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NUTRITION PROGRAM OPTIONS FOR MATERNAL AND CHILD HEALTH

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for Maternal and Child Health

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CHAPTER I

INTRODUCTION

It is anticipated that the 1980s will bring an emphasis on health promotion and disease prevention (Hamburg, 1979; U.S., Surgeon General, 1979). It may also be the decade for the emergence of a national food and nutrition policy. The U.S. Dietary Goals of the Senate's Select Committee on Nutrition and Human Needs (U.S., Congress, Senate, 1977) reflect an increasing awareness of the role of nutrition in health promotion and disease prevention, and may represent an initial step toward such a national policy. This report examines major food and nutrition programs of the U.S. Department of Agriculture (USDA) in an attempt to enhance our understanding of how a broad range of nutritional objectives might be reflected in such programs.

In the 1960s and 1970s, a much greater awareness of the impact of undernutrition arose than had been evident earlier, and was reflected in the rapid growth of major USDA feeding programs such as the Food Stamp Program and School Feeding programs. The USDA began to focus more of its attention not only on food surplus issues but also on nutritional needs. Recent research has indicated that while undernutrition is still a problem in some areas, other population groups are suffering the consequences of overconsumption and an imbalance of nutrient intake. Strategies to prevent or combat these newly recognized problems need to be incorporated into existing food and nutrition programs.

In the chapters that follow, we examine the options available for improving maternal and child nutrition. Improvements which are possible within programs under the jurisdiction of the federal agency most responsible

for nutrition--the U.S. Department of Agriculture (USDA)--provide the context. The remainder of this chapter provides a broad overview of the major U.S. maternal and child nutrition problems and the health rationale for improving them. In the next three chapters, we focus on the objectives, operations and evaluation of the major food assistance programs. The Supplementary Food Program for Women, Infants, and Children (WIC), the School Lunch and School Breakfast Programs, and the Food Stamp Program are discussed in separate chapters. A final chapter summarizes the entire report and provides concluding remarks about policy options for the future.

Nutritional Needs and their Health Significance

This section is an overview of nutritional needs and their impact on health for the key age-sex groupings discussed in this report: infants, preschoolers, children 6 to 12 years of age, male adolescents, female adolescents and women of child-bearing age. Each population group's nutritional status is assessed in terms of its health consequences by means of dietary intake measures, biochemical and clinical indicators, and growth and anthropometric status.

Understanding the functional and health effects of nutritional problems is important for determining both the allocation of resources to various age/sex groups and the choice of programs to meet current nutritional needs. The full range of nutritional problems--undernutrition, nutrient imbalances and overconsumption--may occur in the same U.S. population group. Because of this multiplicity of problems in a diverse society, it is often difficult to make decisions on program directions to deal with emerging problems (e.g., obesity) without harming some participants. For example, if the Food Stamp Program or the School Feeding

Programs were adjusted for lower fat, sodium and caloric intake, some undernourished persons might be adversely affected.

The reader must be made aware of the difficulties in assessing current U.S. nutrition problems. Problems exist in the methodologies available for measuring dietary requirements, food intake, and the existence and degree of malnutrition. Surveys of nutritional status and dietary intake on a national basis are limited. National surveys, such as the Health and Nutrition Examination Survey (HANES) and National Food consumption surveys, report dietary intakes as related to Recommended Dietary Allowances (RDA). However, the Food and Nutrition Board of the National Academy of Sciences, which publishes the Recommended Dietary Allowances, has clearly stated that consumption below the RDA does not necessarily mean that individual dietary deficiency exists. Additionally these surveys identify the number of person-days below standard rather than numbers of individuals. Thus even where national data are available, critical questions exist regarding their interpretation. Also, there is substantial controversy among investigators over what constitutes nutritional risk, partially because of the minimal research on the functional effects of malnutrition (e.g., effects of low or deficient hemoglobin levels on child performance). In spite of these limitations, available data provide some indication of the nature and extent of malnutrition.

Infants. Children through 11 months old are among the most nutritionally vulnerable of all age groups. Their accelerated growth and development and their higher nutrient requirements for size, as well as the immaturity of their various organ systems, magnify the possibility of nutritional insult and its impact. Despite this fact, limited work has been done in examining

the nutritional status of American infants. The First Health and Nutrition Examination Survey (HANES I), the only survey which collected nutritional status data on a representative sample of Americans, did not include children under the age of one year. There have been regional (e.g. Eppright et al., 1972, for the north central states) and local studies (e.g., Conwell et al., 1973, for New York City child health centers), representative of their study populations, which have also studied large numbers of infants. The Ten State Nutrition Survey (TSNS), which examined 855 infants, did not represent U.S. infants as a whole, nor low-income populations, though these were consciously oversampled. However, the TSNS attempted to examine a diversity of Americans and included various ethnic, racial, regional and income groups. TSNS findings largely coincide with findings from these regional and local surveys. Although limited, the TSNS findings provide valuable clues to the possible nutrition problems existing among infants throughout the United States. The TSNS collected information on dietary intakes, biochemical, anthropometric, and clinical (including dental) nutritional indicators.

The following information on infant nutritional status is a report of findings from the TSNS. Further research is needed to estimate fully the nutritional status of U.S. infants. More precise estimates of the nutritional status of infants six months and older will be provided in the future from information currently being collected in the HANES II survey.

Low birth-weight infants continue to be found in high proportion among some populations. These children have special nutritional needs and are

highly susceptible to infections and other health risks. Declines in breast-feeding practice and duration have previously been noted among Americans (Hirshman and Butler, forthcoming; Fomon, 1975). Potential nutritional problems resulting from this decline have been studied extensively in recent years. Preliminary data currently available suggest an upward trend in both breast-feeding practice and duration, at least among middle-class women (Hendershot, 1980; Martinez and Nalezienski, 1979). Information from the TSNS indicates that infants were relatively well nourished in comparison to other groups in the survey. The most striking nutritional problem uncovered was the deficiency of iron intakes. Poor growth and underweight occurred more frequently than expected. Other problems identified in a smaller proportion of infants were obesity, low vitamin A and C intakes and low serum vitamin A and C levels, and, to a much smaller extent, low dietary calcium and dietary riboflavin intakes (and low urinary riboflavin levels). See Table 1 for a summary of the TSNS findings.

