DIETARY INTAKE AND NUTRITIONAL STATUS OF PRESCHOOL CHILDREN IN WESTERN MICHIGAN DAY CARE CENTERS

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ABSTRACT

DIETARY INTAKE AND NUTRITIONAL STATUS OF PRESCHOOL CHILDREN IN WESTERN MICHIGAN DAY CARE CENTERS

By

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This study involved a two-day investigation of nutrient intake of 275 preschool children attending nine Western Michigan day care centers as well as a comparison of nutrient intake with height and weight increments of the children over a three-month interval.

All food served to the children for meals and snacks for one day was weighed prior to serving and the remaining food, uneaten and spilled food was subtracted to determine total daily intake for each nutrient. The total calories and ten nutrients contributed by these foods were calculated from food composition tables and compared with the 1968 Recommended Dietary Allowances taking into account the proposed recommendations by the Michigan Department of Public Health for day care provision for the child's nutrient needs. The nutrient supplied most often in lowest amounts was iron followed by calories and thiamin. Protein and riboflavin were supplied in the

greatest amounts. Overall average intake for all nutrients except iron for all nine day care centers met the recommended range. The per cent contribution of meals and snacks to calorie, protein and total nutrient intake was dependent on the number of meals served with snacks contributing almost 50 per cent of the total caloric and nutrient intake in centers serving only one meal.

Heights and weights of 140 preschool children, average age 4 years, at six of the day care centers were taken twice over a three-month period and compared with an average of increments suggested by various authors for this age group. Height increment averages for both girls and boys were in good agreement with the standard increments whereas weight increments for both girls and boys were above the standards. These data indicated that the average of seven hours spent per day at the center at least did not have a negative impact on growth and may have played a large part in contributing to this growth.

Menus were obtained ahead of time to observe how closely they were followed by the cooks. Modifications were found to a considerable degree at some centers but, in general, the changes were only slight.

Hemoglobin data were obtained for children at two day care centers. Average values for each center fell within the acceptable range as set by the ICNND.

During the two-day period of study at each day care center, descriptive information concerning general operations and menu planning and food service practices was also obtained through personal observation and informal interviews with the cooks and/or directors.

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CHAPTER I

REVIEW OF LITERATURE

Day Care

History

Although there has been a sharp increase in day care facilities for children in the last five or six years, they have existed in this country for more than one hundred years (Juhas, 1970). It was the state of Massachusetts that first showed concern for the care and protection of low-income children and, subsequently, the first child development nursery schools in college and university settings were established. Since the early decades of this century, these experimental nursery schools have been used for research in child and human development (HEW, 1968a).

The Work Projects Administration (WPA) in the 1930's and the Lanham program of World War II were two national programs which involved group day care of large numbers of children (HEW, 1968a). Both programs placed major emphasis on providing child care for employed women in contrast to Project Head Start, initiated in

the sixties, which concentrated on the developmental aspects of the children.

The proliferation of day care centers was a natural outgrowth of Head Start. Prior to this time, day care centers were stereotyped for the poor while nursery schools were for the well-to-do (HEW, 1968a). Ruderman (1968) explained that day care centers were viewed as a service to the deprived where special emphasis had to be placed on the child's adjustment and emotional development as well as the family's social and emotional problems. She contrasted these with the nursery schools which provided social and educational experiences and were a potential benefit to the more advantaged children from middle class homes rather than a reflection of the inadequacy on the part of the family.

This differentiation from nursery schools was also spelled out in the 1960 edition of the Child Welfare League of America's Standards for Day Care Service (CWLA, 1960):

> Day care service has to be differentiated from the nursery school or kindergarten, and from extended school services and other programs for school-age children offered as part of elementary school systems. These have education of young children as their main purpose. The primary purpose of a day care service is the care and protection of children. This purpose, the reasons for which a child and family may need it, and the responsibility shared with parents distinguish a day care service from education programs.

These 1960 standards state the primary purpose of day care as follows:

> The primary purpose of a day care service distinguishing it from other resources for family and children, is to care for and protect children.

In contrast to this set of standards are the revised standards of 1969 (CWLA, 1969) which state:

> The primary purpose of a day care service is to supplement the care and protection that the child receives from his parents.

In addition, the revised version specifies that day care programs include the essential components of care, protection, education, health supervision, social work, parent participation, and planning and coordination.

Consequently, it is apparent that day care is now recognized as a supplementary service for the parents which should be developed and carried out in such a way as to maintain a stable family environment for the children. It should stress not only care and protection, but also development and education.

Present Differences Between Day Care Centers and Nursery Schools

With the latter point in mind, one can see that the once distinct dividing line between nursery schools and day care centers is rapidly diminishing to the point that there are probably two basic differences today.

The first difference concerns their goals. Although both nursery schools and day care centers now stress development and education, this is still the major goal

of nursery schools whereas day care centers are equally concerned with the supplementary care and protection of the child.

A second more specific difference lies in the educational qualifications of the staff. In Michigan the head teacher of a nursery school must meet the educational qualifications as established by the Michigan Department of Education (State of Mich., 1968) and all assistant teachers should have a minimum of two years of study at the college level. The director of a day care center, on the other hand, shall have a minimum of two years of study at the college level, and all other staff members should have some experience in working with children.

Factors Influencing Day Care Development

One might ask what has promoted this shift in outlook during the sixties from scarce recognition of day care to the creation of a prosperous movement in which demand greatly exceeds the capacity to serve. The factors responsible for this change can be divided into four major categories. Probably the greatest impact has come from the first of these, namely, the tremendous increase in the number of working mothers.

Working Mothers.--It is felt that one of the primary reasons day care centers did not develop more rapidly in earlier years is the fear that more women

would be tempted to seek work outside of the home if these centers were available to care for their children (Caldwell, 1971). But statistics reveal that more mothers have started working despite the lack of day care centers. Since 1940 the number of working mothers has increased more than sixfold and has more than doubled since 1950 (U.S. Dept. of Labor, 1967). There are more than five million children in this country under six years of age with working mothers (HEW, 1970), yet according to 1968 statistics, there are licensed day care facilities for only 637,000 of these children (U.S. Dept. of Labor, 1969). It is estimated that there will be a 43 per cent increase between 1970 and 1980 in the number of working mothers, ages 20-44, with children under the age of five (U.S. Dept. of Labor, 1969).

In 1965 the U.S. Department of Labor investigated how children of working mothers were cared for during the day (Low, et al., 1968). This study involved 6.3 million mothers who had worked 27 weeks or more in 1964 and their 12.3 million children under the age of 14. The results of the survey indicated that:

a. 46% of the children were cared for in their own homes usually by another relative.

b. 16% were cared for away from home.

c. 13% were watched by their own mothers during work.

d. 15% had mothers who worked only during their school hours.

e. 8% cared for themselves and were, thus, called latch-key children; of those children, less than 4% were under the age of six.

f. 2% attended group care centers.

Factors affecting the increase in working mothers.--Three main reasons for the increase in working mothers in contemporary times include:

1. recent acceptance of the fact that a woman will not be abandoning her parental responsibilities or showing a lack of concern for her children if she chooses to work outside her home (Emerson, 1969),

2. the rising cost of living plus higher economic aspirations both of which demand a higher income need and thus are responsible for a greater number of women in the labor force (Linden, 1970) and

3. the idea that a middle class, well-educated mother who feels she must stay home may be depriving the community of the benefit of her skills as well as depriving her child of the stimulation offered by other children and professional educators (Stern, 1969).

Work Incentive Program.--A second major factor which is responsible for the recent day care movement is the Work Incentive Program (WIN) authorized under the 1967 amendments to the Social Security Act and operative since 1968 (U.S. Dept. of Labor, 1969). This is a manpower development program to train persons on welfare for permanent jobs at decent pay. The law specifies that day care services must be provided for children whose mothers are participating in these training programs.

Socio-economic, cultural, and health factors.--A third reason day care has shown such expanded development

is due to increased awareness of the existence of such conditions as physical or mental handicaps of the children or parents, illness or death of the mother, economical and cultural deprivation, poor family relationships, slum living conditions with no place to play, and socially and intellectually impoverished environments at home (U.S. Dept. of Labor, 1967, 1969; HEW, 1968b).

Importance of child development.--Finally, there is recognition of the fact that the first few years of a child's life are the critically formative ones and, therefore, provision should be made for optimum development of all who might otherwise be deprived (HEW, 1968a).

Nutritional Patterns of Preschool Children

Effects of Poor Nutrition on Growth and Development

Poor nutrition can be in the form of either undernutrition or malnutrition or both. According to Lowenberg, et al. (1968), undernutrition is getting too few calories to maintain normal body weight and normal activity, whereas malnutrition may involve adequate calories but insufficient, or in some cases, excess amounts of certain needed nutrients. Since adequate nutrition is a prerequisite for proper growth and development in the child, these states of poor nutrition may have profound effects on the child's physical and mental development.

Physical growth and development.--Almost any kind of nutritional deficiency including calories, protein, vitamins and minerals can result in growth retardation (Pearson, 1968). A sensitive indicator of undernutrition in the young child is the failure to thrive and the children who do grow in spite of this undernutrition are smaller than well-nourished children of the same age (Lowenberg, et al., 1968).

In a study on nutrition and growth, McCance and Widdowson (1960) found that rats undernourished during suckling continued, upon subsequent unlimited feeding, to gain weight less rapidly than their controls and they remained smaller and lighter throughout life.

Winick and Noble (1966) also found that caloric restriction of rats from birth to weaning resulted in decreased growth due to curtailment of cell division. Subsequent recovery did not occur with refeeding. Rats restricted between 21 and 42 days of age showed decreased growth with recovery upon refeeding occurring only in the brain and lung, the two organs growing by cell enlargement at this time rather than cell division. A restriction between 65 and 86 days of age, when growth is primarily characterized by cell enlargement, caused reduced cell size but subsequent recovery did result upon refeeding. It was concluded that permanent stunting results from reduction

in cell number but growth recovery will occur after a reduction in cell size.

A later study by these same researchers (Winick & Noble, 1967) demonstrated the reverse response with increased feeding in neonatal rats. Increasing the number of calories accelerated growth by increasing the rate of cell division. At weaning these rats were significantly heavier than their controls, their organs were composed of a larger number of cells, and their increased weight was maintained in adulthood.

Schemmel, et al. (1969), however, found that overfeeding of rats by using a high fat diet from 21 days of age resulted in increased weight due to an increase in fat only. There was no increase in lean body mass in rats fed the high fat diet as compared to their controls fed a grain ration.

The work done by Berg, et al. (1960) raises some questions as to the desirability of increased growth with increased nutrition. They found that rats given restricted amounts of food from 28 days of age showed increased longevity and delayed onset of disease as compared to the controls fed ad libitum.

Two malnutrition syndromes prevalent in many children throughout the world are marasmus and kwashiorkor. Marasmus is partial starvation or a chronic calorie deficiency whereas kwashiorkor is a form of protein-calorie

malnutrition (Lowenberg, et al., 1968). Marasmus, which is more common in children below one year of age, is primarily characterized by retardation in growth and development, muscular wasting, and lack of subcutaneous fat. Kwashiorkor is more prevalent during the second and third years and is characterized by edema, growth retardation, variable degree of dermatosis and muscular wasting (Scrimshaw, et al., 1961).

