4	2	7	-14
98	+ 5	+ 3	-21	-11	- 6	- 7	-20	9	4	- 0	-11	4	10	2	- 5	- 8
99	-12	- 6	+ 2	- 5	-17	- 3	25	- 8	1	- 1	3	- 9	-13	8	- 4	2
100	- 4	- 8	+ 3	+ 8	+17	- 1	-18	4	-15	-13	- 8	2	4	14	11	1
101	+10	+ 3	+14	+14	+10	+ 6	- 0	8	5	18	11	-21	-10	2	- 1	11
102	- 3	+ 8	+13	+ 3	- 3	+ 1	10	2	13	7	17	8	6	-22	-21	5
103	-12	+ 8	+14	+ 1	+13	15	27	- 3	2	- 1	2	18	4	-15	2	4
104	-13	- 5	+ 2	-12	- 3	+ 5	9	0	3	- 8	- 2	5	- 0	3	5	14
111	-18	+ 6	+ 7	- 2	- 1	-11	6	22	9	- 2	- 3	-14	- 4	- 4	- 7	8
112	-27	- 9	-16	+ 5	+18	23	-20	8	15	3	11	- 6	9	- 6	-17	-12
113	- 6	+ 9	+ 9	+ 7	- 3	- 7	15	- 0	6	- 6	-26	- 9	- 9	- 1	-10	19
114	-17	-15	-11	-11	-10	0	10	- 4	12	- 7	- 7	3	- 7	- 0	4	16
115	+21	-12	-11	- 2	- 7	- 3	-43	15	-14	-25	- 7	6	6	4	3	23
116	-11	- 9	- 3	- 8	+17	- 7	18	- 5	5	4	5	13	1	- 9	-15	9
117	-10	- 0	+12	+ 2	- 1	+ 6	22	5	3	- 3	- 4	17	- 1	- 5	- 1	26
118	+19	- 3	-18	- 5	- 9	- 3	-26	- 2	- 2	2	7	5	2	4	19	- 9
119	+17	+11	- 7	+ 6	- 2	-18	- 9	2	-11	- 3	5	7	9	- 2	- 6	1
120	-16	- 3	-10	- 4	- 6	+ 7	12	16	16	- 6	2	2	26	- 8	- 7	7

Appendix E-2 (Cont'd)

	26	27	28	29	30	31	32	41	42	43	44	45	46	47	48	51
121	+24	+ 3	+ 5	+ 3	- 8	+ 2	-32	- 4	-20	-21	- 7	0	12	9	16	-17
122	+21	+ 7	+ 3	+ 1	+ 5	+ 6	-14	-10	-14	7	13	-15	- 6	- 6	- 8	-32
123	-11	+ 2	-22	- 3	- 3	-19	- 1	- 1	-15	11	18	- 0	-13	2	11	-15
124	- 1	+ 5	+ 6	- 8	- 5	- 4	- 9	- 8	- 6	-14	1	1	4	17	10	- 3
125	0	- 5	-15	- 8	+ 6	-14	- 3	10	9	-16	- 5	-15	-17	4	5	- 8
126	-10	+ 5	+ 8	-10	+12	- 8	9	14	16	12	- 7	-17	- 1	- 5	- 8	13
127	+ 4	+ 3	+ 8	+13	+ 7	+ 4	- 2	- 7	- 6	- 1	7	20	2	3	-14	4
128	+25	+ 4	+ 8	- 8	- 3	-14	-31	1	-44	1	16	19	19	- 7	- 0	2
129	+24	+ 9	- 3	+ 8	+ 5	- 1	-12	- 6	-19	- 8	-10	24	19	- 1	7	- 1
130	+19	+20	+12	+10	- 9	-11	-34	3	- 4	- 5	3	2	5	6	7	- 8
131	+35	+ 7	-16	- 2	-26	-27	-35	4	3	- 2	1	-14	3	7	8	-16
132	-15	- 4	- 6	- 0	+ 4	+ 1	18	- 3	5	- 1	-17	9	- 8	- 1	- 2	17
133	+12	+ 5	+15	- 5	-10	+ 7	-20	- 2	3	4	3	- 2	6	- 3	2	- 4
134	+ 7	+ 5	-19	- 6	- 1	-12	- 7	-19	9	- 5	2	- 2	-16	- 7	15	-15
135	-14	- 5	+10	+ 2	+ 2	+24	16	- 6	4	28	4	- 1	- 2	7	- 0	24
136	-31	-14	- 3	+ 6	+ 4	+ 4	37	5	16	1	- 8	- 9	-15	- 2	-14	- 3
137	-17	- 9	+ 7	+ 7	+13	- 1	29	10	13	23	- 0	4	- 0	- 2	- 6	13
138	- 7	- 8	+12	+ 1	+ 8	+ 8	4	-22	- 5	6	5	7	- 8	0	- 4	- 7
139	-13	+ 2	+ 1	- 1	+12	-11	- 0	- 3	- 1	9	2	-10	0	- 1	- 4	12
140	-19	+ 8	-16	-24	- 8	- 6	10	- 7	7	5	- 1	12	14	0	7	- 8
141	+18	- 9	- 7	+14	- 4	+15	-10	- 6	- 2	12	18	3	- 1	- 2	- 1	-22
142	+22	+ 4	-19	+ 7	-18	-14	-14	- 8	-11	- 1	3	-13	-28	12	1	-25
151	+33	+ 7	+ 6	+ 4	- 7	- 1	-37	15	0	-19	-17	- 4	15	10	4	9
152	+23	- 4	-23	- 3	-10	-12	-36	- 0	- 4	-16	5	- 1	12	27	7	- 9
153	+30	+15	+14	+ 7	- 2	-12	-30	13	- 9	-19	-22	1	6	- 8	1	12
154	+40	+25	-11	+ 6	- 1	-20	-44	5	-14	-20	2	7	2	-16	- 4	-25
155	-57	- 3	+ 8	-15	+16	+ 8	85	- 5	16	17	- 1	1	- 9	-14	-20	15
156	+35	+24	- 3	+17	- 2	-12	-36	12	-11	- 6	6	11	14	-12	- 7	-20
157	-36	-14	- 4	+ 1	- 2	+ 4	54	3	14	3	- 7	- 5	- 4	11	-23	12
158	+ 5	+19	+ 4	- 3	+10	-17	14	- 5	- 1	- 9	2	- 2	- 4	-10	-16	2
159	+29	+10	+10	+15	- 4	- 0	-21	16	11	-16	-25	- 6	2	- 0	3	9

Appendix E-2 (Cont'd)

	26	27	28	29	30	31	32	41	42	43	44	45	46	47	48	51
160	+32	+21	-13	-10	-18	-36	-23	9	- 1	-20	2	-15	11	-15	-11	-17
161	- 5	+ 8	+10	+ 2	- 9	+ 1	-14	- 1	-11	- 3	- 5	17	16	-11	- 1	- 5
162	0	+ 4	+ 7	+ 4	+10	+12	4	2	- 7	14	16	2	6	-17	1	- 9
163	-25	- 2	+ 0	- 6	- 1	-13	21	- 9	10	5	4	-10	-18	1	-13	- 4
164	-27	- 2	-19	-13	+ 6	-15	52	- 5	- 5	- 1	-11	8	- 6	- 7	-20	6
165	-21	-12	+12	- 8	+ 0	+ 1	9	18	- 8	-25	- 3	-10	-12	4	-12	23
166	+17	+ 7	- 4	+ 7	+13	- 5	-22	- 7	-11	- 3	7	3	10	0	5	- 2
167	+ 3	+21	+15	-13	- 2	- 9	6	4	-15	- 3	3	9	7	- 5	- 5	9
168	+ 2	-14	-15	-10	+ 5	0	- 5	-14	- 1	-14	10	5	0	- 4	4	-10
169	+19	- 6	- 2	+15	- 9	+13	-27	9	- 3	- 0	- 7	5	21	0	- 9	6
170	- 1	- 0	- 3	- 8	+13	- 4	- 0	- 8	7	- 7	- 1	9	4	4	4	- 8
171	+32	+ 9	+ 1	+11	- 8	- 4	-45	- 4	-12	-11	1	8	26	- 1	11	-12
172	33	17	8	14	- 5	2	41	- 8	4	16	5	14	5	0	- 6	26
173	43	10	-10	12	-17	-11	47	- 7	15	- 5	-17	25	- 3	- 9	- 1	7
174	- 1	- 1	20	- 2	- 6	13	-21	-16	-14	- 3	- 6	15	4	- 8	17	-33
175	- 5	- 5	17	1	6	13	-21	- 5	-15	- 6	1	24	12	-12	9	-19

Appendix E-2 (Cont'd)