Breast-feeding has important effects on infant and family well-being. There is therefore a need to promote this practice. Beneficial aspects of breast-feeding include the provision of immunological protection to the infant (Beer and Bellingham, 1975; Goldman, 1976; Hambraeus, 1977), the stimulation of a desirable emotional bond between mother and child (Fraiberg, 1977; Klaus and Kennel, 1976; Klaus et al., 1970; Newton, 1971) and the supply of essential nutrients to the infant in an easily

Table 1. Nutritional Problems of U.S. Infants in the Ten State Nutrition Survey (TSNS)

Nutrition Problem	Magnitude of Problem	Identified High-Risk Population	Comments
Underweight	30-50% of sample below 15th percentile for weight	Infants from low income ratio states	Stuart-Meredith Standards used
Undersized	32-60% of sample below 15th percentile for height	Infants from low income ratio states	Stuart-Meredith Standards used
Obese	10% of infants	Appears to be somewhat equally distributed between blacks and whites; also no income relationship apparent	Based on percentage of TSNS infants exceeding 95th percentile of triceps skinfold for the group
Inadequate dietary iron intake	Mean intakes below standard with approximately 74% of sample with below standard intake	All infants but especially older non-whites from low income ratio states	
Deficient or low hemoglobin values	15% of white and Spanish-American children <2 yrs. of age [and 30%* of black children <2 yrs. of age]	Children from low income ratio states	*Current evidence supports lower normal hemoglobin values for blacks; new standards needed for reevaluation of these data; available breakdowns include children 12-24 months of age
Inadequate dietary vitamin C intake	Mean intake exceeded standard but approximately 48% of sample with below standard intakes	Infants from low income ratio states	TSNS used a standard of 30 mg/day; 1974 RDA standard is 35 mg/day; using 1974 standards these findings underestimate deficient and low vitamin C intakes

Table 1 continued

Nutrition Problem	Magnitude of Problem	Identified High-Risk Population	Comments
Deficient or low serum vitamin C values	13% of black children <2 yrs. of age from low income ratio states	Black children from low income ratio states	A total of 4 Spanish-American children 2 yrs. of age were examined for serum C values--because of their small number, these findings are not reported here; available breakdowns include children 12-24 months of age
Inadequate dietary vitamin A intake	Mean intakes exceeded standard but approximately 15% of sample with below standard intake	Older infants from low income states	
Deficient or low plasma vitamin A values	22% of children <2 yrs. of age from low income ratio states; 8% of whites <2 yrs. of age from high income ratio states (low values)	Children from low income ratio states	Available breakdowns include children 12-24 months of age
Inadequate dietary calcium intake	Mean intakes more than twice standard but approximately 6% of sample below 400 mg/day intake	Older infants from low income states	TSNS used a calcium (Ca) standard of 550 mg/day; 1974 RDA intakes 360 mg Ca for infants 0-5 mos. and 540 mg Ca for infants 6-11 mos. Using 1974 RDAs, younger infants with intakes below 400 mg/day but above 360 mg would be consuming adequate dietary calcium

Table 1 continued

Nutrition Problem	Magnitude of Problem	Identified High-Risk Population	Comments
Inadequate dietary riboflavin intakes	Mean intakes exceeded standard but 2.5-5% of older infants with below standard intakes	Older infants from low income ratio states	TSNS used a riboflavin standard of 0.55 mg/ 1,000 calories; 1974 RDAs for riboflavin intakes are 0.6 mg/ 1,000 calories. By 1974 standards the findings here slightly underestimate the proportion of infants with below standard riboflavin intakes.
Deficient or low urinary riboflavin levels	25% of children <4 yrs. of age	Black children from both high and low income ratio states and generally children from low income ratio states	Available breakdowns include children 12-48 months of age

digested and assimilated form. In addition, many investigators feel that bottle-feeding increases the probability that an infant will become an obese child and/or adult (Jelliffe and Jelliffe, 1975; Weil, 1974). Formula-fed infants appear to be more likely to become obese, but the actual mechanisms for this are unclear (e.g., Taitz, 1977; Weil, 1974).

The critical period of brain growth in humans has been identified as from conception through the child's second birthday (Dobbing and Sands, 1973). Although it is generally agreed that nutrition plays an important role in brain development (Dobbing, 1970; Winick, 1970; Winick et al., 1970), controversy still exists around the precise relationship of nutrition to intellectual development (Lloyd-Still et al., 1975; Stein et al., 1972). There is some evidence that unless special efforts are made to ensure intellectual "catch-up" of previously malnourished infants and children, these children will lag behind their better nourished peers in some aspects of intellectual performance (Klein et al., 1975; Read, 1973; Winick et al., 1975).

Obesity is a major nutritional problem among Americans and occurs as early as infancy, as noted by various local and regional studies and the TSNS. The importance of infant obesity has been suggested by studies which link infant obesity with an increased risk of childhood obesity (Eid, 1970) and adult obesity (Charney et al., 1976). Recent evidence has questioned the linkage between obesity and childhood obesity (Dine et al., 1979; Melbin and Vuille, 1973; Poskitt, 1977). More research is needed to clarify this issue.

There are some indications that lifelong eating habits may be implicated in the etiology of coronary heart disease. Diets with a high ratio of saturated to unsaturated fat, rich in dietary cholesterol, have been linked to atherosclerotic lesions typical of coronary heart disease. Some would argue that moderate infant dietary cholesterol consumption is developmentally necessary, since cholesterol metobolism may be stimulated to maturity through this mechanism (Fomon, 1971; Hahn and Koldovsky, 1966; Reiser and Sidelman, 1972). Breast-milk provides a much greater proportion of cholesterol (20 mg per 100 ml) as compared to the three most widely used formulas (1.5 to 2.2 mg per 100 ml: Schubert, 1973). The concern about the saturated fat intake level has led some physicians to recommend low-fat milks for infants as a preventive measure. Fomon (1974) recommends that only 2% fat milk be fed to children over the age of one year. However, studies examining serum lipids and lipoproteins of breast-fed and bottle-fed infants have reported no significant differences (Berenson et al., 1979).

The importance of iron deficiency is not only its effect on the oxygen-carrying capacity of the blood (anemia). Nonanemia-related iron deficiency problems reviewed by Oski (1979) include problems related to growth, skin and mucous membranes, gastrointestinal tract, muscle function and behavior. Weight gains appear to be particularly adversely affected by iron deficiency.

Preschoolers. In the mid-sixties evidence of the vulnerability of preschoolers (children aged one to five) to nutritional problems had accumulated from data in developing countries. Owen's Preschool Nutrition Survey examined 3,400 children between the ages of one and six, and the

Ten State Nutrition Survey (TSNS) examined 3,700 children from 1968-70 as a partial response to the need for more information on potentially at-risk U.S. preschoolers. Neither of these large, national surveys was entirely representative of the U.S. preschool population as a whole, or of the low-income populations which comprised a large proportion of the populations of these surveys (58.2% of the Preschool Nutrition Survey population and 48.3% of the TSNS preschool population). The HANES I Survey (1971-74) examined a representative sample of 1,500 U.S. preschoolers aged one to six and collected data on dietary intakes, clinical (including dental), anthropometric and biochemical nutrition indicators.

The following review of nutrition problems among U.S. preschool children is based on data from the HANES I Survey, supplemented with data from the Preschool Nutrition Survey and TSNS.

