

# Parental Behavior and the Availability of Foods Among Undernourished Inner-City Children

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This study was designed to identify differences in parental behaviors and the availability of food between undernourished and well-nourished inner-city children of early school age. Children with a constellation of measurements of height below the 25th percentile, midarm muscle circumference below the 50th percentile, and hemoglobin concentration below 11.5 g/dL were considered undernourished. These children were matched with controls having measurements above these levels. The homes of all children were investigated.

Families of undernourished children were found to have significantly less variety of nutritious foods requiring preparation by an adult available in the home ( $P < .01$ ), to have greater variety of convenience foods of low nutritional value ( $P < .01$ ), and to prefer fewer vegetables ( $P < .04$ ) and dairy products ( $P < .01$ ). The Polansky Child Level of Living Scale showed that mothers of undernourished children were less likely to prepare meals regularly for their children ( $P < .05$ ) and that they were less effective in providing general parental support to their children ( $P < .03$ ).

Food costs and family income affect the nutritional status of children. With rising food costs, food selection narrows to those foods providing most energy at least cost. When the purchasing

power of the family is reduced significantly, some essential nutrient foods are partially or wholly eliminated from the diet, and malnutrition is likely.<sup>1,2</sup>

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Poor communities, however, are heterogeneous; some children from poor families are well nourished while others are not.<sup>3-7</sup> Inadequate parental support with poor utilization of medical resources, economic dependency, and lack of maternal education have been found to distinguish families with poorly nourished children from families with well-nourished children even when income is uniformly low.<sup>3-7</sup> These studies suggest

that family dynamics are important in the pathogenesis of malnutrition. Yet, specific parental behaviors related to food consumption, an issue of importance in designing effective interventions for families of malnourished children, have not been thoroughly characterized.

Jelliffe and Jelliffe<sup>8</sup> have suggested the application of an at-risk approach to nutritional screening programs. The present pilot study was initiated to identify differences in parental behavior as well as food availability and preference between two groups of school-age children (one considered at risk for malnutrition, the other well nourished).

## Methods

This study was conducted at a public elementary school in north central Philadelphia. The school is located within census tract 152, an impoverished area that qualified the school for aid under titles I, II, and III of the Elementary and Secondary School Act. Seventy-one percent of the children come from families with incomes below poverty level, ranking the school 216th of 260 Philadelphia elementary schools in the percentage of poverty-level children in attendance. All of the students are black. The families reside in the immediate geographic area surrounding the school, a 1.6-square-mile area of north central Philadelphia.

The design for this project was approved by the director of School Health Services of the School District of Philadelphia. Permission for conducting the study was requested from parents of all 400 children enrolled in the kindergarten to third grade, and 221 parental permissions were received.

Measurements of height, weight, arm circumference (MAC), and triceps fat fold (TFF) were conducted by the authors, following the techniques described by Jelliffe.<sup>9</sup> Midarm muscle circumference (MAMC) was calculated from the formula  $MAMC = MAC - 3.14 \times TFF$ .<sup>10</sup> The percentile status for each child was determined by reference to published standards.<sup>10,11</sup>

For the purpose of this study, a child was considered "undernourished" if the following constellation of anthropometric and hematologic measurements was found: height below 25th percentile,

MAMC below 50th percentile, and hemoglobin concentration below 11.5 g/dL. The finding of concomitant reduced stature, muscle circumference, and hemoglobin level among children in a poor urban community suggests an inadequate intake of protein, calories, and iron.<sup>3,12,13</sup> Although the constellation of biological markers delineating undernutrition do not define malnutrition as such, the undernourished children described herein are "at risk" for clinical malnutrition.<sup>8</sup>

Of 221 children evaluated, 15 met the aforementioned criteria for the study group. Nine of these children were available for studies. Each of the nine was matched with a child of same sex and similar age with normal measurements of height, MAMC, and hemoglobin from a family without undernourished children. An initial visit was made to the home of each child by a team consisting of a nutritionist (ES) and a public health nurse (JF).

Behaviors of parents that may affect nutritional status of children were identified by the Polansky Child Level of Living Scale.<sup>14</sup> Within the Polansky scale, 51 characteristics of emotional support and parental care were identified that could be measured objectively in this study population, including shopping patterns, food preparation, and behavior at mealtime. Specific items from the Polansky scale that relate to dietary practices include a willingness to prepare special meals for special occasions, an expressed concern about feeding the child a balanced diet, and the planning of meals with a variety of foods. A minimum of two visits of two hours each, one week apart, were made to complete the Polansky scale.