	52	53	54	55	56	57	58	59	60	61	62	71	72	73	74	75
52	100															
53	75	100														
54	96	75	100													
55	50	81	49	100												
56	21	61	18	59	100											
57	24	71	21	66	86	100										
58	44	58	42	51	22	29	100									
59	54	39	54	26	5	6	80	100								
60	54	67	51	57	23	34	86	54	100							
61	94	71	94	46	17	19	48	60	58	100						
62	8	49	5	54	28	39	67	11	77	6	100					
71	26	34	22	35	21	25	28	25	22	21	16	100				
72	17	32	17	36	30	32	33	32	20	17	16	65	100			
73	26	43	26	44	41	43	33	30	25	25	17	70	87	100		
74	9	16	9	19	10	12	20	18	13	8	11	43	55	57	100	
75	18	34	19	35	29	31	29	22	24	16	20	47	59	60	80	100
76	9	21	9	30	24	23	12	5	12	6	13	66	68	88	55	51
77	19	40	18	41	41	46	30	24	21	16	18	46	60	63	70	83
78	11	38	7	42	40	46	31	16	26	10	31	50	54	60	30	38
79	14	34	11	31	47	53	11	8	9	11	6	35	42	52	15	19
80	- 9	0	-13	1	19	23	8	- 4	8	- 9	22	29	5	15	2	- 1
81	12	26	10	24	34	35	36	22	32	14	37	38	24	35	14	10
91	+ 4	- 8	+ 4	- 4	- 5	-13	- 3	+ 3	- 4	+ 3	- 6	+ 1	+ 5	+ 5	- 1	+ 2
92	+13	+ 7	+14	- 4	- 8	-10	+17	+16	+15	+12	+ 9	+14	+15	+ 9	+11	+13
93	-21	-19	-22	-12	- 3	- 2	-12	-12	-12	-20	- 4	-12	-12	-13	- 5	-10
94	+17	+14	+17	+ 9	- 1	+ 1	+14	+11	+20	+19	+10	- 2	- 4	- 8	- 4	- 3
95	+ 8	- 3	+ 7	- 5	-14	-13	+ 7	-10	+12	+10	+ 1	-13	-18	-21	-18	-18
96	5	4	7	3	2	- 2	5	4	9	10	4	5	3	9	4	7
97	-14	-12	-13	- 6	-14	-10	- 8	- 8	- 7	-14	- 4	-13	-11	-20	- 5	- 4
98	-15	- 9	-17	-11	- 6	- 0	5	- 1	2	-12	8	-14	- 3	- 9	-17	-10

Appendix E-2 (Cont'd)

	52	53	54	55	56	57	58	59	60	61	62	71	72	73	74	75
99	12	5	16	- 1	- 7	- 9	5	11	5	13	- 4	- 0	-10	- 3	- 1	3
100	- 7	- 2	- 9	- 3	13	16	-15	-15	-11	-12	- 7	- 1	0	- 2	- 1	- 2
101	13	8	11	19	9	9	- 5	- 0	- 9	6	- 9	16	3	12	5	2
102	- 3	2	- 3	3	15	6	- 8	-11	-13	- 6	1	4	11	16	9	1
103	11	2	10	7	- 3	- 7	8	10	10	12	2	5	4	2	9	2
104	16	15	14	11	0	6	12	12	12	15	6	6	6	1	2	3
111	3	5	- 0	19	15	9	10	6	7	1	9	11	25	17	4	8
112	-12	-12	- 8	-17	-20	-27	6	- 2	3	-10	10	- 4	-10	-12	4	- 2
113	10	18	8	17	17	15	19	11	19	4	19	- 9	- 0	- 2	- 2	0
114	24	18	27	9	- 8	- 5	17	19	14	25	4	11	- 4	1	4	9
115	9	22	6	25	28	36	4	- 3	11	4	11	- 8	-16	- 7	- 3	4
116	12	11	13	- 1	- 9	- 3	13	7	14	14	11	3	- 0	- 2	- 0	- 4
117	16	26	16	28	13	16	26	8	30	12	32	0	7	6	7	6
118	- 5	- 7	- 7	- 6	0	- 3	- 8	- 0	-11	- 2	-15	6	1	1	- 4	- 4
119	3	- 3	- 2	- 3	- 3	- 3	- 6	- 7	0	- 1	2	- 6	-14	-11	- 1	3
120	17	1	16	6	- 8	-10	11	22	3	14	- 7	2	8	3	2	3
121	-15	-19	-16	-20	- 6	- 9	-19	-16	-14	-12	-14	-16	- 9	-15	- 2	4
122	-25	-35	-26	-24	-21	-24	-25	-25	-20	-27	-11	-16	-24	-26	- 2	-10
123	0	-11	0	- 8	-25	-21	- 5	- 3	3	2	- 5	13	2	- 1	2	- 3
124	- 1	- 1	- 2	- 1	0	- 1	2	- 1	4	2	2	6	5	- 2	- 2	8
125	- 3	-10	- 2	- 5	-18	-12	- 3	5	- 7	- 2	- 9	- 3	2	- 3	- 6	- 8
126	1	10	- 3	17	24	22	15	17	8	0	6	- 8	11	11	-11	- 7
127	- 2	4	- 1	3	4	6	-12	-17	- 9	- 5	0	- 7	- 8	-10	-12	-10
128	- 5	0	- 8	2	5	10	-25	-34	- 3	- 5	1	1	-19	-13	-10	- 8
129	4	2	3	- 3	- 0	- 1	-12	-14	- 4	2	- 3	- 9	-15	-15	-18	-12
130	-11	- 8	-11	2	2	- 0	- 3	- 7	- 0	-10	7	-27	-11	-12	- 2	- 4
131	-22	-17	-20	-16	- 3	- 0	- 2	0	- 6	-15	- 4	-17	-12	-16	- 3	- 9
132	12	14	13	11	14	7	16	7	17	10	18	4	- 2	5	- 2	9
133	- 4	- 0	- 2	3	9	7	- 9	- 4	-13	- 6	- 8	5	5	4	- 0	- 0
134	- 1	-12	2	- 8	-10	-19	- 3	8	- 9	3	-16	- 2	- 4	- 4	- 1	- 2
135	15	25	17	23	11	20	18	11	18	13	17	14	17	21	14	18

Appendix E-2 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	21	22	23	24	25
52	5	14	3	3	9	13	15	12	13	4	17	17	-20	24	4	8
53	13	27	12	8	22	18	24	23	27	12	14	16	-13	13	2	7
54	10	16	7	8	10	18	16	19	14	6	18	20	-20	24	7	8
55	7	22	8	- 1	14	12	13	16	18	9	6	17	- 7	4	- 1	- 2
56	7	19	7	3	13	10	8	20	17	9	- 2	5	- 3	4	6	3
57	7	22	11	- 1	15	13	14	17	19	9	- 0	1	2	0	- 7	- 2
58	13	25	8	11	23	14	23	15	25	21	17	14	- 9	3	- 0	12
59	12	18	5	12	12	20	16	14	14	22	18	12	-11	16	4	10
60	7	21	3	4	20	8	23	12	23	11	15	13	-13	- 2	- 5	11
61	10	15	6	8	10	17	17	19	15	7	19	17	-18	22	5	7
62	7	19	5	4	24	- 2	18	6	24	8	6	10	- 3	-14	- 6	8
71	- 8	- 1	-10	- 7	7	1	1	- 4	7	1	- 1	19	-12	16	14	18
72	- 1	- 0	- 4	2	- 2	4	- 4	- 4	- 0	6	1	15	- 9	6	8	9
73	1	2	- 1	2	1	11	0	3	4	5	2	17	- 4	10	13	15
74	-13	-11	-20	- 6	-12	3	- 9	- 8	-12	3	0	9	- 8	- 1	6	7
75	- 8	- 2	-14	- 3	- 6	6	3	- 3	- 4	7	2	8	-10	- 1	7	11
76	- 9	- 9	- 8	- 6	- 6	2	-10	- 6	- 5	- 3	- 2	8	0	6	6	12
77	- 8	3	-10	- 7	- 6	7	- 3	2	- 3	12	1	4	0	- 1	3	13
78	- 8	- 0	- 7	-10	5	- 4	2	- 1	5	- 3	- 3	15	- 2	10	21	14
79	0	8	4	- 5	5	10	1	14	8	7	- 3	12	- 3	11	12	5
80	- 4	5	-24	8	6	- 9	7	6	18	17	3	6	19	8	3	- 1
81	- 0	11	-24	13	3	- 0	10	18	24	33	9	10	20	18	9	- 1
91	- 8	-20	- 9	- 3	-21	- 7	-23	- 4	-18	- 1	+ 1	+19	-15	+12	+17	- 4
92	+11	+15	+ 3	+15	+30	+ 3	+ 5	+ 5	+27	+ 4	+17	+33	-23	+16	+41	+41
93	- 3	- 8	+ 3	- 7	-13	- 1	+ 6	+ 3	-11	- 1	-22	-42	+27	-30	-40	-40
94	+ 1	+11	+ 2	- 3	+12	+ 6	+ 8	+ 1	+ 9	- 1	+17	- 3	-27	+ 2	-12	+ 4
95	+ 0	- 1	+ 3	- 3	- 3	- 1	- 1	+10	- 2	0	+17	-18	-16	- 9	-28	- 3
96	12	0	9	14	- 7	12	11	11	- 3	9	3	-22	13	3	-14	-14
97	- 2	- 4	- 1	- 2	-13	- 0	- 7	- 4	-14	4	- 8	+32	- 9	+37	+43	+29
98	7	2	8	7	- 0	0	- 7	4	- 0	12	-10	+17	-27	+11	+ 7	+ 1
99	- 5	8	- 5	- 7	8	- 6	5	- 1	6	- 5	2	-31	+14	-21	-33	-20