Mental development.--Coursin (1965) indicates that it is often difficult to obtain meaningful data in evaluating mental ability because of such factors as genetic background; family, environmental, and cultural circumstances; time of onset of undernutrition; degree of its severity and duration; adequacy of treatment; subsequent environment, etc.

To study the effects of early malnutrition on mental function, Champakam, et al. (1968) compared the intelligence and sensory development test performance of 19 children who had previously been successfully treated for kwashiorkor with that of a properly matched control group. Performance was poorer in the experimental group with a significant difference in intelligence test performance. For both tests differences tended to diminish with age.

Cabak and Najdanvic (1965) also showed lower intelligence scores for children who had had marasmus

in childhood. Fifty per cent of these children were below the normal intelligence limit as compared to 21 per cent of the control children.

Kugelmass, et al. (1944) administered two intelligence tests to two groups of children, each group consisting of both mentally retarded and normal children but those in group 1 had been malnourished at the time of the first test and well-nourished at the second, whereas the children in group 2 were well-nourished throughout. In group 1 there was a 10 point rise on the second test for the retarded children and an 18 point rise for the normal children compared to an average zero change for group 2 retarded children and -.09 change for the normal children.

Using height-for-age as the basis for defining malnutrition and a group of children from a rural village where diet was poor, Cravioto, et al. (1966) compared the shortest-for-age and tallest-for-age children with respect to ability to integrate visual, haptic, and kinesthetic information. The children retarded in height-for-age performed significantly poorer than the taller children. No differences were reflected in a group of upper class children of the same age range which was selected as the control. Of the various background variables investigated in relation to the child's height, only mother's educational level showed a positive relationship. Therefore, the authors suggested that interference with the child's

physical growth and intersensory development was not from a difference in social background but rather from malnutrition itself.

In a later study Cravioto, et al. (1967) investigated the ability of children to integrate auditory and visual stimuli, again using height-for-age as an indicator of malnutrition. Mean performance of the taller group was higher than that of the shorter, but integration improved with age for all the children.

Nutrient Intake of Preschool Children

During the preschool years growth proceeds at a slower rate than during the first two years of life, but increasing emphasis is placed on maturation and development (Beal, 1954). This change may be reflected in emotional behavior as well as variation in eating patterns (Beal, 1955). Beal (1953, 1954, 1955, 1956) found that both appetite and nutrient intake varied in healthy children from upper middle class families between birth and the age of five. The median daily intakes of all nutrients increased during the first year to year and a half of life. Between the ages of one and three, the median intakes varied: calorie, fat, carbohydrate and niacin intakes continued to increase slightly; protein, thiamin and ascorbic acid intakes leveled off to a plateau; and calcium, phosphorus, iron, riboflavin, vitamin A, and vitamin D intakes decreased.

From ages three to five the median intakes for all nutrients again increased with the exception of vitamin D which continued to decrease.

These intake patterns reflected to a great extent the change in eating patterns of these children during their preschool years. It was found that there was a marked decrease between the ages of one and three in the consumption of milk and vegetables, which was reflected in the decreased intakes of calcium, phosphorus, riboflavin, vitamin D and vitamin A. Iron intakes were largely a reflection of the iron added to specially prepared baby foods which accounted for the increase during the first year of life and subsequent decrease when family foods were introduced.

Median daily intakes of all nutrients except iron and niacin either met or exceeded the Recommended Dietary Allowances (RDA) for children of this age. Although niacin and iron intakes were low relative to the RDA, there were no deficiency symptoms apparent in the children in either case.

Diercks, et al. (1965) found the mean total intake for calories, protein, iron, vitamin A, thiamin, riboflavin, calcium, and ascorbic acid for 115 preschool children studied were close to the RDA except for niacin. A substantial number of individual intakes were low in iron and ascorbic acid. Kerrey, et al. (1968) also found that

mean daily intakes of 40 preschool children from two different socio-economic groups either met or exceeded the RDA for all nutrients except iron and calories. Many individual children, however, were low in iron, calcium, calories, and ascorbic acid consumption. Similarly, Metheny, et al. (1962) found that the least supplied nutrients in diets of 104 preschool children were, in decreasing order, calcium, calories, thiamin, and iron. Ascorbic acid was often low in individual intakes. In agreement with this latter study were the findings of Crumrine and Fryer (1970) which showed that iron intakes of 40 preschool children were the lowest followed by calories, calcium, and thiamin yet all nutrients were close to the RDA except iron.

In these studies there appeared to be universal agreement that iron was the nutrient most often low in the diets of preschool children. Other nutrients often supplied in the least amounts were calcium, thiamin, niacin, ascorbic acid, and calories.

Importance of Snacks

Because children frequently cannot eat a great deal of food at one time, it has been found beneficial to serve snacks to preschool children in addition to their regular meals. These prevent the children from becoming overly hungry between meals and provide extra energy. In

studying the effect of midmorning snacks on lunch appetites, Munro (1957) found that the average caloric intake at lunch decreased but total caloric intake for both snack and lunch increased for the majority of the children. Eppright, et al. (1970) noted in their North Central Regional Study that snacks were just as frequent as meals in the diets of preschool children and they deserved as much emphasis as meals in nutrition education. They also found that eating less than four times a day negatively affected caloric intake, whereas it was positively affected by eating six or more times a day.

Recommendations for Nutrition in Day Care Centers

Although studies have not been conducted on the role of nutrition in day care centers, various recommendations have been put forth as a guide for nutrition in group care of children, particularly day care centers. The Michigan Department of Public Health (1970) recommended that children in group care from five to eight hours a day should have one-third to one-half of their daily nutrient needs met at the center. Therefore, this must be provided through one regular meal and one or two snacks. Children in group care longer than eight hours a day should receive two-thirds of their daily nutrient needs at the center. This can be provided by two regular meals and one or two snacks. Hille (1969) has set forth

similar recommendations for feeding groups of young children cared for during the day.

Similar meal patterns for feeding young children have been devised by various groups (MDPH, 1970; Hille, 1969; USDA, 1970). These suggest foods to be included in each meal and snack and differ only in slight respects. The U. S. Department of Agriculture (1970) specifies inclusion of milk and an enriched bread component in every meal and snack served at the center, whereas the patterns by Hille (1969) and the Michigan Department of Public Health (1970) do not make this specification. They do, however, recommend that a good vitamin C source be served daily and a good vitamin A source be served at least twice a week.

Considerations in Preschool Group Feeding Situations

Food preferences.--Food preferences become very apparent in children during their preschool years, and there appears to be wide agreement that vegetables are the least liked foods. Beal (1953) found a marked decrease in the consumption of vegetables and milk between the ages of one and three. In studying food intake of nursery school children for the noon meal, Merone, et al. (1965) found that vegetables, excluding potatoes were consumed in the smallest amounts and desserts were consumed in largest amounts. In a questionnaire in which mothers

indicated the child's food preferences, Diercks, et al. (1965) found that vegetables were the most disliked or not eaten at all, whereas meats were most liked as were fruits, sweets, cereals, and cereal products. Similarly, Eppright, et al. (1969) found from an interview with mothers of preschool children that by the age of three many children had developed a dislike for certain foods, most notably vegetables. They also noted a sharp decrease in milk consumption after the age of six months which also corresponds with Beal's (1953) findings.

Introduction of new foods.--The eating situation is a learning experience for the child and at the same time carries along with it an emotional impact (HEW, 1968a). Foods which are familiar to a child will be much more acceptable to him than new foods. Therefore, Wagner (1954) has suggested acquainting the child with the new food before it is prepared and then introducing it with familiar and well-liked foods at the mealtime. Breckenridge and Murphy (1969) feel the introduction of a new food is a learning experience. Through repeated experimentation they feel children will learn to accept new foods.

Foods as rewards or punishments.--Hille (1969) stresses that withholding desserts as punishment or giving desserts as rewards only serves to place exaggerated importance on these foods. In order to avoid this problem, Wagner (1954) has noted that desserts in her nursery school

have been planned as a nutritional part of the meal and have thus been served with the meal and second servings have been permitted.

Self-selection of diet.--Eppright, et al. (1969) have concluded from their study that about half the children who enter school have had little experience in making decisions about food selection. Therefore, it appears that during the preschool years a child should be given the freedom of some choice in the amounts and types of foods he eats. Because of the variation in a child's appetite from day to day, Wagner (1954) feels that a process of modified self-selection for preschool children would be most advantageous. In this manner a child may select the types and amounts of foods he desires but the adult controls the variety of foods which are presented.

Attitudes.--Finally, a very important factor in the feeding of young children is the attitudes of these children and the influence of the environment on their formation. It is generally felt that a relaxed nonpressured atmosphere is important in helping a child develop healthy attitudes about food and mealtimes (Wagner, 1954). Metheny, et al. (1962) have stated that a child's attitude toward food at home may differ from his attitude toward food in a group-eating situation. This could possibly be explained by a relaxed atmosphere in the group which may not be as

apparent in the home, or vice versa. Likewise, it has been noted that "problem eaters" often disappear in the relaxed atmosphere where everybody eats (HEW, 1969).

Nutritional Status of Preschool Children

Height and Weight as Indicators

In assessing the nutritional status of children, appraisal of growth and development in relation to age and sex is of great importance. Height and weight, in addition to skinfold thickness, are the most commonly used anthropometric measurements in children to determine growth and development (Pearson, 1968).

Krogman (1948) notes that there is considerable variation in "normal" human growth in general but with the exception of a few cases, this variation follows an orderly progress within an expected range. The few exceptions may be partially explained by such factors as heredity, food and health habits and health vicissitudes.

Bayer and Bayley (1959) relate growth in height to the rate of physical maturing. They indicate that most children mature and grow in a similar pattern but their rates of maturing may vary greatly. Simmons and Todd (1938) further indicate that increments of stature (height) register true body growth whereas weight changes are more nearly an indication of health.

In considering weight as an indicator of nutritional status, there are conflicting ideas. Watson and Lowrey (1967) feel that body weight is probably the best index of nutrition and growth because it sums up all the increments in size. They do, however, recognize the extraneous factors which enter into its determination. These factors have been listed by Krogman (1948) as (a) time of day, (b) before or after meals, exercise or elimination, (c) season of year, (d) socioeconomic status, and (e) health, nutrition, body build, ethnic stock and family line. It is because of factors such as these that Simmons and Todd (1938) emphasize that weight cannot be as reliable or as valid an indicator of growth as stature until it becomes possible to distinguish weight as a true reflection of growth from weight as a reflection of other factors.

Hundley, et al. (1955) studied the reliability of height and weight measurements as a continuing index of the nutritional status of school children. Data were obtained for first-grade children from both favorable and underprivileged areas during the depression era and pre- and post-control periods of economic prosperity. Children from economically favored areas were taller and heavier than the children from underprivileged areas, but the latter group showed no change in its secular growth trend during the depression era whereas the former

group did show significant deviation. Due to other independent variables which may have influenced the results, it was concluded that further study should be done to test the reliability of these measurements.

Methods of Expressing Height and Weight

Heights and weights in determining the nutritional status of children can be used in a number of ways. Among these ways are the use of tables, curves, or grids; determination of growth increment; and determination of developmental age.