Available information indicates that U.S. preschoolers are in relatively good nutritional health except for a small subgroup. Poor growth and nutrient intakes are associated with low socioeconomic status. Clinical signs of malnutrition are found in a very small proportion of the population (ranging from 0.0 to 2.0% for most nutritional deficiency signs). Poor growth by height and weight measurements are much more common in this group than obesity. Iron deficiency is striking among U.S. preschoolers by both dietary intake information and biochemical tests. Children one to three years of age were the most iron deficient. Below standard dietary intakes of vitamins A and C are found for a sizeable proportion of preschoolers, as well as low serum vitamin A levels. Black preschoolers have the highest prevalence of low serum vitamin A of all

groups in HANES I. Calcium intakes are more of a problem for black children than for white children, although below-standard intakes are found in both groups. The poorest calcium intakes are noted in the two- to three-year age group. A small proportion of preschoolers (less than 3%) have below-standard dietary intakes of thiamin and riboflavin. The incidence of dental caries is higher among preschoolers than among infants, but lower than that of older children. HANES I data have not been examined for trace mineral intakes. However, studies from Denver (Hambidge et al., 1972, 1976) indicate that zinc deficiency may be a problem among preschoolers, especially low-income preschoolers.

Table 2 summarizes the nutritional findings for preschoolers from available HANES I data, along with supplemental information from the TSNS. Preschoolers have been considered to be a nutritionally vulnerable group. Although they are growing at a less rapid rate than infants and have relatively smaller nutrient requirements, preschoolers encounter problems which can affect their nutritional status. Preschool-age children show decreased appetite for food related to their slowing growth rate. They have an increasing desire for independence and control over their environment. Self-feeding and food choice appear to be important to the preschooler's expression of this independence. Immature self-feeding skills and refusal to eat anything other than a limited selection of foods are frequently reported (Pipes, 1977) and can lead to poor food intakes. Willingness to sit and eat meals may be limited because it may be difficult for the young child to sit quietly and attend to a single task for any extended period of time. Eppright et al. (1972) reported that preschoolers who ate more frequently were more likely to have adequate nutrient intakes.

Table 2. Nutrition Problems of U.S. Preschoolers

Nutrition Problem	Magnitude of Problem	Identified High-Risk Population	Data Source	Comments
Short stature	40% of sample below 15th percentile for height	Poverty level preschoolers	TSNS	Stuart-Meredith Standards used; only representative of sample population
Underweight	32% of sample below 15th percentile for weight	Poverty level preschoolers	TSNS	Stuart-Meredith Standards used; only representative of sample population
Obesity	7% of children age 2-5	Slightly more common among whites than blacks and among females	TSNS	Obesity defined by triceps skinfold thickness exceeding 95th percentile; available breakdown excluded 1-year olds; only representative of sample may not be significant problem since 5% of population is expected to be >95%
Low caloric intake	14% of white children; 23% of black children	Poverty level preschoolers	HANES I	Low intake defined as less than 1,000 kcals daily
Below standard dietary iron intakes	86.7% of preschoolers	Preschoolers age 1-3	HANES I	Mean intakes were 31-40% below standard
Low hemoglobin levels	Below poverty: 4.9% whites, 8.3% blacks; above poverty: 1.2% whites, 7.7% blacks		HANES I	Biochemical iron deficiency more prevalent in preschoolers than older age groups

Table 2 continued

Nutrition Problem	Magnitude of Problem	Identified High-Risk Population	Data Source	Comments
Low transferrin saturation levels	Below poverty: 8.3% whites, 22.1% blacks; above poverty: 13% whites, 15.6% blacks		HANES I	Black, poverty level preschoolers had highest prevalence of low transferrin saturation of all HANES I groups; preschoolers as a group, higher than all groups except 6-17-year olds
Below standard dietary vitamin A intakes	32.3% of preschoolers	Black, poverty level preschoolers	HANES I	Mean intakes for both income levels were about 1.5 times the standard
Low serum vitamin A levels	Below poverty: 1.6% whites, 9.1% blacks; above poverty: 2.4% whites, 10.3% blacks	Black preschoolers	HANES I	Black preschoolers had highest prevalence of low serum vitamin A values of all groups in HANES I
Below standard dietary vitamin C intakes	44.2% of preschoolers	White, poverty level preschoolers; black, poverty level preschoolers	HANES I	Mean intakes for both income levels exceeded standard (serum vitamin C values have not been published to date)
Below standard dietary calcium intakes	33.3% of black children; 13% of white children	Black preschoolers	HANES I	Mean intakes for both income levels nearly twice the standard
Below standard dietary thiamin intake	2.7% of preschoolers	Slightly more prevalent among whites	HANES I	
Below standard dietary riboflavin intake	2.4% of preschoolers	Slightly more prevalent among blacks	HANES I	

Table 2 continued

Nutrition Problem	Magnitude of Problem	Identified High-Risk Population	Data Source	Comments
Dental caries	Average number of decayed, nonfunctional-carious, and filled teeth: 1.0 ± 0.6	Slightly higher for blacks	HANES I	TSNS found average number of decayed and filled primary teeth was 1.8
	16.6% (± 1.05) with specific dental treatment needs		HANES I	Includes teeth scaling, gum treatment, decay treatment (16.1%); data only broken down by sex. Males insignificantly higher.

"Nursing bottle syndrome," a pattern of tooth decay, has been reported to occur at its highest prevalence among preschoolers three to four years of age (Nizel, 1977). Typically, these children are given a bottle during the day and/or at bedtime, which they suckle for long periods of time. Fomon (1974) estimates that one-fourth of two-year olds and two-thirds of three-year olds have dental caries. Nizel's estimate (1977) is 40 to 50% of three- and four-year olds.

The effect of nutritional status on intellectual development of preschool children is also a concern. Some researchers have noted that the period of rapid brain growth in the human extends through the fifteenth and perhaps at late as the twenty-fourth month of life (Dobbing, 1970; Dobbing and Sands, 1973; Winick et al., 1970). Nutritional insults in the early preschool period may have an important effect on brain development. Further, the preschool years can be thought of as the period in which the child gains critical pre-learning skills and knowledge that will be important to later success in school. The apathetic, listless, irritable child suffering from anemia and/or undernutrition is not fully able to take advantage of the preschool period for this learning.

While less vulnerable than the infant to some nutritional problems, the preschool child is particularly vulnerable to others, which relate to the use of new skills and new independence. Poor eating habits developed during the preschool years may have such long-term consequences as obesity, dental caries and chronic disease. Preschoolers are thus a prime target for nutritional care.