Appendix E-2 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	21	22	23	24	25
100	- 4	3	- 8	- 2	3	- 2	- 2	- 4	5	1	1	+24	- 6	+15	+23	+16
101	-13	-16	- 9	-14	-12	- 8	- 5	- 1	-11	-20	-10	+ 8	-11	- 6	+ 5	+10
102	- 8	-11	- 7	- 6	- 2	- 3	- 3	- 9	- 6	-16	- 0	-24	+ 8	-19	-31	-23
103	- 2	1	- 3	- 1	5	0	5	- 2	7	- 1	16	-38	+32	-26	-23	-10
104	13	13	13	10	7	12	1	2	10	5	12	-11	+15	- 6	+ 1	- 4
111	- 8	1	- 8	-10	8	- 6	6	- 6	4	- 3	2	- 6	+10	- 1	+ 2	- 8
112	10	5	5	13	3	5	- 6	8	4	10	9	-13	- 5	- 2	-31	-22
113	-13	-14	-11	-11	-14	-21	- 1	- 6	- 7	- 5	0	- 4	+ 9	+ 4	+10	+ 3
114	14	19	12	12	16	15	20	12	19	13	15	- 9	+ 3	-10	- 7	-24
115	8	17	12	2	5	18	22	12	5	13	8	+27	-23	+14	+27	+15
116	3	3	3	3	5	0	- 7	9	8	8	2	-24	+13	-18	- 9	-38
117	3	8	3	2	12	0	11	4	12	- 2	- 2	-21	+ 7	- 8	- 5	-21
118	21	13	26	13	- 7	24	- 3	23	- 1	32	2	+26	-20	+17	+16	+11
119	- 1	- 1	- 5	2	-11	- 1	- 8	4	- 5	10	10	+19	+ 6	+30	+19	+ 9
120	- 4	- 3	- 4	- 3	-11	- 5	1	-12	-11	6	23	-13	+10	-17	-10	-14
121	-17	-11	-18	-14	-17	- 6	- 3	-19	-18	- 8	-14	+17	+ 6	+15	+24	+25
122	-17	-24	-20	-10	-17	-24	-20	-18	-18	-14	-13	+ 3	+ 2	+ 5	+ 0	+16
123	8	3	5	9	3	2	1	3	0	- 4	11	+13	+12	+11	+ 7	+ 3
124	1	6	- 9	9	9	- 1	- 5	-11	9	10	1	+ 6	- 4	+ 9	+ 3	- 1
125	- 0	- 1	- 1	0	- 0	2	- 1	1	0	- 2	2	+ 9	- 4	- 7	+15	-10
126	4	2	5	3	- 1	- 4	- 0	4	2	5	13	- 2	- 6	-10	+ 5	+12
127	- 1	- 6	1	0	-11	-10	-14	1	- 8	- 1	1	- 5	+ 5	- 2	- 5	+ 8
128	- 2	8	0	- 6	6	2	- 6	- 1	7	- 3	-24	+15	- 8	+18	+18	+14
129	9	10	9	6	- 3	7	- 9	6	3	8	14	- 5	+11	+ 0	- 1	- 6
130	- 1	- 6	- 3	4	-12	7	- 2	- 1	-10	5	-10	+15	-19	+11	+ 4	+17
131	1	4	2	- 1	- 4	14	1	- 4	- 9	3	-10	+48	-30	+28	+44	+27
132	- 2	- 0	1	- 3	8	-14	8	3	7	-12	2	-14	+15	+ 1	-19	-12
133	-18	0	-11	-26	- 3	3	- 9	- 7	- 3	- 5	-23	-15	-11	- 6	-16	- 1
134	16	9	15	14	4	7	-11	15	4	8	- 9	+19	- 2	- 0	+ 6	- 5
135	- 8	- 3	-13	- 3	11	- 7	10	-10	3	-19	17	-25	+11	-10	- 3	+ 7
136	7	- 4	3	12	2	- 3	-12	4	3	4	4	-30	+18	- 5	-30	-34

Appendix E-2 (Cont'd)

	1	2	3	4	5	6	7	8	9	10	11	21	22	23	24	25
137	- 0	8	1	- 5	21	2	14	3	16	- 2	13	-19	+17	- 8	-17	-12
138	-13	-15	-21	- 3	- 8	-15	- 7	2	- 3	-11	- 6	-11	+ 9	-17	-14	1
139	5	7	7	1	2	0	- 6	10	7	18	- 2	+ 8	- 5	+ 9	- 2	- 8
140	9	13	7	9	11	12	11	1	16	21	- 0	+11	- 7	+ 3	- 4	- 6
141	- 6	-10	- 9	- 1	-10	-15	-12	- 5	-10	- 5	-16	+11	- 9	+12	+ 2	+10
142	1	- 3	- 2	5	6	- 8	1	- 0	1	- 9	- 3	+20	-12	+23	+ 8	+20
151	1	4	3	- 2	- 5	9	14	5	- 4	8	- 4	+29	-15	+16	+38	+35
152	12	12	9	12	6	15	- 3	8	4	14	4	+31	-26	+22	+28	+14
153	- 3	- 0	2	- 6	- 8	- 0	18	7	- 3	3	-11	+20	- 7	+10	+28	+24
154	5	3	8	3	- 9	- 2	-13	2	- 5	2	-21	+29	-11	+17	+18	-12
155	-10	-10	-10	- 7	7	-18	- 4	-11	6	-15	12	-48	+32	-43	-49	-37
156	1	4	5	- 3	- 6	3	-10	9	- 0	9	-21	+10	- 8	+26	+ 9	- 5
157	-10	-11	- 5	-11	- 8	-16	-10	- 2	- 8	-11	19	-33	+16	-12	-31	-21
158	- 6	-10	0	-10	-14	-14	-16	- 4	-13	-10	- 5	+ 1	- 2	+13	-11	-14
159	- 6	- 3	- 2	- 9	-17	2	6	6	- 8	8	-11	+14	-11	+ 5	+22	+21
160	12	12	20	2	- 5	10	1	19	2	13	-10	+19	- 4	+25	+11	-10
161	- 8	7	-14	- 4	11	2	- 3	- 2	13	9	- 6	0	-25	14	+ 2	- 9
162	- 6	1	- 5	- 7	8	4	1	- 8	4	6	- 8	-13	- 5	-11	- 7	- 8
163	2	- 7	- 1	5	- 3	-14	- 9	6	1	- 8	10	-12	+12	- 8	-20	-16
164	2	- 1	0	6	14	-13	- 8	4	14	-10	10	-20	+15	-16	-16	-27
165	-18	-13	-23	-12	- 4	-10	- 4	-11	- 9	-11	13	-17	+11	-24	- 3	- 8
166	8	- 4	9	9	-10	9	- 3	0	- 9	3	- 0	+14	-11	+ 4	+12	+14
167	- 1	12	1	- 7	3	10	0	9	7	14	3	-12	- 0	+ 1	- 6	+ 4
168	18	17	16	17	24	12	10	17	22	12	- 8	- 1	- 4	- 7	- 8	-35
169	1	7	8	- 7	- 3	1	2	2	1	13	- 9	+17	-12	+20	+11	+25
170	12	- 6	10	16	- 2	- 1	8	9	1	5	7	+ 3	+13	- 2	+ 9	+ 7
171	8	12	11	2	0	8	13	12	3	10	- 5	+25	-16	+15	+21	+19
172	16	15	6	22	19	11	- 3	12	20	10	22	25	-17	12	22	22
173	6	5	- 3	13	20	- 8	3	- 1	19	1	15	44	-18	38	42	45
174	82	59	75	77	45	47	23	55	50	46	23	-20	23	-14	- 2	- 0
175	66	82	65	49	59	51	35	51	66	53	10	-11	17	-19	2	8

Appendix E-2 (Cont'd)

	26	27	28	29	30	31	32	41	42	43	44	45	46	47	48	51
26	100															
27	-27	100														
28	- 5	-46	100													
29	- 7	-28	-28	100												
30	+19	- 9	-35	-40	100											
31	+11	+ 2	-20	-22	-16	100										
32	60	16	1	10	- 9	-14	100									
41	- 4	2	8	1	10	1	- 5	100								
42	18	8	- 2	- 5	4	-15	25	8	100							
43	16	- 2	- 5	- 7	- 3	-16	14	-17	6	100						
44	- 4	- 8	- 1	- 6	1	4	- 6	-12	- 8	45	100					
45	- 4	-10	-19	- 8	-16	-14	0	- 0	-18	-16	-23	100				
46	-13	- 4	- 9	9	5	-11	- 7	18	- 3	4	-10	37	100			
47	- 0	2-	10	- 0	3	-12	- 1	- 2	11	16	3	-11	- 6	100		
48	-12	1	- 1	3	4	- 3	-22	-18	-10	6	1	4	3	33	100	
51	22	21	-10	13	- 6	- 2	20	11	6	29	14	2	0	-17	3	100
52	20	15	- 9	19	1	3	22	10	- 5	19	13	- 5	-11	6	13	77
53	25	20	-10	15	- 8	- 3	22	- 4	3	32	12	2	- 4	17	7	96
54	19	17	- 9	22	4	3	21	- 1	- 3	23	16	-12	-12	7	19	73
55	18	2	-14	6	- 7	- 6	11	- 4	8	29	24	- 1	- 5	18	11	79
56	12	7	-15	3	-12	1	- 1	- 5	4	27	12	6	5	13	- 1	62
57	7	12	-13	4	-16	- 2	- 2	- 2	1	- 0	27	12	7	16	0	72
58	29	20	2	5	5	- 4	31	10	49	28	8	- 6	- 1	24	1	61
59	24	19	- 1	9	8	- 5	26	12	59	21	7	-19	- 8	15	17	43
60	25	15	1	8	3	5	25	6	1	29	13	7	1	17	2	68
61	21	17	- 7	21	2	4	21	3	- 4	24	17	- 8	-10	11	25	72
62	19	6	2	- 3	- 3	- 0	20	2	10	22	4	15	8	16	-22	49
71	26	7	- 5	18	- 1	-12	26	4	17	11	8	13	- 8	4	- 5	32
72	20	6	-12	0	- 8	- 7	19	12	32	27	- 3	4	- 1	13	0	32
73	22	13	- 7	11	- 6	- 6	25	7	21	28	9	- 1	- 6	15	- 1	42
74	11	2	-10	- 2	- 1	- 7	- 3	2	18	7	13	- 5	- 3	8	- 2	15