The study and control groups of children were read a list of ten items from each of the following food groups: meat, dairy products and eggs, vegetables, fruits, and breads and cereals. All of the foods listed were of high nutritional value.<sup>15</sup> The child was asked to respond "like" or "dislike" for each item.

The mother of each child was then read a list of 45 items and was asked to respond either "yes" (signifying that she had this item in her home at present or had it in the home during the past two weeks), or "no." The foods in this inventory were categorized into the following three groups:

1. Food that required preparation at home by an adult ("basic" items): frozen meats, vegetables, and dinners; canned fish, meat, vegetables, soups, and fruits; dried beans, hot cereals, mixes

(cake or muffin), cornmeal, rice, white flour; and eggs.

2. Foods that required no preparation at home by an adult, but were of high nutritional value ("wholesome" convenience foods): milk, cheese, carrots, celery, apples, oranges, other fruits, yogurt, orange juice, bread, peanut butter, nuts, raisins, graham crackers, and bananas.

3. Foods that required no preparation at home by an adult and were considered to be of low nutritional value: ice cream bars, popsicles, soda, Kool-Aid or fruit "drink," cookies, cake, pretzels, potato chips, chocolate or candy bars, hard candy, doughnuts, white crackers, commercial popcorn, marshmallows, and gum.

The iron and caloric contents and the iron-to-energy rates of the various foods were elicited from food tables.<sup>16</sup>

The terms *wholesome* and *low nutritional value* are difficult to define. Guthrie,<sup>15</sup> in her review of this problem of definition, suggested that foods be considered nutritional if there is at least an equivalency for nutrient and energy content for several of the nutrients.

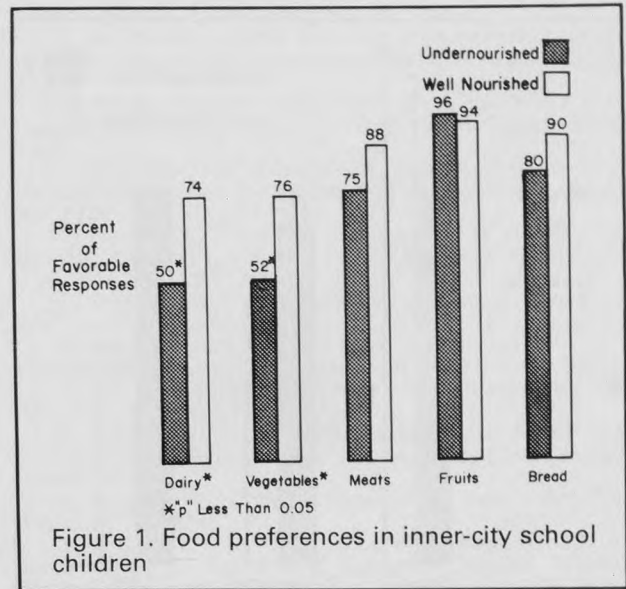
In this study a kitchen inventory was performed to identify differences in the availability of foods between two groups of families. This technique was developed and characterized by Lewin<sup>17</sup> and others during the 1940s and is appropriate for use in families where income is low and little food is kept that is not likely to be consumed.

Evaluation of socioeconomic status was by the Warner Index Characteristics Rankings based on occupation, sources of income, dwelling type, and dwelling area.<sup>3</sup>

Statistical comparisons were carried out by the Z test and by the Wilcoxin rank-sum test.

## Results

Fifteen (6.8 percent) of 221 early school-age children were identified as undernourished, whereas 58 (26 percent) of the children had measurements of height, MAMC, and hemoglobin concentration above minimal acceptable levels and were considered well nourished. The remainder (148) of the children had either one or two of the