School-age children. Nutritional needs of school-aged children (6-17 years old) have been of special concern because of the influence

of nutrition not only on growth and development but also on school performance. For these age groups, hunger--defined as physiologic and psychologic responses when immediate food needs are not met--and suboptimal nutritional status may result in a variety of poor outcomes. These include decreased attention span, irritability, impaired capacity to sustain physical activity, and inadequate growth rates. Relatively long-range outcomes such as adult obesity and/or the acceleration of the development of chronic disease states may also occur.

The HANES I Survey is the most typical representative sample of the U.S. school-aged population in terms of dietary intake, biochemical measures of nutritional status, and prevalence of clinical symptoms indicative of nutrient deficiency. The following summary of nutritional status has been prepared from HANES I data, unless otherwise indicated.

Clinical signs of nutritional deficiencies were found in this group in niacin, vitamin A, vitamin C, iodine and calcium, with adolescents more likely to be affected than younger children. Some evidence of past rickets was found. Published analysis of dietary intake data showed that calories were likely to be below standard for 6- to 11-year olds. (Table 3 summarizes median nutrient intakes as a percentage of RDA.) Height retardation, defined as height for age below the fifteenth percentile of the Stuart-Meredith Standard, was found in 20 to 30% of all children aged six to ten years. This is indicative of long-standing undernutrition. Obesity as measured by the triceps skinfolds was found to occur with the highest prevalence among white adolescent males. It is of interest in the

Table 3. Prevalence of Clinical Signs Indicative of Nutrient Deficit

Nutrient Clinical sign indicative of nutrient deficit	6-11 years Inc > Pov*		6-11 years Inc < Pov		Total 6-11 year olds	12-17 years Inc > Pov		12-17 years Inc < Pov		Total 12-17 year olds
	W %	B %	W %	B %		W %	B %	W %	B %	
Niacin										
Fungiform papillary hypertrophy of tongue	3.9	11.0	4.2	2.8	4.2	7.2	10.4	6.1	18.6	8.3
Vitamin A										
Follicular hyperkeratosis, arms	5.9	2.6	7.9	14.7	6.7	7.6	5.1	10.6	6.5	7.9
Vitamin C										
Diffuse marginal inflammation	4.5	1.0	3.6	7.8	4.3	9.0	19.2	29.1	27.8	12.3
Iodine										
Thyroid enlargement Sum: Grp I & II	6.1	5.4	1.0	6.3	4.4	6.3	12.0	3.0	6.7	6.0
Calcium										
Positive Chrosteks sign	4.5	6.4	5.6	7.6	4.8	12.5	12.4	14.8	18.9	12.7

*Income above 100% of poverty level for W (whites) and B (blacks).

TSNS that with increasing income both black and white children were taller and heavier and more advanced in skeletal maturity and dental development (Garn and Clark, 1975). The problem of under- and overnutrition existed, however, in all income strata. Iron deficiency, as indicated by hemoglobin and percentage of transferrin saturation, was noted in 5 to 25% of this population. Dental problems (dental caries and gingivitis) were found increasingly with increasing age. The breakdowns of cholesterol values into HDL and LDL fractions, which some feel to be better predictors of the indicidence of coronary heart disease than total cholesterol levels, were not available.

The relationship between dietary practices of children aged 6 to 17 and suboptimal nutritional and health status has received considerable attention. Consumption patterns developed during the school-age years have been related to adult obesity and accelerated development of atherosclerosis and hypertension. Short-term behavioral aberrations have been linked to hunger (Stricker and Zigmond, 1976) and suboptimal iron nutrition (Oski, 1979; Pollitt and Leibel, 1976; Popkin and Lim-Ybañez, forthcoming; Read, 1975). Iron deficiency anemia limits oxygen transport and energy metabolism and thus the ability both to perform physical work and to recover from fatigue (N. Smith and Rios, n.d.). Iron deficiency without anemia may result in reduced activity of nonheme-iron containing enzymes and thus also limit muscular performance (Finch et al., 1976). Pollitt, Greenfield and Liebel (1978) report results of a double blind, before-and-after-treatment study in preschoolers designed to test if iron deficiency in the absence of anemia would affect measures of attention, learning and memory. They report that iron deficiency had adverse effects

on attention span and memory control processes, but the deficits were eliminated once iron status was returned to normal levels.

An association has been found between iron nutrition and infection (Chandra and Newberne, 1976). Prolonged recovery from infection may be a more accurate definition of the impact of iron deficiency than is susceptibility to infection, thus explaining some of the differences in reported literature. Prolonged illness due to infectious disease may affect school performance.

Incidence figures for hyperactivity in school-aged children vary depending on diagnostic criteria, and are reported to range between 5 and 20% (Harley and Matthews, 1979). Contributing factors have included neurologic complications following prenatal or perinatal trauma, smoking during pregnancy, hereditary and congenital factors, environmental pollutants--particularly lead, artificial additives in foods and exposure to fluorescent lights (Tryphonas and Trites, 1979). The use of a special diet eliminating synethic food colors and salicylates has received much attention as a treatment to modify hyperactive behavior (Abrams et al., 1979; Harley et al., 1978). While some evidence supports a relationship between behavior modifications and ingestion of synthetic food colorings, this relationship has been shown for only a small proportion of the children identified as hyperactive (Abrams et al., 1979; Conners, 1979; Harley et al., 1978).

Long-term effects of suboptimal nutritional status during childhood are difficult to identify, since few studies have followed populations longitudinally in prospective studies into adulthood. The traditional

rationale for identification of child health and nutritional abnormalities has been to identify children with increased probabilities of adult morbidity and earlier mortality due to chronic disease processes. The corollary of disease prevention--health promotion--is rarely attempted. That is, little work has been done to identify child health factors which can be used to predict adult health.

During early childhood, the differences that exist in health parameters between races and sexes do not provide much information with which to predict adult health outcomes. However, by adolescence, differences in body composition, serum lipid values, and blood pressure values begin to assume more predictive power both in correlations between adolescent health status and adult health status and also regarding differential propensities to develop particular chronic diseases by race and sex (Srinivasan et al., 1978; Strong, 1978).

Childhood obesity has been associated with adult obesity (D'Augelli and Smiciklas-Wright, 1978). A wide range of estimates of the probability of an obese child becoming an obese adult exist (Brownell and Stunkard, 1978; Cacciari et al., 1978). In one 20-year prospective study, Abraham and Nordsieck (1960) report that in a sample of 50 boys and 50 girls who were obese, 86% of the boys and 80% of the girls remained obese into adulthood.

The predominant long-term risks of adult obesity are increased incidence of hypertension, stroke and diabetes. It also appears that obesity is related to depressed levels of high density lipoprotein (HDL) cholesterol, a variable which has significant negative correlation to the probability of coronary heart disease.