Height-weight tables.--Various tables (Watson & Lowrey, 1967) have been developed to present sex-age-height data and sex-age-weight data. These tables are usually based on means or percentiles of a large number of children and are used to compare a child's own height and weight with the norm at his particular age. Watson and Lowrey (1967) enumerate several objections to the use of these tables: (1) there is a question as to what extent deviations from mean figures must occur to be considered abnormal; (2) deviations are apt to be overlooked unless there are excessive deviations from the usual physique; (3) with these tables it is more difficult to compare a child's progress than it is with graphic representations. Nevertheless, because these tables are a convenient standard, they are widely used.

Height-weight curves.--Curves for height and weight, like tables, are usually derived from averages of large numbers of children at each age. These curves (Bayer & Bayley, 1959; Jackson & Kelly, 1945) have an advantage over tables in that they allow comparison of an individual's pattern of growth with that of a large group of his own age. Children with accelerated development will show curves higher than the average and likewise, children showing retarded development will fall below the average curve (Bayer & Bayley, 1959).

Height-weight grids.--The third method of appraisal is by the Wetzel Grid (Wetzel, 1943) which Krogman (1948) feels is the best present device available. By simply plotting heights and weights on the grid, one is able to estimate the physical condition of children. Two major steps are involved in this technique of appraisal. The first is the evaluation of physical status which includes physique, developmental level and nutritional grade; this evaluation applies to each individual point plotted from the height and weight data. The second step is evaluation of physical progress as defined by channel course, which indicates if changes in physique are accompanying development, and auxodrome progress which shows whether a child's development is progressing on schedule. This step applies to the curves which are drawn through the plotted points.

The greatest advantage of this Grid method is the ability to detect a developmental lag characterized in Wetzel's terms by "drifting off" in the channel course and "behind schedule" in auxodrome progress (Wetzel, 1943). In this way one is forewarned of oncoming malnutrition which cannot be detected by height and weight tables or clinical means.

Height-weight increment.--Increments in height and weight are another way to measure a child's progress in growth and development. These increments can be determined by taking the difference between heights and weights at successive age levels. Robinow (1942) feels these are particularly beneficial for following the progress of children over shorter periods of time so he undertook a study to establish norms for weight and length increments during successive intervals from birth to six years of age. It was found that the rate of growth in both height and weight decelerates rapidly throughout the first year, slowly decreases from one to two years of age, and from two to six years of age weight increments remain practically constant while length increments continue to decrease.

Bayer and Bayley (1959) note the importance of increment curves in determining whether a child's slow and fast growth periods are occurring at the expected times.

Developmental age and index.--Developmental age (Drash, et al., 1968) expresses in terms of age an individual's state of development as he relates to a standard population and can be used for any anthropometric characteristic which varies predictably with age and for which certain standards have been set for children at various ages. Specifically in reference to height and weight, the developmental age is the height age and weight age, respectively. Height age expresses an individual's height as the age at which his height is equivalent to the mean of a standard population. Weight age is expressed in a similar fashion. As a further step, developmental index can be obtained by dividing developmental age by chronological age. Therefore, a value of one would indicate normal development, less than one retarded development, and greater than one accelerated development.

CHAPTER II

INTRODUCTION

Because day care is still in relatively early stages of development, studies on preschool nutrition have not yet been conducted in this specific area. On the basis that there is an increasing need for day care for preschool children (U.S. Dept. of Labor, 1967; 1969; HEW, 1970; Low, et al., 1968), that nutrition plays a crucial role in the development of children during this period of life (Winick & Noble, 1966; 1967; McCance & Widdowson, 1960; Champakam, et al., 1968; Cabak & Najdanvic, 1967; Kugelmass, et al., 1944; Cravioto, et al., 1967), and that preschool children exhibit many changes in eating patterns and attitudes (Beal, 1953; 1954; 1955; 1956) which can be influenced by their environment (Wagner, 1954; Metheny, et al., 1962; HEW, 1969), a study on the nutritional adequacy of the food served at day care centers is justified. Therefore, this study was conducted to investigate nutrient intake of preschool children at nine day care centers. Nutrient intake was compared with height and weight increments of the children over a three-month period. In addition, for each participating day care center, descriptive factors concerning general

operations, menu planning and food service practices were noted.

CHAPTER III

METHODS

Selection and Description of Sample

Through the cooperation of the day care consultant for Western Michigan day care centers, ten day care centers in Western Michigan were selected for the study on the basis of location, expected cooperation, full-day program availability, and participant or non-participant in the USDA Special Food Service Program for Children (USDA, 1970). Midway in the study one day care center was informed it would be closing permanently due to lack of funding and attendance was dropping rapidly as a result. This center was, therefore, eliminated from the study as it would not have been representative of the on-going day care centers and the number of children would have been very small.

Table 1 summarizes descriptive information about each of the nine day care centers. Of these, one each was located in Newaygo, Muskegon, Grand Haven, Holland, and Portage and four in Kalamazoo. All centers provided full-day programs, although some of the children attended on a part-time basis at six of the day care centers. Six of the nine centers were participants in the USDA Special Food Service Program for Children.

Food Intakes

Preliminary Study

A preliminary study on individual food intakes was conducted prior to this study at one day care center for five consecutive days. Due to the limited capability of observing many individual children at one time as well as the risk of absences from day to day, it was decided that determination of average intake from several centers for a two-day period would be more beneficial than determination of a few individual intakes at fewer centers for longer periods of time.

Initial Planning

Two observation dates for each day care center were set for the six-week period between the middle of March and end of April. These dates involved two consecutive days at three centers, one day in-between at three centers, a weekend in-between at two centers, and two days plus a weekend in-between at one center.

Collection of Menus

Menus for the two observation dates at each day care center were obtained ahead of time for seventeen of the eighteen days for the purpose of observing how closely the menus were followed. In addition, extra menus were requested to determine whether the meals served during the study were typical for each day care center.

Weighing of Food

The total quantity of each food prepared for a snack or a meal was weighed with its container to ± 0.5 ounces on a Hanson household scale. This weight was corrected for the weight of the container and any food remaining in the serving dish. When the plates were scraped, the individual foods that were uneated were put onto separate plates to determine the weight of wastage for each. Spilled foods were also collected and weighed. The total weight of food served was corrected for these wastes; the resulting values represented the total weight of food eaten by all the children. The average weight of food eaten by each individual child was then determined by dividing the weight of the total food consumed by the number of children eating the meal or snack (see Table 2). No food eaten by the staff was included in these weights.

Analysis of Data

Average daily intakes for calories, protein, fat, carbohydrate, calcium, vitamin A, iron, thiamin, riboflavin, niacin and ascorbic acid for all meals and snacks served at each day care center were calculated using the food composition tables. Watt & Merrill (1963) was used for those foods appearing therein; otherwise Church & Church (1969) was used. For food items not listed in the tables, recipes were either obtained from the cooks or cookbooks (Rombauer, et al., 1967; Better Homes and Gardens New Cookbook, 1968; Junior Welfare League, 1964), and

nutritive composition of individual ingredients was calculated using the food tables by Watt & Merrill (1963).

Niacin equivalents were calculated using the tryptophan values for each food given by Church and Church (1969) and for those foods not listed, 1.4 per cent tryptophan was figured for proteins of animal origin and 1.0 per cent for proteins of vegetable origin (Food and Nutr. Bd., 1968). For each day an allowance of 135 mg. tryptophan was subtracted for its requirement[1] and for the remaining amount 60 mg. of tryptophan were converted to one mg. of niacin.

Average daily intakes for calories and the nutrients listed were compared to the 1968 Recommended Dietary Allowances (RDA) and the portion of these allowances which day care centers were recommended to provide. The Michigan Department of Public Health (1970) recommended that day care centers provide 1/3-1/2 of the child's RDA if he attended 5 to 8 hours daily (one regular meal and one or two snacks) and 2/3 of his daily RDA if he attended more than 8 hours a day (two regular meals and one or two snacks). The RDA for children ages 3-4 and 4-6 were averaged to obtain the most representative standard for this group of children. Percentage of total intake

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[1]Reynolds (1957) has suggested 500mg. of tryptophan as a safe allowance to meet the daily needs of tryptophan in young men. Therefore, using the RDA for protein as a basis for conversion, the allowance was calculated for preschool children and 1/2-2/3 of this value was used in the calculations for day care centers.

contributed by snacks and meals was calculated for each day care center and compared between centers serving two meals and those serving one.

Any vitamin supplements given to the children at the day care centers were not included in the dietary intakes.

Heights and Weights

Procedure

A total of 159 children in seven day care centers were measured and weighed (see Table 3) twice during the duration of this study--once in February or early March and again in May. Data were not collected for both of these times at two centers so they were eliminated from this aspect of the study. Weights were recorded to the nearest half pound when possible and heights to the nearest eighth inch. The first set of data was collected by a staff member of each day care center while the second set was collected by the researcher at six of the centers and by a staff member at the remaining center.

Analysis of Data

Three-month height and weight increments were determined for each child by subtracting the first set of data from the second set. Average age and average height and weight increment were determined for both

boys and girls at each day care center. An average was taken of increments suggested by Simmons (1944), Simmons & Todd (1938), Watson & Lowrey (1967), and Jackson & Kelly (1945) for the average age of the children and compared to actual data obtained.

Hemoglobin Data

Hemoglobin data were available from records at the two day care centers for children of low income families. These were obtained for 62 children at the one center and 12 children at the other and were compared with levels suggested by the Interdepartmental Committee on Nutrition for National Defense (1963).

TABLE 1.--Description of nine Western Michigan day care centers and the participating children.

Day Care Center	Number of Children			Ages of Children	Full- or Part-Time[2]	Ethnic Groups	Socio-economic Level	Meals and Snacks[3]	Style of Service[4]	USDA Participant
	Enrolled	Daily Average	Participating in Study[1]							
A	66	47-50	53	2½-5	Full	Whites Negroes Mex.Am.	low income	Breakfast Lunch a.m.&p.m.snack	Plates prepared by cook	Yes
B	42	28	29	2½-5	Both	Whites Negroes Mex.Am.	all levels	Breakfast Lunch p.m. snack	Cook served food at tables	Yes
C	29	29	21	2½-5	Full	Whites Negroes Mex.Am	low income	Breakfast Lunch a.m.&p.m.snack	Family	No
D	60	20-22	25	2½-5	Both*	Whites	all levels	Lunch a.m.&p.m. snack	Family	Yes
E	36	19	14	2½-5	Both*	Whites	all levels	Lunch a.m.&p.m. snack	Family	Yes
F	45	38-40	36	2½-6	Both	Whites Negroes	all levels	Lunch a.m.&p.m. snack	Family	Yes
G	100	70	55	2½-6	Both	Whites Negroes Mex.Am.	all levels	Lunch a.m.&p.m. snack	Family	No
H	29	29	22	2½-5	Full	Whites Negroes	all levels	Lunch p.m.snack reinforcements	Plates prepared by cook	No
I	27	20	20	2½-6	Both	Negroes	all levels	Breakfast Lunch p.m. snack	Plates prepared by teachers	Yes

[1]Actual number of children participating in the study varied from day to day and throughout each day. Value in table refers to number of children who ate lunch since this was the meal most often consumed by everyone.

[2]At centers with* most children attended on a part-time basis.

[3]At Center C the a.m. snack was experimental and has been discontinued since the study. At Center H reinforcement foods were given to the children periodically throughout the day in accordance with their performance in daily activities.