Appendix E-2 (Cont'd)

	26	27	28	29	30	31	32	41	42	43	44	45	46	47	48	51
75	12	5	-15	2	- 0	- 5	6	- 4	15	17	7	- 0	- 3	17	9	32
76	16	11	1	13	- 2	- 4	14	5	1	4	13	- 5	- 8	6	- 7	19
77	15	5	- 8	5	2	- 4	7	10	21	27	19	-13	- 7	18	6	41
78	29	12	- 5	- 4	-16	-10	31	5	16	19	-10	13	- 4	5	- 8	38
79	16	17	- 4	- 5	-19	-10	13	16	4	19	- 0	7	6	3	-10	36
80	12	15	7	16	5	-19	7	17	6	14	17	23	24	25	-10	10
81	24	19	4	14	5	-28	17	8	27	12	12	12	13	33	- 5	35
91	+ 8	-26	-15	- 8	-12	- 2	-13	- 1	+ 3	+ 3	+15	+ 6	- 8	- 5	- 5	- 6
92	+39	+33	+13	+13	11	- 9	+37	- 0	+10	+ 2	- 9	+ 3	+ 0	+12	- 8	+ 7
93	-54	-26	- 6	-22	+ 6	+10	-45	+ 8	- 3	-11	- 2	- 5	+ 1	- 7	+ 1	-16
94	+ 1	+12	+19	+22	+26	+23	+15	+10	- 5	-27	-11	+ 2	+16	- 2	+ 2	+15
95	- 6	+ 3	+29	+18	+24	+30	+ 0	+ 7	- 6	-27	-10	-17	- 2	- 1	+ 5	- 1
96	- 1	10	13	7	- 4	2	- 9	5	- 8	- 7	- 1	- 8	- 6	7	23	3
97	+36	+10	- 2	+15	- 4	+19	-27	-10	- 7	5	- 6	- 5	4	2	7	-14
98	+ 5	+ 3	-21	-11	- 6	- 7	-20	9	4	- 0	-11	4	10	2	- 5	- 8
99	-12	- 6	+ 2	- 5	-17	- 3	25	- 8	1	- 1	3	- 9	-13	8	- 4	2
100	- 4	- 8	+ 3	+ 8	+17	- 1	-18	4	-15	-13	- 8	2	4	14	11	1
101	+10	+ 3	+14	+14	+10	+ 6	- 0	8	5	18	11	-21	-10	2	- 1	11
102	- 3	+ 8	+13	+ 3	- 3	+ 1	10	2	13	7	17	8	6	-22	-21	5
103	-12	+ 8	+14	+ 1	+13	15	27	- 3	2	- 1	2	18	4	-15	2	4
104	-13	- 5	+ 2	-12	- 3	+ 5	9	0	3	- 8	- 2	5	- 0	3	5	14
111	-18	+ 6	+ 7	- 2	- 1	-11	6	22	9	- 2	- 3	-14	- 4	- 4	- 7	8
112	-27	- 9	-16	+ 5	+18	23	-20	8	15	3	11	- 6	9	- 6	-17	-12
113	- 6	+ 9	+ 9	+ 7	- 3	- 7	15	- 0	6	- 6	-26	- 9	- 9	- 1	-10	19
114	-17	-15	-11	-11	-10	0	10	- 4	12	- 7	- 7	3	- 7	- 0	4	16
115	+21	-12	-11	- 2	- 7	- 3	-43	15	-14	-25	- 7	6	6	4	3	23
116	-11	- 9	- 3	- 8	+17	- 7	18	- 5	5	4	5	13	1	- 9	-15	9
117	-10	- 0	+12	+ 2	- 1	+ 6	22	5	3	- 3	- 4	17	- 1	- 5	- 1	26
118	+19	- 3	-18	- 5	- 9	- 3	-26	- 2	- 2	2	7	5	2	4	19	- 9
119	+17	+11	- 7	+ 6	- 2	-18	- 9	2	-11	- 3	5	7	9	- 2	- 6	1
120	-16	- 3	-10	- 4	- 6	+ 7	12	16	16	- 6	2	2	26	- 8	- 7	7

Appendix E-2 (Cont'd)

	26	27	28	29	30	31	32	41	42	43	44	45	46	47	48	51
121	+24	+ 3	+ 5	+ 3	- 8	+ 2	-32	- 4	-20	-21	- 7	0	12	9	16	-17
122	+21	+ 7	+ 3	+ 1	+ 5	+ 6	-14	-10	-14	7	13	-15	- 6	- 6	- 8	-32
123	-11	+ 2	-22	- 3	- 3	-19	- 1	- 1	-15	11	18	- 0	-13	2	11	-15
124	- 1	+ 5	+ 6	- 8	- 5	- 4	- 9	- 8	- 6	-14	1	1	4	17	10	- 3
125	0	- 5	-15	- 8	+ 6	-14	- 3	10	9	-16	- 5	-15	-17	4	5	- 8
126	-10	+ 5	+ 8	-10	+12	- 8	9	14	16	12	- 7	-17	- 1	- 5	- 8	13
127	+ 4	+ 3	+ 8	+13	+ 7	+ 4	- 2	- 7	- 6	- 1	7	20	2	3	-14	4
128	+25	+ 4	+ 8	- 8	- 3	-14	-31	1	-44	1	16	19	19	- 7	- 0	2
129	+24	+ 9	- 3	+ 8	+ 5	- 1	-12	- 6	-19	- 8	-10	24	19	- 1	7	- 1
130	+19	+20	+12	+10	- 9	-11	-34	3	- 4	- 5	3	2	5	6	7	- 8
131	+35	+ 7	-16	- 2	-26	-27	-35	4	3	- 2	1	-14	3	7	8	-16
132	-15	- 4	- 6	- 0	+ 4	+ 1	18	- 3	5	- 1	-17	9	- 8	- 1	- 2	17
133	+12	+ 5	+15	- 5	-10	+ 7	-20	- 2	3	4	3	- 2	6	- 3	2	- 4
134	+ 7	+ 5	-19	- 6	- 1	-12	- 7	-19	9	- 5	2	- 2	-16	- 7	15	-15
135	-14	- 5	+10	+ 2	+ 2	+24	16	- 6	4	28	4	- 1	- 2	7	- 0	24
136	-31	-14	- 3	+ 6	+ 4	+ 4	37	5	16	1	- 8	- 9	-15	- 2	-14	- 3
137	-17	- 9	+ 7	+ 7	+13	- 1	29	10	13	23	- 0	4	- 0	- 2	- 6	13
138	- 7	- 8	+12	+ 1	+ 8	+ 8	4	-22	- 5	6	5	7	- 8	0	- 4	- 7
139	-13	+ 2	+ 1	- 1	+12	-11	- 0	- 3	- 1	9	2	-10	0	- 1	- 4	12
140	-19	+ 8	-16	-24	- 8	- 6	10	- 7	7	5	- 1	12	14	0	7	- 8
141	+18	- 9	- 7	+14	- 4	+15	-10	- 6	- 2	12	18	3	- 1	- 2	- 1	-22
142	+22	+ 4	-19	+ 7	-18	-14	-14	- 8	-11	- 1	3	-13	-28	12	1	-25
151	+33	+ 7	+ 6	+ 4	- 7	- 1	-37	15	0	-19	-17	- 4	15	10	4	9
152	+23	- 4	-23	- 3	-10	-12	-36	- 0	- 4	-16	5	- 1	12	27	7	- 9
153	+30	+15	+14	+ 7	- 2	-12	-30	13	- 9	-19	-22	1	6	- 8	1	12
154	+40	+25	-11	+ 6	- 1	-20	-44	5	-14	-20	2	7	2	-16	- 4	-25
155	-57	- 3	+ 8	-15	+16	+ 8	85	- 5	16	17	- 1	1	- 9	-14	-20	15
156	+35	+24	- 3	+17	- 2	-12	-36	12	-11	- 6	6	11	14	-12	- 7	-20
157	-36	-14	- 4	+ 1	- 2	+ 4	54	3	14	3	- 7	- 5	- 4	11	-23	12
158	+ 5	+19	+ 4	- 3	+10	-17	14	- 5	- 1	- 9	2	- 2	- 4	-10	-16	2
159	+29	+10	+10	+15	- 4	- 0	-21	16	11	-16	-25	- 6	2	- 0	3	9

Appendix E-2 (Cont'd)

	26	27	28	29	30	31	32	41	42	43	44	45	46	47	48	51
160	+32	+21	-13	-10	-18	-36	-23	9	- 1	-20	2	-15	11	-15	-11	-17
161	- 5	+ 8	+10	+ 2	- 9	+ 1	-14	- 1	-11	- 3	- 5	17	16	-11	- 1	- 5
162	0	+ 4	+ 7	+ 4	+10	+12	4	2	- 7	14	16	2	6	-17	1	- 9
163	-25	- 2	+ 0	- 6	- 1	-13	21	- 9	10	5	4	-10	-18	1	-13	- 4
164	-27	- 2	-19	-13	+ 6	-15	52	- 5	- 5	- 1	-11	8	- 6	- 7	-20	6
165	-21	-12	+12	- 8	+ 0	+ 1	9	18	- 8	-25	- 3	-10	-12	4	-12	23
166	+17	+ 7	- 4	+ 7	+13	- 5	-22	- 7	-11	- 3	7	3	10	0	5	- 2
167	+ 3	+21	+15	-13	- 2	- 9	6	4	-15	- 3	3	9	7	- 5	- 5	9
168	+ 2	-14	-15	-10	+ 5	0	- 5	-14	- 1	-14	10	5	0	- 4	4	-10
169	+19	- 6	- 2	+15	- 9	+13	-27	9	- 3	- 0	- 7	5	21	0	- 9	6
170	- 1	- 0	- 3	- 8	+13	- 4	- 0	- 8	7	- 7	- 1	9	4	4	4	- 8
171	+32	+ 9	+ 1	+11	- 8	- 4	-45	- 4	-12	-11	1	8	26	- 1	11	-12
172	33	17	8	14	- 5	2	41	- 8	4	16	5	14	5	0	- 6	26
173	43	10	-10	12	-17	-11	47	- 7	15	- 5	-17	25	- 3	- 9	- 1	7
174	- 1	- 1	20	- 2	- 6	13	-21	-16	-14	- 3	- 6	15	4	- 8	17	-33
175	- 5	- 5	17	1	6	13	-21	- 5	-15	- 6	1	24	12	-12	9	-19