The etiology of childhood hypertension is not clearly understood, but it is important to detect the condition and to provide follow-up and intervention for sustained elevations. Several studies have tried to measure the extent of tracking, or the identification of children at high future risk for hypertension as adults (Fixler et al., 1979; Kilcoyne et al., 1974; Levine et al., 1979). Although hypertensive levels in a small proportion of children may be indicative of adult hypertension, a correlation between present and past blood pressure levels have not been achieved in adults. However, if irreversible modifications occur in arterial walls after relatively short periods of hypertension (Berry, 1978), it would be important to identify not only children with persistent elevations, but also those prone to severe or frequent fluctuations.

Reported hypertension prevalence in children varies with the definition of elevated levels. Age-related blood pressure distribution curves have been developed by the National Heart, Lung and Blood Institute Task Force on Blood Pressure Control in Children (1977). Children more likely to have persistent blood pressure elevations include those with hypertensive parents, black adolescents and obese adolescents (Strong, 1978; Weidman, 1979). Reported prevalence of persistent hypertension in children ranges from 0.6 to 2.5% but one-time measurements have identified prevalence rates as high as 13.4% (Levine et al., 1979). Two life-style factors which affect blood pressure prevalence and severity and which can be modified include obesity and sodium intake (Dahl, 1972).

Several prospective studies have shown a relationship between elevated serum cholesterol (over 200 mg/dl) and increased risk of coronary artery

disease (Breslow, 1978). Results of autopsy studies reviewed by Strong (1978) indicate that patients of all ages had intimal deposits and histologic alterations consisting of intra- and extracellular lipid deposits. The amount of surface area involvement increased slowly from ages six to ten years. After age ten, the fatty streak involvement increased markedly among black children, followed by increases in white teenagers after approximately a five year lag. Fibrous plaques began to appear in the second decade of life. Whites showed greater plaque involvement than did blacks. Strong concluded that a lag time of 15 years is required for conversion of all fatty streaks to fibrous plaque. However, since the rate of conversion differed between blacks and whites, factors initiating the fatty streak process must differ from the process producing clinical manifestations. Basic morphological features of the coronary arteries provide the foundation subsequent development of atherosclerosis. Risk factors influence the severity of the disease, the pattern and onset of clinical features.

Several epidemiologic studies have suggested that the relative amounts of LDL cholesterol and HDL cholesterol are better predictors of the incidence of coronary heart disease than is total cholesterol, elevated levels of HDL cholesterol being associated with lower disease incidence (Castelli et al., 1977; Wood et al., 1976). HDL cholesterol has been shown to vary with body weight, weight change, smoking and exercise. Child HDL levels have been measured in the Bogalusa Heart Study population (Berenson et al., 1979), the Princeton Family Lipid Program (Morrison et al., 1979), and the Lipid Research Clinic

(LRC) Prevalence Study (Rifkind et al., 1979). Little relationship among the risk parameters has been observed among children younger than school age. In the Princeton cohort, hypercholesterolemic (greater than 205 mg/dl) white children were much more likely to have elevations of LDL cholesterol in contrast to hypercholesterolemic black children who were more apt to have elevated HDL levels. In this population, approximately 29% of the hypercholesterolemic children did not have elevated LDL cholesterol values.

Women of childbearing age. A central concern of maternal and child health programs and policies has been the improvement of pregnancy outcomes and the reduction of infant mortality. Both are shown to relate to inadequate maternal nutrition at the onset of pregnancy and inadequate diet and weight gain during pregnancy.

The HANES study is the only nutritional survey to date conducted on a representative nationwide sample of the U.S. population. Although special subgroups of the population were sampled, including pregnant and lactating women, data on these subgroups have not yet been published. Major findings of the HANES I Survey with regard to adult women are summarized in Table 4.

Fifty percent of women aged 18 to 24 had iron intakes below 50% of the 1974 RDA; approximately 93% of all females had iron intakes below 100% of the RDA. Over 50% of adult women were below the RDA for calcium, with the proportion decreasing with increasing age. Approximately 50% of women 18 to 24 had vitamin A intakes below two-thirds of the RDA; a lesser percentage of older women (25 to 34) were below two-thirds of the

Table 4 Median Intake as a Percentage of 1974 Recommended Daily Allowances for Selected Nutrients for Adult Women by Age*

Age Group	Percentages					
	Calories	Protein	Calcium	Iron	Vitamin A	Vitamin C
18-19	76	135	50	49	66	137
20-24	75	165	71	49	62	106
25-34	100	165	85	66	75	124

Source: HANES I

*Figures indicate that, for example, 18-19 year old females consumed less than 76% of the RDA for calories.

RDA for vitamin A. Only vitamin C and protein intakes appeared to meet the standard for a majority of the sample.

The data also indicate that:

1. A higher proportion of females in the low-income groups tended to report protein, calcium, vitamin A, and vitamin C intakes below the standard than those in the upper income groups.
2. Low-income white females had a lower caloric intake than their upper-income counterparts, but the reverse was true for lower-income black females.
3. Although a high percentage of women were reported has having caloric intakes below standard, the high prevalence of obesity points to the need to consider energy expenditure in evaluating caloric intakes.

Analyses of the HANES data collected on pregnant and lactating women are not yet available. However, studies on small groups of pregnant women (Snowman, 1979; Blackburn, 1976; Thompson, 1974; Harrill, 1973, and Stevens, 1967) have identified nutritional deficiencies and indicate that such deficiencies during pregnancy are not limited to women of lower socioeconomic status. A significant proportion of pregnant women appear to have caloric intakes below the recommended levels. Although protein intakes appear to be adequate, caloric intakes may not be sufficient to protect protein from being used as a source of energy. Calcium and iron appear to be uniformly below standard in the diets of pregnant women, and vitamin A intakes are marginal. Vitamin C intakes are variable, with more recent studies showing intakes above recommendations; this may be due to improved diets or to the lowering of the recommended levels of vitamin C in the 1974 RDAs.

Because of the increased demands of both pregnancy and their own growth, pregnant adolescents are considered to be at special nutritional risk. The HANES study included pregnant teenagers in its special study of the nutritional status of pregnant women, but the results have not yet been published. No other nationally representative study has been conducted on the dietary intakes of pregnant adolescents. Studies on small groups of pregnant teenagers (Singleton, 1976; King, 1972; Osofsky, 1971, and McGanity, 1969) have revealed nutritional deficiencies in the pregnant teenager's diet similar to those of the pregnant adult woman. Inadequacies seem to exist more frequently, and more severely, in calories, calcium, iron and vitamin A. Although intakes of certain nutrients by pregnant teenagers may equal or exceed the intakes of older women, the higher requirements of teenagers often leave them in a more deficient state, especially for calcium, iron and vitamin A.