[4]All food was catered in to Center I from a central kitchen so there was no on-premise food preparation at the center except for afternoon snack.

TABLE 2.--Total number of preschool children eating meals and snacks during a two-day study at each of nine Western Michigan day care centers.

Center	Day	Breakfast	A.M. Snack	Lunch	P.M. Snack
A	1	51	51	51	51
	2	53	53	53	53
B	1	23	--	28	21
	2	24	--	29	26
C[1]	1	18	18	18	--
	2	20	21	21	5
D	1	--	25	21	19
	2	--	25	25	14
E	1	--	8	14	11
	2	--	11	13	9
F	1	--	33	36	32
	2	--	32	34	33
G	1	--	55	55	55
	2	--	47	50	53
H[2]	1	--	23	22	23
	2	--	20	19	20
I	1	10	--	16	17
	2	17	--	20	18

[1]The low and zero number for P.M. snack is due to the fact that children were allowed to go home early on Mondays and Fridays only, the two days the study was conducted, and very few, if any, were present for snack.

[2]A.M. snacks were not served but figures indicate total number of children receiving reinforcement foods periodically, at regular intervals, throughout the day.

TABLE 3.--Outline of procedures used in collecting height and weight data for preschool children in nine Western Michigan day care centers.

Day Care Center	Dates	Collector	Time of Day	Instrument Used		With or Without Shoes
				Heights	Weights	
A	2-20	Nurse	a.m.	Medical scale measurer	Medical Scales	With
	5-17	Nurse	a.m.	Medical scale measurer	Medical Scales[1]	With
B	2-12	Teacher	a.m.	Tape measure & wooden triangle	Bathroom Scales	With
	5-13	Researcher	a.m.	Tape measure & wooden triangle	Bathroom Scales[1]	With
C	2-10	Teacher	a.m.	Tape measure & wooden triangle	Bathroom Scales	Without
	5-17	Researcher	a.m.	Tape measure & wooden triangle	Bathroom Scales[1]	Without
D	2-15	Teacher	a.m.	Tape measure & wooden triangle	Bathroom Scales	With
	5-13	Researcher	a.m.	Tape measure & wooden triangle	Bathroom Scales[1]	With
E	3-1	Teacher	a.m.	Tape measure & wooden triangle	Bathroom Scales	With
	5-20	Researcher	a.m.	Tape measure & wooden triangle	Bathroom Scales[2]	With
F	3-1	Teacher	a.m.	Tape measure & ruler	Bathroom Scales	Without
	5-20	Researcher	a.m.	Tape measure & wooden triangle	Bathroom Scales[2]	Without
H	2-15,23	Teacher	--	----	Bathroom Scales	With
	5-17	Researcher	p.m.	Tape measure & wooden triangle	Bathroom Scales[2]	With

[1]Same scales both times.

[2]Different scales each time.

CHAPTER IV

RESULTS AND DISCUSSION

Nutrient Intake

Agreement Between Food Tables and Recipes

Since both Watt & Merrill (1963) and Church & Church (1969) were used for calculation of the nutrient content of the foods ingested by the children, a comparison of the nutrient content of 100 gram portions of representative foods from various food groups as given in the two food composition books was done (Table 4). For single food items, there was 100 per cent agreement whereas for mixed food items such as fruit cocktail, agreement between the two books ranged from 20 per cent to 100 per cent for the individual nutrients. However, the low value of 20 per cent agreement for ascorbic acid in fruit cocktail may be misleading since the content of this vitamin was so low in one and not very high in the other. Therefore, for this study using the two books in order to locate the published nutrient value of most food items was justifiable. Similarly, data in Table 5 for mixed dishes, although not in as good agreement as for single food items, would justify the use of the food composition

table either for the recipe as such, if given, or the nutrient content of the single food items contained in the recipe.

Calculated Data

Calculated values for average caloric and nutrient intake of the children ranging in age from 2 1/2 to 6 years for both days in all nine day care centers as well as the Recommended Dietary Allowance (RDA) for that age group for calories and each nutrient are given in Table 6. The table also includes a breakdown into percentages of each nutrient which, according to the Michigan Department of Public Health (1970), should be served each day to each child dependent upon the total hours in daily attendance for that child. Graphic presentation of these data is shown in Figures 1-9. Average intakes either met or exceeded 2/3 of the RDA for riboflavin (Figure 7) and protein (Figure 2) for half or more of the 18 days; 1/2 the RDA for calcium (Figure 3), vitamin A (Figure 5), niacin equivalent (Figure 8) and ascorbic acid (Figure 9); 1/3 the RDA for calories (Figure 1) and thiamin (Figure 6) and fell below 1/3 the RDA for iron (Figure 4).

The relatively low intakes of iron, thiamin and calories have also been found by other researchers (Crumrine & Fryer, 1970; Metheny, et al., 1962) for this age group. Crumrine & Fryer (1970) found that

less than half the 40 preschool children studied met the Recommended Dietary Allowances for thiamin, calcium, calories and iron while all intakes for protein were above the allowance. Metheny, et al., (1962) found calcium, calories, thiamin and iron were low in the diets of 104 preschool children while riboflavin and protein were high.

In her study on Denver preschool children, Beal (1953, 1954, 1955, 1956) found that mean daily intakes of all nutrients except iron and niacin met the Recommended Dietary Allowances. Studies conducted since that time such as the ones listed above have confirmed the low iron intakes but, in general, low niacin intakes have not been as frequent. This may be due to the recent recognition of niacin equivalents from tryptophan (Food & Nutr. Bd., 1968) which are now calculated in addition to the regular niacin intake.

Suggested Explanations for Intake Variations

The relatively low intakes by Center D for most nutrients in relation to other centers could be attributed to the fact that many of the children attended on a part-time basis, were from higher socio-economic level families and may, therefore, have had more food at home and smaller appetites at the center.[1] The high intakes of calcium (Figure 3) and riboflavin (Figure 7) by Center I reflected

[1]As a specific example, one boy commented one morning that he did not want any snack because he had had four pancakes for breakfast.

their milk consumption three times daily and their very low ascorbic acid (Figure 9) levels reflected the fact that no juice or fruit was served during the two-day period of study. Spaghetti with meat and iron-fortified dry cereal contributed to the relatively high iron intake by Center F. The very low intakes of vitamin A (Figure 5) for Centers G and H occurred because no good vitamin A source was served either day at either center whereas the extremely high intake for Center E reflected the use of carrots, a good source of vitamin A, in some form both days. The extremely high intake of ascorbic acid (Figure 9) by Center C reflected the large consumption of orange juice by the children.

Contribution by Meals and Snacks

Table 7 shows the per cent contribution meals and snacks made toward the daily caloric, protein and total nutrient intake. In general, snacks contributed a greater percentage of calories than of protein. In the centers serving two meals plus snacks a much greater percentage of calories, protein, and overall nutrient intake was contributed by the meals as was expected. In centers serving only lunch plus snacks, the snacks came close to providing almost 50 per cent of the daily caloric and overall nutrient intakes.

Menu Modification and Typical Representation

Modifications

Of the seventeen menus which were obtained ahead of time, two were received verbally, i.e. the cooks had not made out the menus but specified what they would serve that next day of observation. In both of these cases the cook did follow what she said.

Of the remaining fifteen menus, six, which were from three centers only, were followed with no modifications. In the other nine, the modifications which occurred were slight with the exception of one where the cook had forgotten which menu she had sent and began following a different one. She switched, however, to the original menu and followed it as soon as she became aware of the mistake.

Some examples and reasons for the slight modifications were: substituted birthday cake for regular planned snack or dessert (child's birthday); changed salmon loaf to salmon patties (easier for children to handle); omitted cheese sauce (children didn't care for it); added whipped cream topping to gelatin (children liked it); added sausage to a breakfast menu (to give children more protein since they were just having salmon patties at noon); substituted apple crisp for cherry cobbler (children didn't like thick dough and wouldn't eat cherry crisp); added

relishes such as green pepper, lettuce and tomato (leftovers to be used up); substituted milk for cider or apple juice (didn't have any cider or apple juice); substituted bread for bran muffins (children wouldn't eat bran muffins).

Generally speaking, the modifications which occurred were slight enough to have little effect on the nutrient intake of the children. Many of the reasons the cooks gave for the modifications concerned the likes and dislikes of the children which brings to question why certain foods as these were even planned on the menu. There were a considerable number of small modifications at one center in which a retired dietitian planned the menus but there were no modifications at another center where menus were planned by a retired dietitian. Also, some of the modifications which occurred were made by cooks who either planned the menu or were consulted in the planning.

Therefore, no conclusions can be drawn as to the effects of menu planner on the extent of menu modification, but from this study at least it can be concluded that menu modification did occur to some extent but the types of modifications made were minor for the most part and many of the reasons for which they occurred, at least according to the cooks, were for the benefit of the children's likes and dislikes.

Typical Representation of Menus

Table 8 indicates a breakdown of five-day lunch menus into food groups for the two days of study at each day care center (days 1 and 2) plus three different days either from the same week or a different week. One center did not provide an extra set of menus so no comparison could be made and it was, therefore, eliminated.

All menus from days 1 and 2 appeared to be quite typical as compared to those from days 3, 4, and 5 for all centers with the exception of Center H which served no fruits or juices for lunch during the days of study but these were listed for the other three days of comparison. Ascorbic acid intake for this center was still above average, however, since fruits and juices were served at times other than lunch time throughout the day.

Height and Weight Increment

Height increment averages (Table 9, Figure 10a) for girls and boys at six centers for three spring months were 0.72 and 0.64, respectively. These were in good agreement with standard increments of 0.74 and 0.66, respectively, obtained by averaging four suggested increments for a 4-4 1/2 year old obtained from Simmons (1944), Simmons & Todd (1938), Watson & Lowrey (1967--modified Stuart Meredith tables) and Jackson & Kelly

(1945). This age range was selected since the average age of all girls and boys at the time of the first measurements ranged from 3.8 to 4.2 years with the exception of one group of six boys from Center E who averaged 4.9 years of age. With these boys a slightly lower increment in height and weight would be expected. Actual results showed that these boys were, in fact, the closest group to the standards in both height and weight.

Weight increment averages (Table 9, Figure 10b) for the girls and boys were 2.03 and 1.29, respectively as compared to the respective standards of 1.28 and 1.13.

In general, the girls grew in height and gained in weight slightly more than the boys as was expected from the standard increments given. One finding contrary to expectations was the greater growth found in weight rather than height which should have been the reverse for the period during the spring months. Possibly part of the difference could be attributed to types of shoes which were worn at both times. In February boots may have been worn in some cases which would have increased the height slightly for the February data thereby making the increment smaller. However, in the two centers where measurements were taken without shoes (C and F) increments were still below the standard for height in both cases and above the standard in weight for both. In reference to weight, winter clothing may have had a

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for Center C boys and girls. Children from Center D had below average nutrient intakes but height increments were average for both boys and girls while weight increments were above standard for girls and below standard for boys.