Appendix E-2 (Cont'd)

	52	53	54	55	56	57	58	59	60	61	62	71	72	73	74	75
52	100															
53	75	100														
54	96	75	100													
55	50	81	49	100												
56	21	61	18	59	100											
57	24	71	21	66	86	100										
58	44	58	42	51	22	29	100									
59	54	39	54	26	5	6	80	100								
60	54	67	51	57	23	34	86	54	100							
61	94	71	94	46	17	19	48	60	58	100						
62	8	49	5	54	28	39	67	11	77	6	100					
71	26	34	22	35	21	25	28	25	22	21	16	100				
72	17	32	17	36	30	32	33	32	20	17	16	65	100			
73	26	43	26	44	41	43	33	30	25	25	17	70	87	100		
74	9	16	9	19	10	12	20	18	13	8	11	43	55	57	100	
75	18	34	19	35	29	31	29	22	24	16	20	47	59	60	80	100
76	9	21	9	30	24	23	12	5	12	6	13	66	68	88	55	51
77	19	40	18	41	41	46	30	24	21	16	18	46	60	63	70	83
78	11	38	7	42	40	46	31	16	26	10	31	50	54	60	30	38
79	14	34	11	31	47	53	11	8	9	11	6	35	42	52	15	19
80	- 9	0	-13	1	19	23	8	- 4	8	- 9	22	29	5	15	2	- 1
81	12	26	10	24	34	35	36	22	32	14	37	38	24	35	14	10
91	+ 4	- 8	+ 4	- 4	- 5	-13	- 3	+ 3	- 4	+ 3	- 6	+ 1	+ 5	+ 5	- 1	+ 2
92	+13	+ 7	+14	- 4	- 8	-10	+17	+16	+15	+12	+ 9	+14	+15	+ 9	+11	+13
93	-21	-19	-22	-12	- 3	- 2	-12	-12	-12	-20	- 4	-12	-12	-13	- 5	-10
94	+17	+14	+17	+ 9	- 1	+ 1	+14	+11	+20	+19	+10	- 2	- 4	- 8	- 4	- 3
95	+ 8	- 3	+ 7	- 5	-14	-13	+ 7	-10	+12	+10	+ 1	-13	-18	-21	-18	-18
96	5	4	7	3	2	- 2	5	4	9	10	4	5	3	9	4	7
97	-14	-12	-13	- 6	-14	-10	- 8	- 8	- 7	-14	- 4	-13	-11	-20	- 5	- 4
98	-15	- 9	-17	-11	- 6	- 0	5	- 1	2	-12	8	-14	- 3	- 9	-17	-10

Appendix E-2 (Cont'd)

	52	53	54	55	56	57	58	59	60	61	62	71	72	73	74	75
99	12	5	16	- 1	- 7	- 9	5	11	5	13	- 4	- 0	-10	- 3	- 1	3
100	- 7	- 2	- 9	- 3	13	16	-15	-15	-11	-12	- 7	- 1	0	- 2	- 1	- 2
101	13	8	11	19	9	9	- 5	- 0	- 9	6	- 9	16	3	12	5	2
102	- 3	2	- 3	3	15	6	- 8	-11	-13	- 6	1	4	11	16	9	1
103	11	2	10	7	- 3	- 7	8	10	10	12	2	5	4	2	9	2
104	16	15	14	11	0	6	12	12	12	15	6	6	6	1	2	3
111	3	5	- 0	19	15	9	10	6	7	1	9	11	25	17	4	8
112	-12	-12	- 8	-17	-20	-27	6	- 2	3	-10	10	- 4	-10	-12	4	- 2
113	10	18	8	17	17	15	19	11	19	4	19	- 9	- 0	- 2	- 2	0
114	24	18	27	9	- 8	- 5	17	19	14	25	4	11	- 4	1	4	9
115	9	22	6	25	28	36	4	- 3	11	4	11	- 8	-16	- 7	- 3	4
116	12	11	13	- 1	- 9	- 3	13	7	14	14	11	3	- 0	- 2	- 0	- 4
117	16	26	16	28	13	16	26	8	30	12	32	0	7	6	7	6
118	- 5	- 7	- 7	- 6	0	- 3	- 8	- 0	-11	- 2	-15	6	1	1	- 4	- 4
119	3	- 3	- 2	- 3	- 3	- 3	- 6	- 7	0	- 1	2	- 6	-14	-11	- 1	3
120	17	1	16	6	- 8	-10	11	22	3	14	- 7	2	8	3	2	3
121	-15	-19	-16	-20	- 6	- 9	-19	-16	-14	-12	-14	-16	- 9	-15	- 2	4
122	-25	-35	-26	-24	-21	-24	-25	-25	-20	-27	-11	-16	-24	-26	- 2	-10
123	0	-11	0	- 8	-25	-21	- 5	- 3	3	2	- 5	13	2	- 1	2	- 3
124	- 1	- 1	- 2	- 1	0	- 1	2	- 1	4	2	2	6	5	- 2	- 2	8
125	- 3	-10	- 2	- 5	-18	-12	- 3	5	- 7	- 2	- 9	- 3	2	- 3	- 6	- 8
126	1	10	- 3	17	24	22	15	17	8	0	6	- 8	11	11	-11	- 7
127	- 2	4	- 1	3	4	6	-12	-17	- 9	- 5	0	- 7	- 8	-10	-12	-10
128	- 5	0	- 8	2	5	10	-25	-34	- 3	- 5	1	1	-19	-13	-10	- 8
129	4	2	3	- 3	- 0	- 1	-12	-14	- 4	2	- 3	- 9	-15	-15	-18	-12
130	-11	- 8	-11	2	2	- 0	- 3	- 7	- 0	-10	7	-27	-11	-12	- 2	- 4
131	-22	-17	-20	-16	- 3	- 0	- 2	0	- 6	-15	- 4	-17	-12	-16	- 3	- 9
132	12	14	13	11	14	7	16	7	17	10	18	4	- 2	5	- 2	9
133	- 4	- 0	- 2	3	9	7	- 9	- 4	-13	- 6	- 8	5	5	4	- 0	- 0
134	- 1	-12	2	- 8	-10	-19	- 3	8	- 9	3	-16	- 2	- 4	- 4	- 1	- 2
135	15	25	17	23	11	20	18	11	18	13	17	14	17	21	14	18

Appendix E-2 (Cont'd)

	52	53	54	55	56	57	58	59	60	61	62	71	72	73	74	75
136	5	- 4	7	-11	-10	-18	5	7	3	4	2	8	13	14	9	4
137	12	13	14	3	2	7	23	23	18	17	9	12	9	12	- 2	3
138	- 1	- 8	- 2	- 7	6	- 5	-16	- 8	-15	3	-18	- 1	- 7	- 4	7	1
139	4	14	2	13	15	14	14	5	19	3	20	- 4	- 0	0	7	2
140	-11	- 4	-12	1	-12	- 6	19	8	17	- 8	21	4	-12	- 9	- 6	- 4
141	-17	-23	-16	-23	-22	-25	-13	-13	-15	-16	- 7	-16	-23	-24	- 7	-17
142	-11	-22	- 8	-15	-38	-34	-13	-14	- 9	-11	- 4	- 6	- 9	-14	- 5	- 7
151	- 2	4	- 4	3	18	20	- 0	1	- 2	- 5	- 1	-30	-18	-16	-10	- 4
152	-18	-11	-19	- 3	- 1	- 2	- 2	-11	- 2	-18	10	-13	-15	-10	- 6	2
153	2	8	- 0	5	20	24	- 7	- 5	- 3	- 2	- 5	-32	-17	-18	-15	-12
154	-23	-27	-24	-17	-11	-13	-31	-33	-27	-29	-12	-12	-10	-14	- 8	- 8
155	24	17	23	6	- 2	- 5	21	23	18	24	7	25	17	25	11	4
156	-19	-24	-20	-16	-14	-14	-20	-22	-16	-22	- 7	- 4	- 4	-10	- 5	- 9
157	8	10	6	8	9	7	16	12	11	2	11	7	15	13	10	9
158	1	2	2	6	- 3	- 6	-13	-18	-11	- 2	- 0	2	- 2	1	4	4
159	0	6	- 1	5	15	15	6	9	0	- 3	- 0	-22	- 8	-12	- 5	- 3
160	-12	-19	-10	-12	-12	-12	-12	- 6	-12	- 9	-13	-30	-12	-19	-13	-14
161	-12	- 7	-17	- 4	6	5	-13	-18	- 9	-14	0	- 8	-16	-17	-11	- 6
162	- 1	- 6	- 2	- 9	-17	-13	0	2	4	2	- 0	9	- 5	1	- 7	-13
163	2	- 3	3	5	- 4	-12	- 4	- 6	- 9	- 2	- 2	15	12	7	11	8
164	17	7	14	0	- 5	-10	1	0	8	13	2	7	1	6	0	- 2
165	26	22	24	18	21	20	2	5	6	21	- 1	19	18	19	5	8
166	- 6	- 2	- 6	2	5	7	-15	-16	-11	- 6	- 6	-14	-15	- 6	- 0	- 5
167	7	6	6	8	3	10	1	- 3	10	9	5	8	2	8	6	6
168	-10	- 8	- 6	- 9	- 1	- 5	- 8	- 5	- 8	- 7	- 8	9	- 1	5	- 3	1
169	- 5	3	- 7	8	11	11	2	- 5	3	- 9	11	-14	- 8	- 8	- 3	- 2
170	- 1	- 7	1	-12	-16	-15	- 1	- 1	4	4	- 0	- 3	- 4	- 6	- 1	- 5
171	- 6	-15	- 7	-23	-10	- 8	-14	-10	-11	- 7	-11	-65	-81	-78	-53	-47
172	29	29	28	22	9	6	25	17	28	28	22	19	11	9	- 2	4
173	14	9	13	6	- 8	-11	16	14	13	16	10	7	4	0	- 9	- 8
174	-23	-27	-19	-29	-21	-26	-23	-22	-18	-19	-12	-27	-27	-29	-26	-28
175	-17	-16	-15	-15	-10	-12	-15	-20	- 9	-16	- 1	-22	-28	-29	-26	-24