The correlation between measured intakes of nutrients based on dietary recall data and other sources of information on nutritional status (anthropometric measurements, biochemical values and clinical observations) are weak. With the exception of obesity, overt clinical signs of malnutrition for women of childbearing age in the U.S. are rarely found. The severely low iron intakes of pregnant women seem to correspond to lower than normal hemoglobin and hematocrit values. However, it is not clear to what extent this phenomenon is a normal physiological consequence of pregnancy. White (1970) reviews a number of studies on the iron status of pregnant women, most of which show a significant proportion of women with a diagnosis of anemia based on blood

hemoglobin or hematocrit levels--a reflection of inadequate past iron nutriture. The HANES study on pregnant women will include data on the serum levels of several other nutrients and should aid in the interpretation of the dietary intake data.

The association between maternal nutrition and pregnancy outcome (e.g., neonatal and postnatal infant mortality, and birth weight) is documented in numerous studies (Karn and Penrose, 1951; Naeye, 1979; Naeye et al., 1973; Shapiro et al., 1968; U.S. National Institutes of Health, 1971; Van den Berg, 1966). Increased fetal and neonatal mortality and reduced birth weights were observed during famines in World War II in Leningrad and Holland (Antonov, 1947; Smith, 1947). In more recent studies conducted with low-income Canadian (Higgins, 1973) and rural Guatemalan mothers (Habicht et al., 1972; Lechtig et al., 1978), the role of nutritional supplementation in improved birth weight has been reported. Conflicting evidence of the relationship between specific elements of maternal diet and pregnancy outcome has been reported (e.g., Habicht et al., 1972; Winick, 1974). Baird (1964) showed that maternal weight and height at conception may have more influence on infants' birth weight than increased caloric intakes during pregnancy. Naeye (1979) shows that pregnancy outcome relates to maternal weight gain which is conditional upon prepregnancy nutritional status.

Methodological differences (Osofsky, 1975) including differences in the degree and duration of maternal malnutrition (Habicht, et al., 1972; Sussner and Stein, 1977) may explain some of the conflicting results. Studies in Britain have also suggested that prior nutritional experience

of the mother over her lifetime, other health conditions, quality of obstetrical care, other aspects of medical care, sanitation and a host of other variables contribute to outcomes of pregnancy (Baird, 1964; Butler and Elberman, 1969). Associations between low birth weight and low socioeconomic status have been well documented (Butler and Elberman, 1969; Lewis, 1973; Stockwell, 1962; Weiner, 1970). Baird (1964) showed that in Britain racial differences in birth weight persisted even after adjustments for socioeconomic status. A number of studies link the adequacy of maternal diet as influenced by dietary counseling to improved outcomes of pregnancy (Ebbs et al., 1942; Higgins, 1973; Tompkins et al., 1955).

The consequences of undernutrition on the outcome of an adolescent pregnancy can be particularly severe, affecting not only fetal growth and development, but the mother's growth as well. A majority of adolescent females do not achieve their ultimate height until the age of 17, although the average age of menarche in the U.S. is 12.5-13.0 years. Among teenagers in general, and especially teenage girls, a significant proportion consume diets inadequate for their own growth (see Table 5); the additional burdens of pregnancy further accentuate their deficiencies. Inadequate dietary intake among pregnant adolescents, along with a host of other biological and socioeconomic factors, all contribute to an increased incidence of low birth weight infants, a higher infant mortality rate and an increased incidence of complications of pregnancy (National Academy of Sciences, 1970).

An additional dimension of pregnancy outcome which has long been held to be influenced by nutrition is the edema, proteinuria and

Table 5 Median Intakes as a Percentage of Recommended Dietary Allowances, 1979 Revision*

	Income Less than Poverty Threshold				Income Greater than Poverty Threshold			
	White		Black		White		Black	
	Male	Female	Male	Female	Male	Female	Male	Female
	12-14 Years							
Calories	74%	72%	75%	71%	89%	79%	83%	73%
Calcium	100	78	62	64	108	84	74	59
Iron	61	49	63	52	69	54	62	55
Vitamin A	63	63	53	64	71	69	43	43
Vitamin C	92	69		75	128	102	148	95
Niacin	85	84	80	82	94	90	87	93
	15-17 Years							
Calories	78	75	78	77	96	78	99	76
Calcium	100	49	69	46	109	63	68	51
Iron	60	40	66	43	89	48	73	60
Vitamin A	60	54	63	48	81	59	42	51
Vitamin C	77	82	67	83	105	84	65	84
Niacin	71	72	95	67	112	83	91	100

*Indicates that, for example, 50% of 12-14 year old white males consumed less than 74% of the RDA for calories. Values calculated from HANES Dietary Intake Findings (NCHS, VHS Series II, No. 202).

hypertension syndrome, although etiology and treatment for this condition remains in dispute.

Summary. This section has presented a brief overview of the current state of knowledge regarding the nutritional status and the rationale for nutritional intervention among infants, preschoolers, school-aged children and women of child-bearing age in the United States. Problems in data availability, measurement techniques and data analysis limit our ability to make definitive statements about the nutritional status of these groups. Nevertheless, available data allow us to delineate potential problem areas.

Infants in the U.S. are felt to be generally well-nourished with the exception of iron nutriture. Poor growth and underweight, obesity, and problems in vitamin A and C intakes and serum levels have been noted in a small subgroup of infants.

Preschoolers are also in relatively good nutritional health except for a small subgroup. Obesity figures less among them than poor growth as indicated by height and weight measurements. Iron nutriture is poor among preschoolers, especially among those in the one- to three- year age group. Black children have been noted to have greater vitamin A and calcium deficiencies than whites, although low dietary intakes and serum levels (vitamin A) are also found in whites. Below-standard vitamin C intakes are found for a sizable proportion of preschoolers.

Among school-aged children, 12- to 17-year olds are more frequently found to have below-standard dietary intakes of nutrients and clinical signs of nutrient deficiencies than children 6 to 11 years of age.

Clinical signs of nutrient deficiencies have been found for niacin, vitamin A, vitamin C, iodine and calcium. Children 6 to 11 are more likely to have below-standard caloric intakes than older school-age children. Height retardation, indicative of long-standing undernutrition, is found in 20 to 39% of children aged 6 to 10 years. Obesity is most common among white adolescent males but has been found in other school-age children as well. Iron deficiency, as measured by hemoglobin and percentage of transferrin saturation, ranges from 5 to 25% in this group. Dental caries are found increasingly with increasing age.

Women of childbearing age are noted to have problems with nutrient intakes of iron, calcium and vitamin A. Pregnant women in all income strata appear to have problems with nutrient intakes of calories, calcium and iron and to some extent vitamin A. Although protein intakes are generally adequate, insufficient caloric intakes are known to compromise protein intakes by causing protein to be used for energy.

The rationale for nutrition intervention among these groups is based on the premises that (1) nutrition is one of the major environmental influences in the establishment and achievement of child health potential and (2) nutrition can affect the course and rate of development of chronic degenerative disease.