Hemoglobin

Calculation of the average hemoglobin values for the children from each of the two day care centers from which data were available resulted in an average of 11.3 gm. for the 12 children at Center C and 11.8 gm. for the 62 children at Center A. Both of these values fell in the "acceptable" range as set by the Interdepartmental Committee on Nutrition for National Defense (ICCND, 1963). For individual values at Center C, 17 per cent fell in the "low" range (10-10.9 gm.) and 83 per cent in the "acceptable" range (11-12.4 gm.). At Center A 2 per cent (1 child) were "deficient" (<10.0 gm.), 19 per cent were "low" (10-10.9 gm.), 48 per cent were "acceptable" (11-12.4 gm.), and 31 per cent were "high" (>12.5 gm.).

The children from Center A had a higher hemoglobin level than those from Center C but the reverse was true for the iron intake for the children of these two centers.

TABLE 4.--Nutrient content of selected foods on a 100 gram basis with per cent agreement between two food composition tables.[1,2]

		Calories	Protein (gm.)	Fat (gm.)	Carbohydrate (gm.)	Calcium (mg.)	Iron (mg.)	Vit. A (IU)	Thiamin (mg.)	Riboflavin (mg.)	Niacin (mg.)	Asc.Acid (mg.)
Carrots												
	1	30	.8	.3	6.7	30	.7	15,000	.02	.03	.4	2
	2	30	.8	.3	6.7	30	.7	15,000	.02	.03	.4	2
% Agreement		100	100	100	100	100	100	100	100	100	100	100
Green Beans												
	1	24	1.4	.2	5.2	45	1.5	470	.03	.05	.3	4
	2	24	1.4	.2	5.2	45	1.5	470	.03	.05	.3	4
% Agreement		100	100	100	100	100	100	100	100	100	100	100
Fruit Cocktail												
	1	76	.4	.1	19.7	9	.4	140	.02	.01	.4	2
	2	90	.5	.1	23.0	--	.3	190	--	--	--	10
% Agreement		84	80	100	86	--	75	74	--	--	--	20
Hamburger Bun												
	1	298	8.2	5.6	53	74	1.9	tr	.28	.18	2.2	tr
	2	297	8.3	5.7	53	73	2.0	tr	.27	.17	2.3	tr
% Agreement		100	99	98	100	99	95	--	96	94	96	--
Baked Beans												
	1	120	6.3	.5	23	68	2.0	60	.07	.04	.6	2
	2	120	6.3	.5	23	68	2.0	60	.07	.04	.6	2
% Agreement		100	100	100	100	100	100	100	100	100	100	100
Spaghetti with Meat												
	1	134	7.5	4.7	15.6	50	1.5	640	.10	.12	1.6	9
	2	134	7.5	4.7	15.6	50	1.5	641	.10	.12	1.6	9
% Agreement		100	100	100	100	100	100	100	100	100	100	100

[1]Watt & Merrill (1963).

[2]Church & Church (1969).

TABLE 5.--Nutrient content of selected mixed dishes on a 100 gram basis with per cent agreement between calculated recipes[1] and two food composition tables.[2,3]

	Calories	Protein (gm.)	Fat (gm.)	Carbohydrate (gm.)	Calcium (mg.)	Iron (mg.)	Vit. A (IU)	Thiamin (mg.)	Riboflavin (mg.)	Niacin (mg.)	Asc.Acid (mg.)
Vanilla Pudding											
Recipe	134	2.7	3.4	23.6	92	.02	135	.02	.13	.1	1
2	111	3.5	3.9	15.9	117	tr	160	.03	.16	.1	1
3	122	3.4	3.8	19.0	115	.08	156	.03	.17	.1	0
% Agreement	83	77	87	67	79	--	84	67	76	100	--
Meat Loaf											
Recipe	146	13.7	7.4	5.0	29	2.2	300	.09	.17	2.9	8.3
2	200	15.9	13.2	3.3	9	1.8	--	.13	.22	2.5	--
% Agreement	73	86	56	66	31	82	--	69	77	86	--
Macaroni & Cheese											
Recipe	163	9.2	9.8	9.1	218	.7	469	.07	.2	.4	.3
2	215	8.4	11.1	20.1	181	.9	430	.10	.2	.9	tr
3	225	8.4	11.1	20.1	181	.9	431	.10	.2	.9	tr
% Agreement	72	91	88	45	83	77	92	70	100	40	--

[1]Recipes were taken from Berolzheimer (1968, p. 626), Berolzheimer (1968, p. 967) and Rombauer, et al. (1967, p. 186), respectively. Calculations of nutrient content were made using Watt & Merrill (1963) and % agreement was determined between the value for the recipe and the most extreme value from the two tables.

[2]Watt & Merrill (1963).

[3]Church & Church (1969).

TABLE 6.--Average daily calorie and nutrient intake of preschool children ages 2½-6 in nine Western Michigan day care centers.

Day Care Center	Days	Calories	Protein (g)	Calcium (mg.)	Iron (mg.)	Vitamin A (IU)	Thiamin (mg.)	Riboflavin (mg.)	Niacin Eq. (mg.)	Ascorbic Acid (mg.)	Fat (g)	Carbohydrate (g)
A	1	615	22	378	2.6	1304	.26	.67	7.5	30	22	84
	2	701	21	422	2.9	2892	.32	.68	4.9	8	25	100
B	1	672	20	297	1.9	1445	.40	.51	3.6	56	34	74
	2	630	22	342	2.9	3260	.24	.63	4.4	14	31	67
C	1	635	28	410	3.7	3057	.35	.73	5.7	55	33	80
	2	749	25	304	4.2	3543	.57	.59	7.4	110	32	94
D	1	447	16	404	1.5	776	.20	.58	2.9	18	20	54
	2	489	16	384	1.8	1603	.23	.52	2.6	12	20	65
E	1	819	30	468	4.0	5318	.34	.79	9.2	25	32	104
	2	578	19	484	3.4	4310	.39	.74	4.8	45	22	78
F	1	693	21	436	3.5	1014	.31	.64	4.1	22	27	96
	2	597	22	344	4.8	2598	.54	.76	8.1	57	23	78
G	1	637	19	245	2.0	474	.14	.35	2.4	8	29	78
	2	481	19	351	1.8	856	.20	.56	4.1	8	13	74
H	1	870	27	458	3.6	814	.32	.70	8.0	42	37	111
	2	730	21	366	1.8	723	.17	.57	5.6	36	27	104
I	1	886	34	633	3.4	1559	.55	1.09	9.2	8	48	83
	2	706	28	561	2.6	985	.32	.89	5.9	5	33	77
Total RDA[1]		1500	30	800	10	2500	.8	.8	10	40		
2/3 RDA		1000	20	533	6.6	1666	.53	.53	6.6	27		
1/2 RDA		750	15	400	5	1250	.40	.40	5	20		
1/3 RDA		500	10	266	3.3	833	.26	.26	3.3	13		

[1]Represents Recommended Dietary Allowances (RDA) for both boys and girls ages 3-6.

TABLE 7.--Per cent calories, protein and overall nutrient intake average[1] of preschool children contributed by meals and snacks at nine Western Michigan day care centers. Botton part shows comparison of this between centers serving two meals and those serving one.

Day Care Center	DAY 1						DAY 2					
	Calories		Protein		Overall Nutrient Average		Calories		Protein		Overall Nutrient Average	
	Snacks	Meals	Snacks	Meals	Snacks	Meals	Snacks	Meals	Snacks	Meals	Snacks	Meals
A[2]	24%	76%	13%	87%	21%	79%	30%	70%	21%	79%	22%	78%
B[2]	15	85	8	92	8	92	13	87	15	85	15	85
C[2]	7	93	4	96	2	98	20	80	13	87	16	84
D	39	61	34	66	37	63	47	53	47	53	42	58
E	55	45	34	66	38	62	58	42	53	47	58	42
F	38	62	30	70	42	58	30	70	28	72	42	58
G	31	69	24	76	35	65	52	48	41	59	47	53
H	28	72	15	85	27	73	47	53	27	73	43	57
I[2]	17	83	18	82	16	84	15	85	18	82	17	83
Centers Serving:							Snacks	Meals	Snacks	Meals	Snacks	Meals
Two meals & snacks							18%	82%	14%	86%	15%	85%
Lunch & snacks							42.5	57.5	33	67	41	59

[1]Overall nutrient intake average was calculated by combining the per cent contribution for each of the eleven nutrients (including calories and protein) and dividing by eleven.

[2]Meals included both breakfast and lunch. Lunch was only meal served at remaining day care centers.

TABLE 8.--Continued.

Food Group	Days[1]						
	1	2	3	4	5	Total	Ave.
Center D							
Meat, Fish, Poultry, Eggs, Legumes	.5	1	2	1	1	5.5	1.1
Vegetables	1.5	2	1	2	2	8.5	1.7
Fruits or Juices	1	1	1	1	1	5	1
Enriched Bread or Grain Products	1.5	1	1	1	1	5.5	1.1
Butter or Margarine	1	1	1	1	1	5	1
Simple Dessert	1					1	.2
Milk	1	1	1	1	1	5	1
Center E							
Meat, Fish, Poultry, Eggs, Legumes	1	1	1	1	.5	4.5	.9
Vegetables	2.5	1	2.5	1	2	9	1.8
Fruits or Juices	1	1	1	.5	1	4.5	.9
Enriched Bread or Grain Products	1	1.5	1	1	1	5.5	1.1
Butter or Margarine	1	1	1	1	1	5	1
Simple Dessert				.5		.5	.1
Milk	1	1	1	1	1	5	1
Center F							
Meat, Fish, Poultry, Eggs, Legumes	2	.5	1.5	1	.5	5.5	1.1
Vegetables	.5	1	2	2	1	6.5	1.3
Fruits or Juices	1.5	1		1		3.5	.7
Enriched Bread or Grain Products	1	1.5	1	1	1.5	6	1.2
Butter or Margarine	1	1	1	1	1	5	1
Simple Dessert			1		1	2	.4
Milk	1	1	1	1	1	5	1

TABLE 8.--Continued.

Food Group	Days[1]						
	1	2	3	4	5	Total	Ave.
Center G							
Meat, Fish, Poultry, Eggs, Legumes	1	1	.5	1	1	4.5	.9
Vegetables		1	.5	1	.5	3	.6
Fruits or Juices			1	1	1	3	.6
Enriched Bread or Grain Products	1		1.5	1	1	4.5	.9
Butter or Margarine	1		1	1	1	4	.8
Simple Dessert	1	1				2	.4
Milk	1	1	1	1	1	5	1
Center H							
Meat, Fish, Poultry, Eggs, Legumes	.5	1.5	1	1	1	5	1
Vegetables	2	1	2	2	.5	7.5	1.5
Fruits or Juices	.5			.5		1	.2
Enriches Bread or Grain Products	1.5	1.5	1	2	1	7	1.4
Butter or Margarine	1	1	1	1	1	5	1
Simple Dessert	1	1	1	.5	1	4.5	.9
Milk	1	1	1	1	1	5	1

[1]Days 1 and 2 refer to days included in study; days 3, 4, and 5 refer to the remaining lunch menus for the same week or to menus from a different week. Numbers in table refer to the frequency of food groups on the menu. Fraction's indicate approximate amount present in a combination food item containing 2 major food groups.

TABLE 9.--Total number, average age, 3-month height increments, and 3-month weight increments of preschool girls and boys attending six Western Michigan day care centers.