Appendix E-2 (Cont'd)

	76	77	78	79	80	81	91	92	93	94	95	96	97	98	99	100
76	100															
77	50	100														
78	47	49	100													
79	40	34	67	100												
80	11	14	- 4	17	100											
81	17	30	8	22	94	100										
91	- 4	- 1	- 1	- 6	+ 3	- 9	100									
92	+ 9	+ 4	+14	- 5	-12	-14	-13	100								
93	- 9	-18	-12	- 6	-14	+14	4	-50	100							
94	- 6	- 1	- 3	-10	-23	-31	-24	22	-15	100						
95	-15	-17	-11	- 6	-38	-45	-13	11	- 1	68	100					
96	8	- 0	- 2	- 2	- 4	6	0	-27	+17	-10	+ 2	100				
97	-16	- 8	-21	-20	5	- 3	- 9	-13	+20	+11	+22	-17	100			
98	-10	- 2	- 2	- 9	24	15	- 4	+ 3	- 7	- 6	- 3	-20	12	100		
99	- 4	1	1	5	6	9	0	+16	-21	+ 6	+ 7	-18	-22	-21	100	
100	0	5	7	7	16	7	-12	- 1	+ 3	- 6	- 6	9	- 1	-13	-26	100
101	12	7	15	17	-10	- 9	-18	-10	-14	- 7	- 6	0	1	-23	-17	- 0
102	16	2	16	9	-17	-17	-17	+ 1	- 3	-11	-23	-18	-45	-20	3	-30
103	4	- 3	- 6	- 2	-30	-20	-19	+10	-14	+15	+ 3	-12	-16	-34	-14	-25
104	- 5	1	-11	1	- 6	7	- 7	- 5	-17	- 6	-14	0	-27	0	- 8	0
111	11	7	13	12	-21	-25	- 9	+11	-11	+10	+11	6	- 2	-11	- 8	0
112	- 5	-15	2	-12	0	0	-10	-35	13	+ 1	-13	- 8	- 5	- 1	2	3
113	- 9	3	13	6	- 6	4	- 2	- 6	- 2	+ 5	+ 7	1	- 1	- 6	4	3
114	0	5	-10	- 6	9	18	-26	+22	-24	+ 0	- 7	- 2	- 8	- 1	3	- 9
115	- 7	9	- 8	4	21	21	-35	-17	-18	+ 0	- 1	15	2	6	-12	19
116	- 4	- 5	4	10	- 7	- 1	-12	+19	-17	+13	+ 4	-15	-11	- 2	2	-15
117	2	4	6	11	-20	-19	-21	- 5	-10	+12	+ 6	4	- 4	2	7	-16
118	1	- 5	2	4	- 9	- 2	- 7	- 2	-33	+11	+16	5	16	16	-12	1
119	-13	- 2	- 9	- 7	2	6	+14	-15	-16	+14	+17	13	18	-10	- 6	11
120	- 1	3	- 9	- 1	1	3	-13	+ 5	- 8	- 3	+ 4	- 0	-12	- 7	-14	- 7
121	- 5	- 7	-23	-15	- 5	-10	+ 3	-11	-12	+ 4	+ 5	9	11	2	- 1	7

Appendix E-2 (Cont'd)

	76	77	78	79	80	81	91	92	93	94	95	96	97	98	99	100
122	-14	-17	-25	-20	18	10	+10	- 4	-17	-27	-10	- 1	6	- 7	1	- 1
123	5	- 3	- 7	-15	1	- 3	- 1	+20	-11	+11	+17	8	6	- 2	- 9	8
124	- 5	3	- 4	- 5	43	37	-13	-16	-12	+ 6	- 1	-12	8	12	- 8	16
125	- 3	2	- 6	7	-10	- 9	+ 4	-13	- 0	-12	+16	12	- 8	- 8	14	- 4
126	4	17	17	20	2	14	+11	-15	- 5	+ 6	+ 6	-16	- 3	0	- 9	9
127	-12	-12	- 5	6	10	13	+ 9	-13	- 2	-14	- 8	- 3	6	-12	4	- 6
128	- 2	-10	-10	0	24	15	-14	15	+14	+ 8	- 4	1	16	- 6	- 7	5
129	-14	-19	-11	- 6	- 4	-11	- 2	- 0	- 2	+ 4	+ 6	0	12	- 9	5	8
130	-12	- 2	-17	-18	8	10	-13	-19	-18	-19	- 9	13	- 5	18	- 4	-14
131	-13	- 6	-17	-10	1	- 1	21	-28	-41	+ 1	+ 7	6	27	21	-14	- 0
132	1	0	13	- 1	2	- 0	- 5	- 7	10	- 7	- 9	14	-15	- 9	- 5	11
133	- 1	3	- 1	7	6	7	- 7	- 9	- 2	-21	-27	- 4	-13	- 7	13	7
134	0	- 9	-12	-12	- 6	- 5	- 1	- 1	- 7	+ 7	+13	12	4	10	- 2	- 3
135	17	17	3	3	- 8	- 5	+ 3	+14	-16	-12	-24	-17	- 6	3	- 3	- 0
136	15	3	13	- 2	0	0	+17	+29	-26	+10	- 4	-17	- 6	- 2	17	-23
137	5	6	15	11	-10	-16	- 4	+21	-17	+14	- 7	-10	- 3	3	11	-13
138	2	- 2	- 1	8	33	29	+ 7	- 8	- 9	- 4	- 3	-15	- 0	- 5	5	-11
139	- 2	7	0	7	-20	-12	- 6	- 7	- 9	- 5	+10	8	- 9	7	- 7	6
140	- 3	- 5	- 1	-12	16	27	- 3	+ 4	9	+ 3	- 2	- 3	- 3	11	- 3	2
141	-12	-26	-13	- 9	-22	-20	-15	0	-17	-28	-13	0	2	- 6	7	- 8
142	- 3	- 6	-11	-23	11	2	-11	- 3	+17	+ 5	- 5	- 6	20	- 0	3	1
151	-16	- 4	-19	5	2	4	- 6	-34	-30	- 5	+ 4	21	7	11	-10	16
152	4	- 4	-21	-20	29	26	- 8	- 9	+14	- 4	- 3	22	10	17	- 4	23
153	-23	- 8	-10	15	-13	-11	- 2	36	-26	- 4	+11	3	9	12	-10	- 1
154	- 2	- 9	-20	- 6	6	- 9	- 6	-19	+22	-12	+ 9	-15	18	15	-10	- 0
155	16	8	29	14	- 3	9	-17	-29	-39	+10	- 2	- 7	-29	-17	22	-26
156	- 3	- 4	- 6	8	5	- 6	- 1	-13	+17	-14	+ 3	-16	13	18	- 8	- 5
157	3	13	22	23	6	12	+ 5	+23	-32	-45	+ 1	- 5	-21	- 8	13	- 5
158	6	3	- 1	- 2	- 2	3	0	- 7	+ 3	+ 4	+ 5	-14	1	2	4	-32
159	-19	0	-11	11	2	11	- 3	-34	+30	-11	0	10	7	4	- 4	- 8
160	-21	-10	-16	- 5	-10	-16	- 6	-10	+13	+15	+29	-10	15	17	3	- 6
161	-11	- 4	- 3	- 9	17	15	- 4	- 4	- 2	-13	-19	-22	- 3	14	6	12

Appendix E-2 (Cont'd)