The impact of adequate nutrition on postdelivery child growth and development is well known. New research indicates that intrauterine growth and development is importantly linked to nutrition. The relationship of nutrition to brain development, intellectual performance and behavior has been studied, and indications are that nutrition can have profound influence on all of these.

Linkages between various disease processes and nutrition have been examined. A clear relationship exists between nutrition and dental disease, the most prevalent child health problem. It appears that many diseases which occur in adulthood may have had their start in childhood with inadequate dietary practices and/or poor nutritional status. The development of hypertension and atherosclerosis has been scrutinized from this viewpoint. Although the relationship of long-term dietary practices to the development of such killer diseases needs further investigation, sufficient evidence existed for the publishing and promotion of Dietary Goals for the United States which included dietary modifications believed to reduce the risk of hypertension and atherosclerosis among Americans.

Several significant socioeconomic factors have not been mentioned in this brief overview. This is not an oversight, but rather reflects the fact that analysis of socioeconomic determinants of nutritional status for the U.S. population has been limited to income (variably defined) and race. Newer analyses should provide information on the impact of working mothers and single parent families, as well as other economic and environmental factors, on nutritional status.

Government Policy Options

The policy decisions that influence food supply and demand originate from widely divergent sources, ranging from agencies of the federal government with various concerns (e.g., incomes and price policies, health protection and promotion, agricultural and food processing/marketing issues) to private-sector food manufacturers and providers of

health insurance and health care. A large number of factors, including the nutritional care provided in maternal and child health programs, indirectly affect nutrition by changing the level and nature of food demand. U.S. government policy options for improving nutrition and diet encompass an extensive series of regulatory and programmatic alternatives, many of which could allow changes in most key factors influencing maternal and child nutrition.

It should be noted that potential policy changes have unexpected sequellae of costs and benefits. Any attempt, however, at predicting indirect benefits and costs of specific changes other than those in direct delivery systems (e.g., USDA and DHHS programs) is fraught with danger because of the complexity of the factors affecting food consumption. For example, Timmer and Rankin (1978) point out that a tax on food graduated according to saturated fat content might initially reduce the consumption of fat-rich foods, but that these foods might later be identified as higher-status foods and be consumed in greater amounts as incomes rose. Moreover, manufacturers could develop ways to modify the fat content of their processed food products while farmers producing eggs, milk, etc., directly for consumption (processed slightly) might be estranged from the consumers' market even further.

The following section discusses selected issues related to food supply and demand which will be relevant to these departments and agencies and to the improvement of maternal and child nutrition.

Food supply. Many diverse factors determine which foods (in specified forms which specified nutritional content) are available in each locale at different times of the year. The U.S. Department of Agriculture

may choose to apply price supports, to lower production costs through other subsidies, and in other ways (e.g., regulatory, funding, price-setting and other policies) to affect the nature of foods available to the consumer at the food market.

An important issue facing nutritional decision-makers is to develop policies which can effectively rationalize the major shifts in food supply and distribution which take place due to government intervention. The government intervenes in all of the food-supply areas presented in Table 6. Each results in poorly understood nutritional benefits and costs to the farmer, food processor and distributor, and consumer.

Food-supply issues relevant to this report include the role of vending machines in the schools and the influence of the rapidly changing U.S. food supply on maternal and child nutrition. Ubiquitous vending machines offer foods high in sugar, salt and calories almost exclusively. About $10.5 billion per annum is spent in the U.S. in these machines (Brewster and Jacobson, 1978: 2-3; Wilbur et al., 1979). The National Heart, Lung and Blood Institute has tested the feasibility of improving the nutritional choice of vending machines in the National Institutes of Health complex (Wilbur et al., 1979). The federal study offers hope that consumers will purchase lower-calorie, more nutritious items from vending machines. A number of school districts, particularly in New York City, have experimented with ways to improve the nutritional quality of vending machine products.

Numerous other policy options relate to the increase in the proportion of meals and snacks eaten away from the home in restaurants, in "fast food"

Table 6 Potential Government Influences on Food Supply

Food Supply Factors	Key Government Department/ Agency	Major Function
Research (Nutrient content, yields, inputs, other factors of production such as mechanization, processing, marketing)	USDA	Animal and plant production research; research on soil, water
	NSF/NIH/ private sector	Basic research (genetics, plant phytopathology, etc.)
	NOAA/Commerce	Fish/seafood production, water safety
Costs of Production Credit/infrastructure	USDA	FHA provides rural development/ housing/conservation grants
Crop acquisition/storage/ guaranteed pricing/ acreage limitations	USDA	
Insecticides/fertilizers/ etc.	USDA/FDA	FDA regulates usage based on health risks; USDA funds research
Pest control	USDA	Controls and prevents pest/plant/ animal diseases (APHIS; CSRS)
International Trade Quotas, tariffs, exports	USDA/Commerce	
Regulations Preservatives/food safety	USDA/FDA	FDA--nutrient safety, quality of processed foods; USDA--inspects, insures safe, wholesome, nutritious food (FSQS); detection of food contamination
Fortification/enrichment	FDA	FDA considers nutrient bioavailability for fortification, sets fortification/enrichment levels (minimum, maximum)
Processing (additives, preservatives, sanitation, grading)	USDA	Food safety and quality serviced FSQS
Vending (availability/ content)	USDA/FDA	FDA--considers nutrient availability of processed foods; USDA--sets regulations for vending machines in schools with feeding programs
Restaurant sector	Local government	

chains, and in more traditional sources of food such as work site cafeterias. One of the important issues which must be faced in consideration of the nutritional implications of food supply sources is the contrast in nutritional and health significance between consumption of processed foods and their natural counterparts. The same issue holds for the increases in complex processed food products which are increasingly being purchased for home consumption.

Food demand. An assortment of factors affect the price the consumer pays for the food product, the resources available to the consumer to obtain foodstuffs, and access to food through various federal food programs. Table 7 presents some of the possible intervention points in the food demand chain. Food advertising, food labeling and grading, and child nutrition programs are relevant food-demand-related issues to be addressed briefly.

Food advertising (e.g., brand identification), often delivered in creative and subtle ways by the food industry to influence food choice, represents a significant proportion of the United States food bill. Estimates of the cost of food advertising range from one billion dollars (Timmer and Nesheim, 1978) to $6 billion a year, or 3% of our food bill (Brewster and Jacobson, 1978). In addition it is estimated by Brewster and Jacobson (1978) that we pay about $26 billion or 13% of our food bill for packaging--which often can be viewed as another form of advertising. In contrast, very little money is spent on nutrition education--education which may be needed to counteract the influence of food advertising.

The Federal Trade Commission (FTC) and other government regulatory commissions have considered a number of options for limiting the impact

Dependent Children (AFDC), maternal and child health care, and school health programs can also affect food demand.