	Number			Average Age			Height Increment (in)			Weight Increment (lbs)		
	Group	Girls	Boys	Group	Girls	Boys	Group	Girls	Boys	Group	Girls	Boys
A	44	22	22	4.1	3.9	4.2	.65	.65	.66	.96	1.16	.76
B	17	6	11	3.8	3.8	3.9	.89	1.00	.83	1.26	2.25	.73
C	18	8	10	4.0	4.0	4.0	.48	.42	.52	1.86	1.88	1.85
D	12	6	6	4.0	3.8	4.2	.72	.71	.73	1.54	2.42	.67
E	14	8	6	4.3	3.9	4.9	.91	1.11	.65	1.71	2.00	1.33
F	35	20	15	4.0	4.2	3.8	.46	.45	.48	2.40	2.45	2.40
				Total Sample Average			.68	.72	.64	1.62	2.03	1.29
				Increment Average For Children Age 4				.74	.66		1.28	1.13

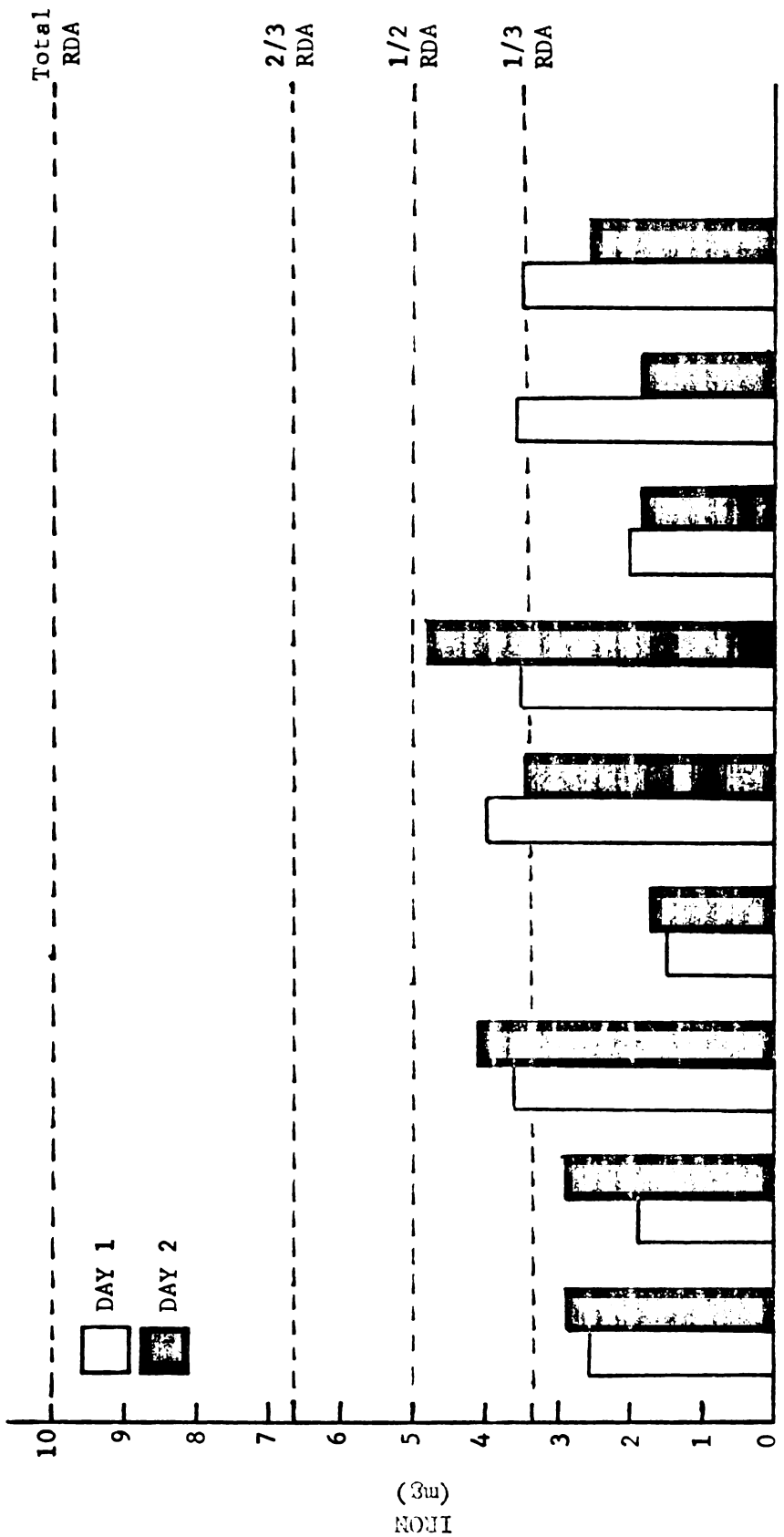

FIGURE 4.

Comparison of average daily iron intake of preschool children in nine Western Michigan day care centers with the Recommended Dietary Allowances (RDA)[1]

[1]The Michigan Department of Public Health recommends that day care centers provide 1/3 - 2/3 of the child's daily RDA depending on the length of his daily attendance.

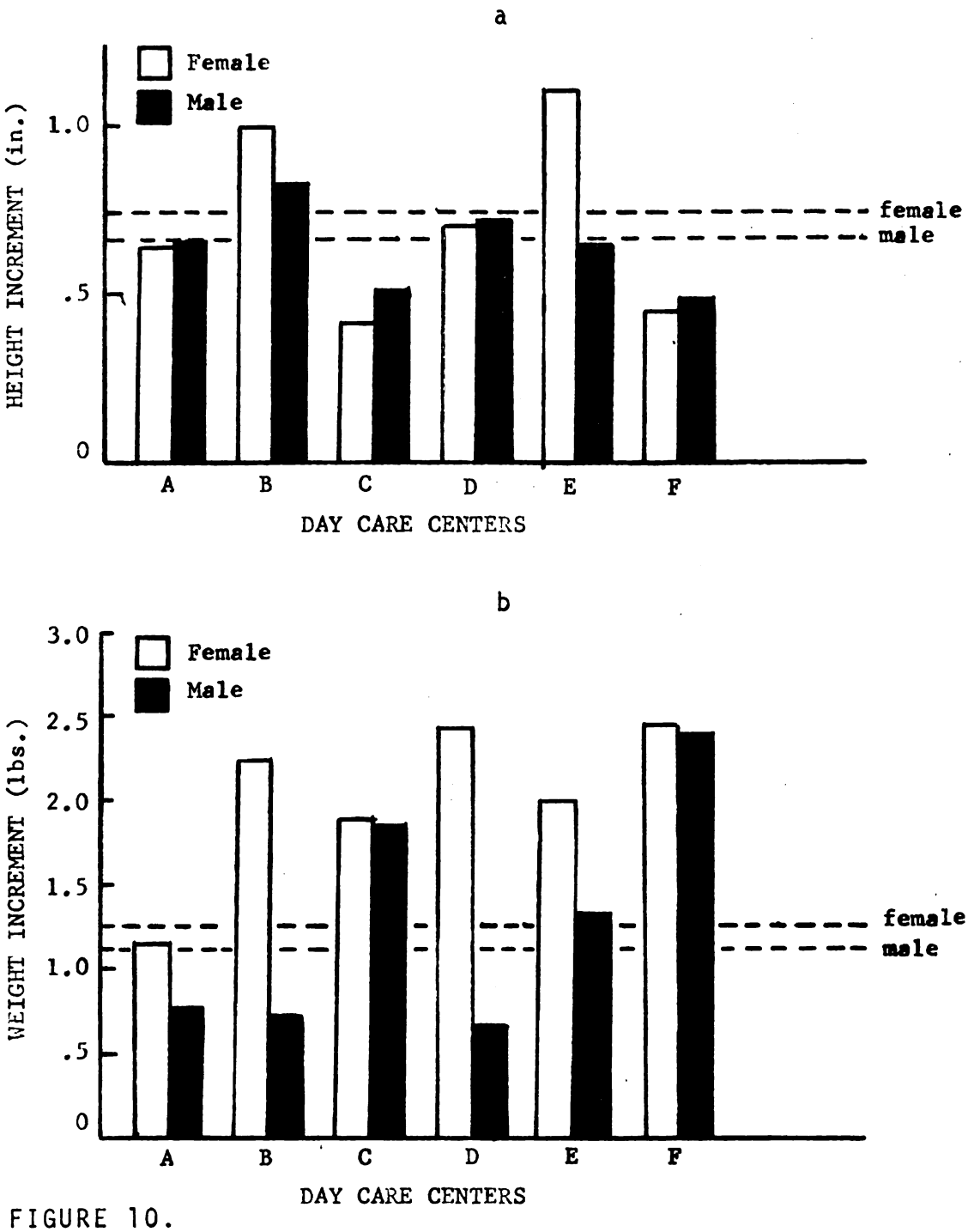

FIGURE 10.

Comparison of 3-month height and weight increments of preschool children, average age 4 years[1], in 6 Western Michigan day care centers with an average of increments recommended by Simmons(1944), Simmons & Todd(1938), Watson & Lowrey(1967) & Jackson & Kelly(1945) for children of the same age.

[1]Average age of all boys and girls was 4 years except for Center E boys who averaged 5 years of age.

CHAPTER V

DESCRIPTIVE FACTORS CONCERNING NINE WESTERN MICHIGAN DAY CARE CENTERS

During the two-day period of study at each day care center an attempt was made to gather information concerning: (1) general operations and (2) menu planning and food service practices. This was done by personal observation and informal interviews with the cooks and/or directors.

General Operational Information

Operational Age of Center

The nine centers investigated have been operating for a range of one to 37 years. Of these, one has been in operation for five years, seven for three years or less and one for 37 years. The latter was originally established under a different name and did not become known by its present name until three years ago.

Location of Centers

Five of the centers are located in presently operating churches, one in an old church no longer in operation, one in a presently operating elementary school,

one in an old school building no longer in operation, and one is located in its own private building.

Funding of Center

Two centers are strictly for children of low income families so no fees are charged and all funding comes from federal, state and local levels. In one center all families pay a fee, and in the remaining centers some families pay fees while others are on ADC and the fees are paid by the state. On a weekly basis the fees are $21.00 at one center, $22.50 at two centers, $27.50 at one, $30.50 at one and $15-$20 per week at one according to income level of the family. Fees for half-day attendance range from $2.25 (plus $.25 for lunch) to $3.00 per half day.

Months, Days, and Hours of Operation

Seven centers are in operation year-round while two centers are open from the first of September to the middle of June. All operate on a five-day week, Monday through Friday. Daily opening time ranges from 6:30 to 8:00 a.m. and closing time from 4:00 to 6:00 p.m. The centers are open an average of 10 hours per day with a range of 8 to 11 1/2 hours.

Number and Ages of Children

The total enrollment at the time of this study for all nine centers was 434 children and average daily

attendance for all centers totaled approximately 305 children. This attendance fluctuates daily. Enrollment at individual centers ranged from 27 to 100 children and average daily attendance ranged from 19 to 70. The children range in ages from 2 1/2-5 years at five centers and 2 1/2-6 years at three centers. Most of the six year olds, which were few in number, attended kindergarten for half days and, therefore, attended the day care center for half days only.

Full- or Part-time Attendance

In three centers all children attended on a daily full-time basis. In the remaining six centers, children attended on both full- and part-time bases. Most of the children were full-time in four of these six centers while most attended on a part-time basis in the other two. Part-time refers to either attending half days or attending only certain days of the week.