	76	77	78	79	80	81	91	92	93	94	95	96	97	98	99	100
162	3	-13	- 2	-10	-14	-19	- 3	- 1	- 7	+ 4	- 4	-11	7	5	- 3	- 7
163	8	7	13	9	13	11	- 1	-24	27	+ 3	+ 9	-17	-14	-15	10	-15
164	5	- 1	8	11	6	9	+ 8	+18	-25	+17	+20	- 5	- 1	- 1	20	-19
165	13	11	16	19	26	22	- 7	- 1	-15	+12	+ 6	7	-16	-13	4	14
166	1	- 9	-19	1	- 3	5	+ 4	-17	-15	-24	- 8	3	10	- 6	-10	- 9
167	9	10	5	13	6	5	-16	- 7	5	+ 6	+ 0	8	- 7	- 5	-13	- 5
168	13	- 2	- 0	2	27	20	-13	- 9	- 9	-10	- 1	4	- 3	3	4	- 5
169	- 7	- 1	1	18	6	12	- 6	-17	-26	-13	- 9	16	2	- 2	- 3	10
170	- 0	-14	-10	- 4	-20	-16	+11	+ 4	- 3	+ 6	+16	4	8	13	-14	1
171	-78	-45	-50	-34	6	3	- 3	-26	-26	- 8	+ 5	1	12	12	- 2	8
172	1	1	13	9	- 1	6	- 0	+39	-23	+22	+ 6	-17	- 7	- 3	14	-10
173	- 5	- 9	22	3	-17	-12	- 7	+48	-47	+13	+ 4	-14	-20	- 6	8	- 8
174	-21	-34	-32	-22	- 4	-15	- 3	- 7	- 2	+ 3	+ 8	7	9	9	- 8	1
175	-22	-26	-25	-14	2	- 8	-15	+10	- 1	+11	+ 6	- 4	6	6	6	3

Appendix E-2 (Cont'd)

	101	102	103	104	111	112	113	114	115	116	117	118	119	120	121	122
101	100															
102	14	100														
103	-10	10	100													
104	-15	- 5	17	100												
111	4	6	3	0	100											
112	- 0	4	0	0	- 1	100										
113	- 9	- 9	9	- 4	7	- 1	100									
114	8	- 6	7	18	0	18	1	100								
115	- 2	-15	-14	- 0	1	-21	11	19	100							
116	- 1	10	11	13	5	25	5	28	-15	100						
117	3	- 2	11	8	16	5	15	13	2	34	100					
118	1	-12	-10	-10	-22	12	- 7	-11	12	- 7	-14	100				
119	- 6	-17	- 7	3	- 1	- 6	7	-23	4	- 7	-17	12	100			
120	- 8	10	6	0	8	- 3	16	8	9	- 1	- 2	4	1	100		
121	-20	-10	- 5	0	- 1	-13	1	-20	- 1	-15	- 8	7	9	- 6	100	
122	16	8	-12	- 4	- 8	- 1	-11	- 5	- 9	-10	-24	- 1	13	- 1	22	100
123	- 0	-12	- 3	0	13	16	-20	13	- 3	- 4	-23	5	3	4	- 1	15
124	-11	-11	- 8	12	4	3	- 8	8	- 5	- 5	0	1	1	-10	9	3
125	- 3	3	- 6	3	5	-34	- 7	- 1	- 2	- 0	- 0	-16	1	17	- 3	10
126	6	- 1	12	- 5	- 3	-18	20	- 4	4	-11	- 1	- 5	- 4	1	-13	-11
127	6	9	- 1	0	- 9	- 5	1	- 2	- 5	0	5	-13	- 3	- 6	8	8
128	5	- 1	- 3	-14	- 0	-11	- 7	-24	7	- 3	- 4	10	2	-25	20	12
129	- 8	- 5	- 1	- 3	- 5	- 1	1	3	3	10	- 9	3	11	- 6	7	4
130	-15	9	- 5	0	-11	-27	- 7	-15	25	-24	- 9	1	- 1	- 3	6	7
131	9	-18	-23	- 8	-10	-17	- 8	- 6	19	-24	-12	16	- 9	-16	13	4
132	- 7	9	- 4	7	8	22	33	11	3	13	8	-24	5	5	- 4	- 5
133	- 7	12	0	1	1	- 5	-11	- 1	17	-17	-12	- 0	-16	7	- 6	- 8
134	- 7	-12	- 3	6	- 1	12	-12	7	- 2	- 1	3	17	3	- 1	1	- 6
135	11	3	16	13	- 7	- 2	- 1	12	- 4	1	5	-24	-22	9	6	1
136	- 6	11	16	0	- 6	22	- 6	5	-34	8	- 4	- 9	- 1	- 3	-24	5
137	3	3	7	-14	20	- 6	-12	6	-12	7	10	-16	- 5	- 1	-24	-20

Appendix E-2 (Cont'd)

	101	102	103	104	111	112	113	114	115	116	117	118	119	120	121	122
138	17	12	6	- 9	6	1	- 3	- 2	-19	6	-17	- 7	- 5	- 1	12	16
139	7	- 9	4	-11	16	6	7	1	18	- 1	17	9	2	5	-10	5
140	-23	-11	13	17	- 4	15	1	10	- 1	- 5	- 2	4	- 8	0	-19	- 6
141	13	10	- 9	7	- 8	26	3	- 1	- 6	8	9	11	- 1	8	17	25
142	1	- 1	-11	-23	- 8	- 3	-10	- 1	- 5	-19	-18	- 2	4	- 2	1	15
151	-17	-12	-17	- 4	- 5	-25	37	-17	45	-14	7	6	7	2	33	-11
152	-17	-13	-32	- 4	-12	5	-21	- 2	32	-13	-13	11	4	- 6	19	5
153	-12	- 7	1	- 4	- 3	-36	52	-16	33	- 4	15	3	2	1	22	-15
154	11	3	-12	0	- 7	- 9	-13	4	2	- 1	-10	5	- 1	- 2	9	22
155	6	10	34	5	6	16	5	13	-47	19	14	-20	-13	10	-33	-12
156	11	1	- 3	- 3	-12	- 7	-11	- 2	- 6	3	- 9	12	4	- 7	2	12
157	- 2	2	11	11	2	16	45	9	- 7	7	19	- 9	- 6	22	-14	- 7
158	33	19	5	- 2	- 6	6	- 5	11	-16	8	5	0	9	8	-16	12
159	- 6	- 5	1	0	- 1	-22	60	- 9	25	- 2	16	7	3	6	22	- 9
160	-10	- 2	-18	-11	10	- 4	1	-10	0	6	- 2	6	11	13	- 8	2
161	-10	7	- 8	0	4	- 4	- 2	-10	8	12	5	- 0	- 0	4	10	4
162	8	1	4	- 8	4	1	-38	- 3	-15	6	- 9	- 1	6	-13	- 9	8
163	19	12	17	6	5	16	5	16	-24	10	4	- 6	0	9	-14	11
164	- 8	-13	14	5	- 4	- 0	13	- 1	-29	18	15	-10	12	10	-27	- 6
165	- 1	3	0	6	44	-22	5	- 2	13	2	8	-24	1	- 2	- 8	-17
166	12	7	- 0	14	-17	- 3	- 3	6	16	5	-10	9	11	5	4	28
167	- 5	- 4	18	0	3	-10	11	-14	11	9	15	- 3	15	- 8	14	- 3
168	2	2	- 7	- 6	- 8	8	-26	12	- 6	19	4	1	-19	6	2	9
169	-10	- 7	- 9	6	4	-11	27	-12	38	-23	2	6	17	8	23	8
170	-15	-14	5	- 4	- 5	- 0	12	- 9	-11	28	10	10	7	- 1	16	7
171	- 7	-14	-13	0	-24	- 4	6	2	34	- 7	-13	4	17	- 5	18	14
172	-12	- 5	18	17	7	20	0	26	- 9	27	14	- 5	3	2	-29	-16
173	- 4	11	23	13	17	26	- 2	18	-32	27	9	-18	-19	2	-32	-16
174	-18	-13	- 2	7	-14	17	-20	6	- 2	3	- 9	22	3	- 9	- 2	4
175	-21	-14	2	7	- 7	12	-21	10	7	2	- 4	16	4	-10	1	- 4

Appendix E-2 (Cont'd)

	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138
123	100															
124	4	100														
125	7	- 2	100													
126	-15	- 6	- 1	100												
127	-16	4	- 1	-15	100											
128	- 2	11	-16	-17	4	100										
129	- 0	- 4	-13	-13	31	8	100									
130	-12	- 2	- 3	- 1	13	1	-14	100								
131	- 1	8	6	9	- 2	12	- 4	14	100							
132	-10	- 9	- 8	5	- 3	-11	8	-18	-37	100						
133	-13	10	2	- 3	- 2	3	- 1	21	7	- 6	100					
134	7	3	0	- 9	-10	- 8	2	- 7	8	- 6	- 5	100				
135	7	0	0	- 2	1	-11	-10	- 2	- 8	11	8	-24	100			
136	2	-12	5	- 4	- 5	-22	-12	-15	-32	7	- 9	- 3	- 6	100		
137	0	- 1	10	3	4	-17	- 4	-14	- 7	1	5	-13	17	20	100	
138	1	1	2	- 7	8	7	- 5	- 9	- 6	- 3	- 2	5	6	9	8	100
139	2	- 9	- 3	4	11	- 5	5	22	2	- 9	- 5	- 0	- 6	-19	9	- 8
140	11	21	2	0	- 3	- 7	- 0	6	15	- 2	13	10	- 5	- 7	- 4	- 2
141	- 8	-13	-13	-15	20	5	1	1	0	4	-16	4	- 7	-15	- 5	11
142	17	0	24	-14	4	8	- 4	18	8	- 7	1	- 2	- 1	2	- 4	6
151	-26	-10	- 5	14	3	11	9	18	28	8	- 1	- 6	-11	-48	-20	-16
152	0	11	1	- 9	3	10	16	14	24	0	8	14	- 6	-25	-19	-17
153	-30	-18	2	16	8	11	5	20	17	3	- 6	-15	- 9	-32	-12	- 3
154	4	2	30	-13	17	10	21	10	22	-15	1	23	-10	2	-19	4
155	1	-12	1	7	- 7	-26	-15	-27	-36	7	-17	- 1	11	41	23	10
156	- 9	- 8	6	-11	27	14	29	14	20	-18	7	5	-16	4	-11	4
157	- 7	-11	- 8	13	- 0	-23	-14	-19	-22	-20	- 7	- 7	- 1	18	- 9	-13
158	- 0	- 2	12	7	8	3	-20	- 5	2	- 7	-15	9	- 6	13	-13	- 3
159	-36	-17	4	20	1	4	8	15	17	10	- 2	- 8	-13	-28	-17	- 9
160	3	- 2	12	4	- 4	3	11	5	19	- 4	3	10	-40	1	-11	- 7
161	-25	10	- 9	- 5	6	16	8	15	- 3	-10	18	- 1	4	- 9	- 0	10