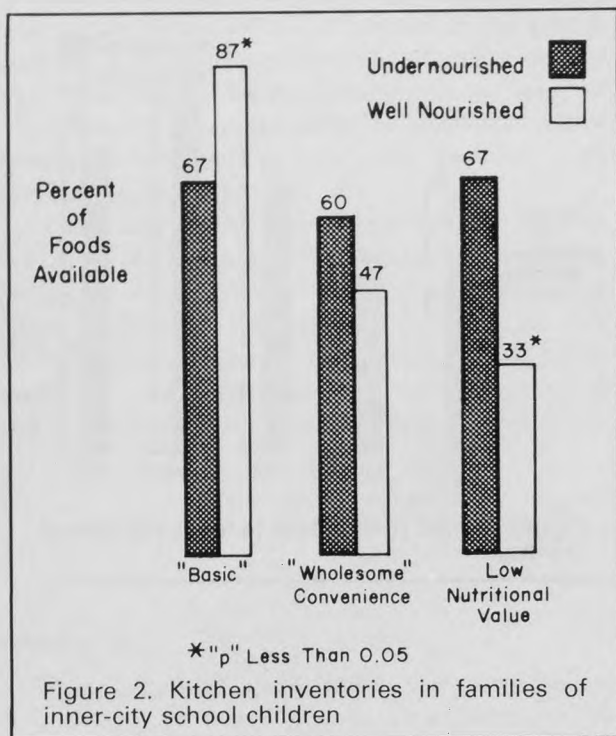
three measurements of nutritional status below the minimal acceptable levels.

In examining parental behaviors, significantly fewer mothers (2 of 9) of undernourished children prepared meals at home regularly when compared with mothers (7 of 9) of well-nourished children ( $P < .03$ ).

In comparing the children's preference for food items, undernourished children ("at risk" for malnutrition) were less likely to like vegetables ( $P < .04$ ) and dairy products ( $P < .01$ ) (Figure 1). No significant differences were found in preference for foods listed in the other three categories, but for the total number of foods the well-nourished children had significantly more preferences ( $P < .01$ ).

In the survey of kitchen inventories, the families of "at risk" children had more food of low nutritional value available than families of well-nourished controls ( $P < .01$ ) (Figure 2). In addition, the families of undernourished children were less likely to have "basic" foods that required preparation by an adult in the home ( $P < .01$ ). The difference in inventory for "wholesome" convenience foods was not significant.

All of the families in this study were classified by the Warner scale in the lowest socioeconomic



status group because of residence in an impoverished community and income from unskilled labor or public welfare.<sup>2</sup> There were more children (mean = 4.3) and fewer adults (mean = 1.3) living in homes of undernourished children than children (mean = 2.4) and adults (mean = 1.6) in the homes of control children. These differences, however, did not reach significance. More families of undernourished children received food stamps (9 of 9) and public assistance (8 of 9) than control families (5 of 9 and 4 of 9, respectively). These differences also were not significant.

### Discussion

The prevalence of malnutrition, especially iron deficiency, is much higher among the poor than

among the middle class.<sup>2</sup> The present pilot study estimated a prevalence of undernutrition (as defined herein) of 6.8 percent in early school-age children from a poor urban area; the prevalence would likely be lower in more affluent communities. It is not certain that the reduced somatic growth displayed by children in this study was caused by malnutrition; the association with low hemoglobin levels suggests that the cause is rooted in environmental rather than in hereditary factors.<sup>1-3</sup>

Although the present study was preliminary and the sample size small, the power of the measures that were used to discriminate families of well and poorly nourished children was surprising. Clearly the undernourished come from homes where convenience foods are regularly eaten and where fewer foods requiring adult preparation are available.

Foods requiring preparation by an adult have consistently higher iron-energy ratios than do convenience foods.<sup>18</sup> The reduced preference for a variety of nutritious foods found among poorly nourished children from this study reflects the reduced availability of parentally prepared foods in their homes. In the absence of effective intervention, it is likely that the preference for convenience foods of low nutritional value will be maintained into adulthood and perhaps perpetuated.<sup>17</sup>

Differences in the Polansky Child Level of Living Scale suggest that food-related behavior may be a symptom of a larger complex involving mother-child interaction and family coping and behavior. Using the Caldwell Home Inventory, Pollitt<sup>4</sup> found ineffective mother-child interaction in urban children to be associated with failure to thrive, as did Cravioto and DeLicardie<sup>7</sup> among children antecedent to the development of clinically severe protein-energy malnutrition.

The origins of malnutrition in urban poor communities are complex. Poverty and the adaptation people make to being poor contribute to the occurrence of malnutrition. An obvious implication of this study is that families of poorly nourished children should be encouraged to prepare foods at home. These preliminary results also suggest, however, that there is a food culture and a pattern of behavioral characteristics common to such families that may serve as barriers to improving nutritional status.<sup>19</sup>

It is suggested that family physicians working with undernourished children focus on the devel-

opment of parenting skills related to the provision of nutritious food at a reasonable cost.

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