Ethnic Groups Represented

At the time of the study Whites, Negroes, and Mexican-Americans were represented in four of the centers, Whites and Negroes in two centers, Whites only in two centers and Negroes only in one center.

Description of Staff

Some or all of the following staff members are found in each day care center: director, assistant

director, cook, nurse, teachers, teacher aides, co-op students, community aide, bus drivers, and volunteers. The number of staff at each center ranges from 4 to 20 with an average of 10 per center.

Menu Planning and Food Service Practices

Although not a Head Start center, one center receives all its meals from a central kitchen which distributes meals to all Head Start centers in the area and thus has no on-premise food service operation. Therefore, some of the following questions will not be applicable to this center and will refer to the remaining eight day care centers only.

Who plans the menu?

The cook plans the menu at four centers, the director at two centers with the cook consulted at one of these, a retired consultant dietitian at two centers and a dietitian at one (the Head Start central kitchen).

When is the menu planned?

One center uses a pre-planned cycle menu planned well in advance of serving; another plans the menu one month ahead of time, another two to four weeks ahead of serving, four centers the week before, one center on Monday of the same week, and at the remaining center an attempt is made to plan it the weekend before.

Is a cycle menu used?

Only one center uses a written cycle menu which was planned by a retired consulting dietitian. Two six-week cycle menus have been planned, one each for winter and summer. Another center uses a cycle menu more or less from memory about every three weeks.

Is the menu posted at the center?

This question was not asked at any one center but from observation and recall, there were four centers in which the weekly menu was posted in a fairly conspicuous place so parents could see it.

Are snacks planned as a part of the written weekly menu?

Snacks are planned as a part of the written menu at four of the nine centers.

Who purchases the food and how often?

The cook purchases the food at six centers and the director at two. Frequency of purchasing varies with the types of food but most is done on a weekly basis. Three centers order some foods from a wholesaler and most centers purchase the majority of their food from one grocery store in town. All food is delivered to four centers. At the other centers most or all of the food is picked up by the director or cook.

Who prepares the meals and snacks?

Two cooks prepare the meals at one center and one cook at the remaining seven. Morning snacks are prepared by the cook at two centers, cook and teacher at one center, and the teachers at three centers. Three centers do not serve morning snacks. Afternoon snacks are prepared by the cook at five centers and the teachers at four. Generally speaking, the snacks prepared by the teachers are also planned by the teachers but this is not true in every case.

What are the cook's hours each day?

Arrival time for each cook ranges from 6:30 to 10:00 a.m. and departure time from 12:30 or 1:00 to 3:30 p.m. Total number of working hours ranges from four to eight per day with an average of six.

What types of meals and snacks are served and at what times of the day?

One center serves breakfast, lunch, and morning and afternoon snacks; three centers serve breakfast, lunch and an afternoon snack; four centers serve lunch and morning and afternoon snacks; and one center serves lunch, an afternoon snack, and reinforcement foods periodically throughout the day depending on the child's performance in various activities. Breakfast is usually served between 8:30 and 9:00 a.m., morning snack between 9:30 and 10:30

a.m., lunch between 11:30 a.m. and 12:30 p.m., and afternoon snack between 2:30 and 3:30 p.m.

What is the style of service?

Four centers serve family style in which separate serving dishes for all foods are placed on each table. At two centers the cook prepares the individual plates in the kitchen and the teachers carry them to the tables. At one center the cook and teachers walk around to each table and serve the children from serving dishes or pans. There is a modified family style service at one center in which separate serving dishes are prepared for each table but the teachers usually walk around the table and serve the children rather than sitting at the table with them. At the center where food is transported in, the teachers prepare the individual plates of food for the children.

How is milk served?

Milk is poured from 8-ounce cartons into small cups at the table in four of the centers. At two centers milk is poured from pitchers at the table and at one of these centers, the pitchers are small enough that the children often pour it themselves. Milk is poured from half gallon cartons at the table at two centers and at the remaining center the children, usually using a straw, drink directly from the 8-ounce carton.

What type of milk is used and is it vitamin D-fortified?

Five centers use whole milk, one uses 2% fat milk, one uses skimmed milk, one uses whole white and chocolate milk, and one uses chocolate milk only. The milk is not vitamin D-fortified at the latter two centers or at one of the five centers using whole milk.

Do the children eat at the same table and with the same children each day?

The children eat at the same table and with the same children at three centers but at the other center children do not eat at the same table or with the same children each day.

Do the teachers sit at the tables with the children?

The teachers sit at the tables with the children at five centers--the four centers serving family style and the one center in which both the teachers and cook walk around to each table to serve the children and then sit down with them. At one center the teachers do not sit with the children but stand in the middle of a circle which the tables form and help the children as needed. At three centers teachers sometimes sit with the children. At two of these centers they do so to help the children while at the third the primary purpose is to have the children experience eating with an adult as well as with children only.

Does the cook eat with the children?

The cook eats with the children at three centers, sometimes at one center and not at all at four centers.

How many children sit at each table?

The usual number of children per table is six to eight. This was true for eight centers. At the remaining center the number of children sitting at each table varied from six to 22 dependent on table size.

Are children required to finish their meal before having dessert or leaving the table?

Personnel at all centers agree that no children are forced to finish their meals but, in general, most feel they should taste everything. At one center they are not given dessert if they haven't eaten anything. One center does insist the children drink their milk but average milk consumption for this center did not differ markedly from that for any other center.

Are children required to remain at the table until everyone is finished eating?

At three centers the children must remain seated until everyone is finished eating and at three other centers they should, generally speaking, but some may be excused and some slower children may stay longer if the teachers think they'll eat more. At one center the children are supposed to remain seated but the teachers have found this difficult to achieve. At two centers

the children may leave the table as soon as they are finished and at one of these centers the children also may start eating before everyone is seated which is contrary to the procedure followed at the other eight centers.

What types of dishes, glasses and flatware are used?

Three of the four centers serving breakfast use paper plates while the other one uses china. For lunch, three centers use china dishes, two use paper plates, three use plastic dishes, and one uses styrofoam divided plates with snap-shut attached covers. Paper plates or napkins are used by all centers for snacks. For both snacks and meals small paper cups are used by six centers, small plastic glasses by one center, and 8-ounce plastic mugs by one center. At the remaining center small paper or plastic cups are used for snacks and no cups are used for lunch since the children drink out of the milk carton. The type of flatware used is plastic in three centers and metal in six centers. Of the latter group, only one center uses child-sized flatware. Flatware consists of spoons only at two of the centers.

Is children's furniture used at mealtime?

Children's furniture is used by all centers for meals and snacks.

Do the children help with meal service?

At eight centers children help in one or more of the following ways: make birthday cakes, bake cookies, prepare tossed salad, make applesauce, set the tables, carry serving dishes to the tables, take serving dishes to the kitchen for refills, scrape plates, throw away their disposables and sweep the floor after meals. At the remaining center such help was discontinued due to problems it presented primarily for the cook.

Do the children eat together for afternoon snack?

At five centers the children eat together at one time for the afternoon snack whereas at three centers the children eat as they awaken. This means that snack time can last as long as 1 1/2 hours. At one center the children awaken from naptime at approximately the same time and consume their snack shortly thereafter, but remain standing while doing so which is in contrast to the other eight centers where all children are seated for snack time.

Does the center conduct any type of nutrition education program for the children or staff?

The only type of nutrition education program conducted for the staff has been a nutrition workshop at one day care center. Two centers indicated no type of nutrition education program for the children and the remaining centers indicated only an informal educational experience

of learning about foods through snacks, special food preparation, pictures of foods, experimentation with different fruits and vegetables, health and safety practices or discussion of dental caries.

Do the children receive nutrient supplements?

The children receive fluoride tablets at one center and multiple vitamin tablets at two centers.

Does the center receive government surplus foods?

Four centers receive government surplus foods and two centers do not. Two centers which are eligible to receive them do not, feeling they are more trouble to obtain than they are worth to them.

Does the center participate in the USDA Special Food Service Program for Children?

Six centers do participate in this program and three centers do not.

CHAPTER VI

CONCLUSIONS AND SUGGESTIONS FOR FURTHER STUDY

Conclusions

On the basis of the findings from an investigation of nutrient intake of preschool children from meals and snacks provided by nine Western Michigan day care centers, it can be concluded that these meals and snacks as well as the food intake of the children provided adequate nutrients when compared with the recommendations as set up by the Michigan Department of Public Health and The Food and Nutrition Board (Recommended Dietary Allowances). The low iron intakes relative to the Recommended Dietary Allowances should not be of great concern since this has been a common finding among most of the studies concerning nutrient intake of preschool children and leads one to believe that perhaps the Recommended Dietary Allowances for this nutrient have been set at levels higher than necessary.

Generally speaking, average caloric intakes from centers serving more than one meal in addition to snacks were higher than those from centers serving only one meal plus snacks. The difference was so slight, however, that

it is safe to conclude that it was the quality of each meal and snack rather than the quantity which was a deciding factor in the nutrient intakes of the children. Therefore, menu planning which includes consideration of both meals and snacks becomes important for feeding children in day care centers.

The fact that the average gain in height and weight from February to May for six centers was in agreement with published values for 3-month height and weight increments further supported the fact that children were receiving sufficient nutrients. These increments implied that the center did not negatively affect growth and may have, indeed, played a large role in positively affecting the growth which occurred.

Suggestions for Further Study

Since this study on nutrition provided by day care centers was one of the first of its kind, there are ample opportunities for further research in this area. Some suggestions for further research are the following: (1) a study in Detroit similar to this one to observe the effect of locale on nutrition provided by day care centers; (2) a study on individual intakes at day care centers in relation to number of hours of attendance and to heights and weights; and (3) a study on individual intakes of children at the day care center as well as at home for the same day to determine if, between the day care center and home, the

child is receiving adequate daily nutrition and what percentage is provided by the home and center.

From the preceding suggested studies plus many more which could be conducted, one will be able to more conclusively assess the nutritional adequacy of day care centers and determine wherein the need for nutrition education lies. Programs could then be devised in such a way as to most effectively teach the day care center staff, children and parents the principles, importance and goals of nutrition for preschool children.

Helpful Hints

For anyone interested in conducting a study on nutrition in day care centers, the following suggestions may be of some benefit.

1. Remember that development of day care is still recent enough that major efforts are concentrated on the fundamentals and nutrition is scarcely recognized as an entity in itself at the present time. Therefore, the purpose and importance of the study should be made very clear to the persons involved.

2. A preliminary study at any day care center is advised to detect any obvious procedural problems which might be encountered.

3. If possible, a preliminary visit should be made to each participating center to acquaint the director and remaining staff with the study ahead of time. Especially

make sure the teachers are informed because they are the ones in direct contact with the children during meals and snacks.

4. Make definite plans well in advance and send reminders to each center shortly before the actual visit to the center.

5. Have all forms and data sheets prepared ahead of time. Good ideas for the types and format of data sheets needed can be obtained through the preliminary study.

6. Be familiar ahead of time with the center's daily activities and especially the style of service at mealtime to determine the most effective method of procedure with as little disruption of the normal daily routine as possible.

7. Try to eat with the children as often as possible to observe eating habits.

8. Have food composition tables on hand at all times to identify all foods served. For food items not listed in the tables, obtain recipes from the cook and for commercial foods, write to the food companies for information on nutrient composition of the foods.