Appendix E-2 (Cont'd)

	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138
162	6	4	- 3	- 7	- 2	5	10	- 2	-10	- 6	8	- 3	14	13	29	7
163	19	5	14	- 9	7	-15	-14	-13	-23	- 9	-11	4	- 8	26	-10	14
164	- 4	-15	17	- 4	1	- 9	- 5	-22	-16	3	-23	24	- 8	29	4	0
165	- 9	9	2	6	- 7	- 0	- 3	- 2	-13	- 2	2	-12	- 5	3	13	4
166	2	- 1	3	1	18	- 2	10	16	13	- 9	-12	11	4	-16	-24	- 2
167	- 6	1	- 6	8	- 2	17	1	3	5	1	- 6	- 8	- 6	-14	- 7	- 8
168	- 2	3	19	-20	0	4	4	-21	9	- 3	-18	20	- 9	9	- 2	8
169	-21	- 3	-10	9	15	10	14	10	14	6	11	-10	-19	-32	-21	-11
170	2	-12	- 4	-12	- 2	3	8	-13	- 9	- 3	-35	3	- 6	- 3	- 0	5
171	-13	- 0	- 4	- 4	16	13	21	28	21	1	9	- 1	-13	-31	-13	- 2
172	7	10	- 5	- 0	- 2	- 8	1	-21	-18	6	3	15	4	24	16	- 3
173	- 4	2	1	- 7	- 1	-16	1	-14	-41	10	- 5	5	3	33	25	13
174	15	7	1	- 7	- 0	11	13	4	1	- 9	-19	19	-20	9	-11	- 4
175	10	8	0	-11	- 3	20	15	- 0	3	- 6	- 2	13	-16	3	- 1	- 7

Appendix E-2 (Cont'd)

	139	140	141	142	151	152	153	154	155	156	157	158	159	160	161	162
139	100															
140	10	100														
141	13	- 4	100													
142	- 4	4	5	100												
151	8	-12	6	-16	100											
152	- 4	17	2	3	45	100										
153	11	-17	3	-13	78	- 5	100									
154	0	1	7	16	- 5	8	14	100								
155	3	12	-15	-13	-50	-48	-33	-32	100							
156	- 1	- 0	14	13	1	6	18	70	-30	100						
157	- 1	- 7	- 5	-17	6	-17	9	-24	39	-15	100					
158	9	-12	6	6	-26	-20	-12	26	32	4	16	100				
159	7	-19	11	-13	71	- 6	82	5	-28	11	19	- 5	100			
160	7	6	-14	11	14	6	23	29	-17	35	1	12	13	100		
161	10	13	16	- 1	1	14	2	9	-17	11	-14	-18	- 3	- 9	100	
162	2	6	- 2	2	-40	-15	-35	- 4	13	- 3	-55	-11	-34	-20	4	100
163	4	- 2	- 1	15	-45	-39	-24	17	29	5	37	37	-22	7	- 4	-42
164	- 7	5	-11	1	-20	-17	- 6	8	55	6	39	27	-10	4	- 3	-13
165	- 3	-20	-17	- 6	1	-17	7	-14	9	-20	9	- 8	2	-10	- 4	0
166	7	6	18	-15	13	14	10	21	-21	6	-12	19	9	1	9	- 6
167	- 1	1	- 7	2	19	- 6	18	-15	5	1	16	5	19	- 0	- 3	- 9
168	- 4	0	7	- 6	- 8	16	-11	34	- 3	20	-11	5	-15	10	13	- 5
169	13	1	14	- 3	54	20	39	0	-39	9	18	-17	49	- 2	4	-26
170	11	- 4	8	- 0	17	- 9	24	- 9	2	1	- 1	-13	12	9	- 9	- 7
171	6	8	19	- 1	38	21	35	13	-44	11	-22	-16	27	13	20	- 2
172	- 3	11	-14	- 7	-37	-12	-36	-17	35	-13	19	10	-31	- 2	- 3	1
173	1	10	- 1	-11	-41	-26	-25	- 8	51	- 6	14	6	-27	-15	9	15
174	- 1	15	4	14	- 6	17	- 7	22	-19	13	-21	- 4	-15	16	3	1
175	0	19	2	11	- 5	15	- 4	22	-19	19	-22	- 5	-12	18	17	8

Appendix E-2 (Cont'd)

	163	164	165	166	167	168	169	170	171	172	173	174	175
163	100												
164	24	100											
165	3	- 1	100										
166	- 4	- 4	-28	100									
167	- 3	5	12	- 1	100								
168	9	20	-17	15	-14	100							
169	-15	-19	- 4	10	16	- 8	100						
170	4	11	- 4	10	12	1	2	100					
171	-25	-26	-17	20	- 4	- 4	28	- 0	100				
172	22	31	10	-17	- 7	-11	-26	- 5	-22	100			
173	23	29	13	-24	-11	8	-36	- 5	-20	37	100		
174	4	1	-25	9	- 2	18	- 5	17	19	8	6	100	
175	- 2	- 1	-23	- 1	10	17	1	- 1	24	7	5	81	100

APPENDIX E-2

Item Names: Inter-Scale Matrix

1 Calories
2 Protein
3 Fat Intake
4 Carbohydrate
5 Calcium
6 Iron
7 Vitamin A
8 Thiamin
9 Riboflavin
10 Niacin
11 Vitamin C
21 Parents are all-wise cale (PARI)
22 Treating child as an equal scale (PARI)
23 Only listen to parent scale (PARI)
24 Unquestioned loyalty scale (PARI)
25 Deception scale (PARI)
26 Trapped in a dull job scale (PARI)
27 Anomie scale
28 Would like to get out scale (PARI)
29 Children are very demanding scale (PARI)
30 Occasional dissatisfaction scale (PARI)
31 Frequent dissatisfaction scale (PARI)
32 SES index scale
41 Sex of child
42 Age (in months)
43 Hemoglobin
44 Hematocrit
45 Serum albumin
46 Total serum proteins
47 Change in weight
48 Change in height of child
51 Weight-age, Fels
52 Height-age, Fels
53 Weight-age, Stuart-Meredith
54 Height-age, Stuart-Meredith
55 Height-weight-age
56 Weight-height-scale
57 Weight-height ratio
58 Weight-age, May
59 Height-age, May
60 Developmental index for weight
61 Developmental index for height
62 Weight-age/height-age, development index
71 Sitting height
72 Shoulder width
73 Pelvic width
74 Head circumference
75 Chest circumference
76 Index of trunk breadth

Appendix E-2 (Cont'd)

77 Upper arm circumference
78 Skinfold thickness for triceps
79 Subscapular skinfold thickness
80 Hydroxyproline/creatinine ratio
81 Hydroxyproline index
91 Permissiveness about feeding-attitudes scale
92 Nutrition is very important for child scale
93 Powerlessness scale
94 Semantic differential (1)
95 Semantic differential (2)
96 Economy
97 Prestige
98 Health
99 Family centrism
100 Religion
101 Friendship
102 Freedom
103 Education
104 Aesthetics
111 Premature vs full term
112 Mother received prenatal care
113 Mothers age when pregnant with child
114 Mothers present height
115 Mothers present weight
116 Fathers present height
117 Fathers present weight
118 Bottle vs breast fed
119 Age at weaning
120 Infantile behavior scale
121 Child ever anemic
122 Feeding problems scale
123 Child receives vitamin supplement
124 Child receives other supplement or health food
125 Amount sleep per day
126 Last medical exam
127 Reason for last seeing doctor
128 Dental record
129 Amount of time family eats together
130 Children eat at same time as parents
131 Mothers opinion about eating everything on plate
132 Mothers action when child dawdles or plays with food
133 Frequency of snacking scale
134 Time when child seems most hungry
135 Child uses spoon
136 Child uses fork
137 Child uses knife
138 Childs favorite food
139 Food child refuses to eat
140 Most important influence on mothers meal planning
141 Family acceptance of new foods
142 Meal pattern of child--regular or irregular
151 Total persons in home

Appendix E-2 (Cont'd)

152 Number of children 5 years or younger in home
153 Ordinal position of child
154 Mothers marital status
155 Parents occupation and education scale
156 Income status scale
157 Family income
158 Mother away from child scale
159 Stage in family life cycle
160 Race--white vs black
161 Times moved in last 3 years
162 Own or rent
163 Crowding index (rooms/person in house)
164 Condition of house and neighborhood scale
165 Childs birth weight
166 Mothers opinion that child eats too many sweets
167 Who decides foods to buy
168 Frequency of grocery shopping
169 Amount spent for food per week
170 Frequency of use-convenience foods scale
171 Family receives food stamps
172 Number of basic four named
173 Score on nutrition knowledge test
174 Calories/kg body weight
175 gm protein/kg body weight