9. If heights and weights are to be studied in conjunction with intake data, try to obtain these personally using standardized procedures rather than relying on each center to do it.

10. Show appreciation and gratefulness to the staff throughout the study for making it possible and provide

each center with the results upon completion of the study. This could be the first step in nutrition education of the staff.

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APPENDIX

TABLE 10.--Day care center sample menus.

Menu No. 1	Monday	Tuesday	Wednesday	Thursday	Friday
Breakfast	Pears Sausage Pancakes Syrup & Butter Milk	Pineapple Chunks Oatmeal with Raisins Bt. Toast Milk	Sliced Peaches Bacon Scrambled Eggs Bt. Toast Milk	Fruit Cocktail Corn Flakes Peanut Butter Toast Milk	Orange Juice Pork Patties Eggs Bt. Toast Milk
A.M. Snack	Bread & Butter Sandwich Milk	Apple Wedges Cracker Milk	Graham Crackers Milk	Buttered Bread Chocolate Milk	Tangerines Milk
Lunch	Ham Loaf Spinach & Eggs Mashed Potatoes Tossed Salad Bread & Butter Fresh Fruit Milk	Vegetable Soup Meat Sandwich Carrot & Celery Sticks Bread Pudding with Raisins Milk	Oven Fried Chicken Potato Salad Asparagus Bread & Butter Oranges Milk	Liver & Onions Macaroni & Cheese Stewed Tomatoes Celery Sticks Bread & Butter Cookies Milk	Fish Sticks Mashed Potatoes Buttered Broccoli Carrot Sticks Bread & Butter Apples Milk
P.M. Snack	Vanilla Pudding Milk	Fruit Jello Milk	Frozen Strawberries Whipped Topping Milk	Rice Custard Milk	Chocolate Pudding Milk
Menu No. 2					
Lunch	Spaghetti with Meat Sauce Relishes Bread & Butter Applesauce Milk	Scrambled Eggs & Bacon Diced Potatoes Green Beans Bread & Butter Chocolate Pudding Milk	Oven Fried Chicken Rice Peas Bread & Butter Jello Milk	Meat Loaf Mashed Potatoes Cooked Carrots Bread & Butter Peaches Milk	Tuna Noodle Casserole Tossed Salad Bread & Butter Ice Cream Milk

TABLE 10.--Continued.

Menu No. 3	Monday	Tuesday	Wednesday	Thursday	Friday
Breakfast	Orange Slices Sausage Eggs Toast Milk	Orange Slices Warm Donuts Hot Chocolate	Orange Juice French Toast with Syrup Milk	Apricot Nectar Bacon Eggs Toast Hot Chocolate	Grapefruit Sections Oatmeal with Milk Toast
Lunch	Hot Dogs French Fries Relish Plate Hot Dog Bun Cherry Tarts with Whipped Cream Milk	Sliced Turkey Potatoes & Gravy Broccoli Dressing Bread & Butter Cranberry Gelatin Salad Milk	Salmon Loaf with Cheese Sauce Potatoes in Jacket Green Beans Roll & Butter Sliced Peaches with Cookies Milk	Vegetable Soup Turkey Sandwich Green Pepper Rings Bread & Butter Pear Gingerbread Shortcake Milk	Meat Loaf Macaroni & Cheese Tossed Salad Bread & Butter Chilled Apricots Milk
P.M. Snack	Brownies Milk	Dry Cereal Grapefruit Juice	Lime Jello with Plain Cookies	Deviled Eggs Crackers Tomato Juice	Strawberries & Cookies
Menu No. 4					
Lunch	Spaghetti with Beef Carrot Sticks Corn Bread Applesauce Milk	Sloppy Joe with Buns & Oleo Potato Chips Jello Milk	Hot Dogs with Buns & Oleo Peas Pears Milk	Chicken Creamed Potatoes & Gravy String Beans Chocolate Pudding Milk	Hamburger with Bun & Oleo Potato Chips Carrot Sticks Pineapple Milk

TABLE 10.--Continued.

Menu No. 3	Monday	Tuesday	Wednesday	Thursday	Friday
Breakfast	Orange Slices Sausage Eggs Toast Milk	Orange Slices Warm Donuts Hot Chocolate	Orange Juice French Toast with Syrup Milk	Apricot Nectar Bacon Eggs Toast Hot Chocolate	Grapefruit Sections Oatmeal with Milk Toast
Lunch	Hot Dogs French Fries Relish Plate Hot Dog Bun Cherry Tarts with Whipped Cream Milk	Sliced Turkey Potatoes & Gravy Broccoli Dressing Bread & Butter Cranberry Gelatin Salad Milk	Salmon Loaf with Cheese Sauce Potatoes in Jacket Green Beans Roll & Butter Sliced Peaches with Cookies Milk	Vegetable Soup Turkey Sandwich Green Pepper Rings Bread & Butter Pear Gingerbread Shortcake Milk	Meat Loaf Macaroni & Cheese Tossed Salad Bread & Butter Chilled Apricots Milk
P.M. Snack	Brownies Milk	Dry Cereal Grapefruit Juice	Lime Jello with Plain Cookies	Deviled Eggs Crackers Tomato Juice	Strawberries & Cookies
Menu No. 4					
Lunch	Spaghetti with Beef Carrot Sticks Corn Bread Applesauce Milk	Sloppy Joe with Buns & Oleo Potato Chips Jello Milk	Hot Dogs with Buns & Oleo Peas Pears Milk	Chicken Creamed Potatoes & Gravy String Beans Chocolate Pudding Milk	Hamburger with Bun & Oleo Potato Chips Carrot Sticks Pineapple Milk

TABLE 10.--Continued.

Menu No. 3	Monday	Tuesday	Wednesday	Thursday	Friday
Breakfast	Orange Slices Sausage Eggs Toast Milk	Orange Slices Warm Donuts Hot Chocolate	Orange Juice French Toast with Syrup Milk	Apricot Nectar Bacon Eggs Toast Hot Chocolate	Grapefruit Sections Oatmeal with Milk Toast
Lunch	Hot Dogs French Fries Relish Plate Hot Dog Bun Cherry Tarts with Whipped Cream Milk	Sliced Turkey Potatoes & Gravy Broccoli Dressing Bread & Butter Cranberry Gelatin Salad Milk	Salmon Loaf with Cheese Sauce Potatoes in Jacket Green Beans Roll & Butter Sliced Peaches with Cookies Milk	Vegetable Soup Turkey Sandwich Green Pepper Rings Bread & Butter Pear Gingerbread Shortcake Milk	Meat Loaf Macaroni & Cheese Tossed Salad Bread & Butter Chilled Apricots Milk
P.M. Snack	Brownies Milk	Dry Cereal Grapefruit Juice	Lime Jello with Plain Cookies	Deviled Eggs Crackers Tomato Juice	Strawberries & Cookies
Menu No. 4					
Lunch	Spaghetti with Beef Carrot Sticks Corn Bread Applesauce Milk	Sloppy Joe with Buns & Oleo Potato Chips Jello Milk	Hot Dogs with Buns & Oleo Peas Pears Milk	Chicken Creamed Potatoes & Gravy String Beans Chocolate Pudding Milk	Hamburger with Bun & Oleo Potato Chips Carrot Sticks Pineapple Milk

TABLE 10.--Continued.

Menu No. 5	Monday	Tuesday	Wednesday	Thursday	Friday
Breakfast	Orange Juice Smokey Links Cheese Cubes Toast Milk	Sliced Bananas Cream of Wheat or Cream of Rice Cheese Slices Cinnamon Toast Milk	Orange Wedges Poached Eggs Buttered Toast Jelly Milk	Orange Juice French Toast Syrup Bacon	Grapefruit Juice Hard Cooked Egg Buttered Toast Jelly
Lunch	Meat Loaf Catsup Baked Potato Butter Carrots & Peas Pickles/Celery Bran Muffins Pineapple-Banana Cup Milk	Spanish Rice with Beef(or Chicken) Green Beans Celery & Carrot Sticks Tossed Salad Dressing Garlic Bread Baked Custard Milk	Turkey Roll Gravy Squash Cauliflower/Cheese Baking Powder Biscuit/Honey Peach & Pear Milk	Macaroni & Cheese Stewed Tomatoes Tossed Salad Celery/Pickles Dinner Rolls Fruit Jello Whipped Cream Milk	Barbecue on Bun Cole Slaw Carrot & Green Pepper Sticks Pickles Potato Chips Ice Cream Milk
P.M. Snack	Doughnuts (or Doughnut Holes) Cider or Apple Juice	Graham Crackers Chocolate Milk	Cheese & Crackers Milk	Cookies Apple	Peanut Butter & Crackers Milk
Menu No. 6					
Lunch	Vegetable Soup Peanut Butter & Jelly Sandwich Carrot Sticks Chocolate Pudding Milk	Creamed Chicken Mashed Potatoes Bt. Peas Celery Sticks Bread & Butter Applesauce Milk	Cream of Celery Soup Ham Salad Sandwich Carrot Sticks Jello with Fruit Cocktail Milk	Ground Beef & Potato Hash Green Beans Celery Sticks Canned Diced Pears Bread & Butter Milk	Cream of Chicken Soup Tuna Salad Sandwich Lettuce & Dressing Sliced Banana in Pineapple Juice Milk

TABLE 10.--Continued.

Menu No. 7	Monday	Tuesday	Wednesday	Thursday	Friday
Breakfast	Milk Cold Cereal Sandwich Stewed Fruit Fruit Juice	Milk Ham Scalloped Potatoes Raisin Muffins Fruit Fruit Juice	Milk Sausage French Toast & Syrup Fruit Juice	Milk Hot Cereal Peanut Butter & Jelly Sandwich Peaches Fruit Juice	Milk Bacon Scrambled Eggs Raisin Toast Fruit Juice
Lunch	Polish Sausage Hot Potato Salad Vegetable Bread & Butter Milk Cake	Ham Black Eyed Peas Rice Sliced Tomatoes & Onions Corn Bread Milk Peach Cobbler	Beef & Noodles Corn Carrot & Pineapple Slaw Bread & Butter Milk Applesauce Cake	Bean Soup Meat Sandwich Milk Pie	Macaroni & Cheese Green Salad Hot Bread Vegetable Milk Dessert
Menu No. 8					
A.M. Snack	Muffins with Jam Orange Juice	Graham Crackers with Peanut Butter Milk	Apple & Orange Sections Grape Juice	Cheese Cubes with Crackers Pineapple Juice	Meat Squares on Bread Orange Juice
Lunch	Meat Loaf Baked Potato Spinach Muffins with Butter Fruit Cocktail Milk	Corn Beef Hot Dish with Peas Fruit Salad Carrots, Celery & Radishes Whole Wheat Bread with Butter Ice Milk Milk	Baked Ham Loaf Baked Sweet Potato Buttered Corn Biscuits with Butter Applesauce Milk	Hot Dogs Baked Beans Lettuce Salad with French Dressing Raisin Bread with Butter Pears Milk	Grilled Cheese Sandwich Potato Salad Mixed Vegetables Orange Sections Milk
P.M. Snack	Raisins with Animal Cracker Milk	Orange Sections Grape Juice	Cheese Cubes with Crackers Milk	½ Boiled Egg Animal Cracker Milk	Celery, Carrot & Radishes Milk