The next three chapters focus on the nature of the beneficiaries and benefits of the three major Food and Nutrition Service (FNS) programs--WIC; the School Feeding Programs, incorporating the National School Lunch (NSLP) and School Breakfast Programs (SBP); and the Food Stamp Program (FSP). Each program is analyzed separately, but the same issues are addressed:

--What have been the major congressional, legal, and regulatory backgrounds of each program? How have changes affected program participation and benefits?

--What is known about state, district or county, local agency, and household participation in each program? What have been the major barriers affecting participation in each program? What are the conflicts between entitlement and equity?

--What is known about the dietary, nutritional and health benefits of each program?

--What are some of the policy options at the federal, state and local levels which can be used to improve maternal and child nutrition outcomes of each program?

One of the more important issues facing the Food and Nutrition Service (FNS) has been the issue of equitable distribution of its food program benefits. Each of the food program regulations state fairly precisely which participants are entitled to what benefits. Participants include various units, such as states, counties, school districts and households. Both the USDA at earlier points in the operation of some programs (e.g., for WIC, see

Durham vs. Butz) and state and local administrative units have made it very difficult to achieve maximum participation. The low proportion of low-income, "severe need" schools participating in the SBP is a result of some of the barriers which prevent the achievement of fuller participation of schools in the SBP. At the household level, numerous issues of resources (income, transportation, child care) and of culture have affected program participation. To illustrate: Practices established in schools which identify children who receive free and reduced-price lunches may deter children from participating in these programs; the need to use food stamps instead of cash may inhibit food stamp participation; the variety of travel, child care and other costs incurred by women desiring to obtain WIC certification may also act as a deterrent.

Only in the last few years has the Food and Nutrition Service directly considered nutrition and health issues in relation to its programs. There are a large number of nutritional impact evaluations which have been initiated by the new FNS/USDA Office of Program Policy and Evaluation in 1979, but very few completed studies exist. The following reviews attempt to use the few existing studies to point out the nutrition-related policy options available to these major federal food and nutrition programs.

CHAPTER II

THE SPECIAL SUPPLEMENTAL FOOD PROGRAM FOR WOMEN, INFANTS, AND CHILDREN

In an attempt to prevent malnutrition and its consequences among a particularly vulnerable segment of the population--pregnant women, infants and children--the U.S. Congress, in September, 1972, passed the Special Supplemental Food Program for Women, Infants, and Children, known as the WIC Program. The intent of the legislation was to develop "a program under which supplemental foods will be made available to pregnant or lactating women and to infants determined by competent professionals to be nutritional risks because of inadequate nutrition and inadequate income" (PL 92-433). In addition to providing supplemental foods, the program was expected to have a further impact on health status by increasing the use of prenatal and child health-care services.

Once the legislation had been passed, problems plagued the WIC Program due to opposition by certain important groups, delaying its implementation and limiting its expansion. Active support by key legislators, state and local nutritionists and advocates, along with several favorable court decisions, however, brought about the expansion of the program to a recent participation level of 1,318,000 (year end, 1978) with an appropriation for the 1979 fiscal year of $750 million (see Table 8). It is appropriate to recognize the hard work undertaken and the difficulties faced by the parties who worked to plan, promote and implement this program. State and local nutritionists often had to implement this program under great duress caused by bureaucratic red tape, and states often took on large fiscal risks in the early period of the program. Without this commitment, WIC might never have succeeded.

Table 8 WIC Funding and Participation, 1973-78

Year	Authorization (millions)	Available Funds* (millions)	Total Federal Expenditure (millions)	No. State Agencies** (Year end)	No. Participants (Year End) W	I	C	Total (thousands)	Persons on Waiting List
1973	$ 20	$ 20.0	0	0	0	0	0	0	0
1974	20	40.6	$ 10.4	46	38	62	105	206	NA
1975	100	126.1	89.4	51	77	150	270	498	NA
1976	250	250.0	142.6	54	97	146	348	592	41,145
Transition quarter	62.5	96.2	44.4	60	114	157	371	642	55,626
1977	250	387.2	256.5	67	202	261	547	1,011	NA
1978	250	405.0	380.0	72	277	344	697	1,318	32,585

*Appropriation plus unspent funds carried over x from previous years.

**Includes Indian tribes which can apply as state agencies.

Sources: U.S. Department of Agriculture, Food and Nutrition Service, *Annual Reports on Special Supplemental Food Program; Program Participation and Expenditures;* and *WIC Administrative Cost Report,* 1978; personal communication, Rita Meyer, Supplemental Food Programs Division, Food and Nutrition Service, U.S. Department of Agriculture, December 1979.

At the federal level, the program is administered by the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA). Using funds appropriated by Congress, FNS makes cash grants to state agencies which distribute these funds to local agencies for operation of WIC projects. Local agencies must submit detailed program plans to the state agency, which then submits an annual plan to FNS detailing how the state agency, in conjunction with local agencies, will operate the program. Each responsible state agency periodically reports to FNS on program operation within its jurisdiction, on the dispersal of allocated fund expenditures, and on women, infants and children served.

Although funding for the program has grown rapidly, indicating congressional support, the WIC Program remains controversial. Many aspects of the program are unique when it is compared with other federal food programs, and these aspects have been the subject of continuing debates among legislators, administrators, advocates and participants.

WIC Legislative History

The WIC Program was not the first national attempt to improve the nutritional status of pregnant women and preschool children. Sporadically throughout the 1960s representatives from USDA and DHEW met to discuss the medical and nutritional needs of low-income pregnant women and children and to suggest methods of meeting those needs through existing programs. In 1969, USDA authorized establishment of the Commodity Supplemental Feeding Program (CSFP) whereby surplus agricultural commodities were made available for distribution to low-income pregnant and postpartum women, infants and children under age six who were certified to be

in nutritional need. Foods provided under that program included meat, peanut butter, egg mix, dry milk, vegetables, juice, evaporated milk and corn syrup. The average value of food provided was $9 to $12.50 per person per month (U.S., Congress, Senate, Select Committee on Nutrition and Human Needs, 1974). Food was supplied by USDA, but USDA did not make available any administrative funds; local agencies wishing to participate in the program had to find funds to cover their administrative costs, including the cost of storage of the commodity foods. By 1971, over one-half of the programs in existence were covering their administrative costs through funds supplied through the Office of Economic Opportunity's (OEO) Emergency Food and Medical Services Program (EFMS). At its peak in 1971, CSFP was providing food to only 200,000 participants (at a cost of just under $13 million); by 1973 participation had declined to 161,000 (U.S. Congress, Senate, Select Committee on Nutrition and Human Needs, 1974).

Since CSFP was not mandated by any legislative action, USDA had complete control over program regulations and the level of funding. Before the program began to have a significant impact on the nutritional status of its target population, USDA began implementing measures which caused program cutbacks: counties switching from the Commodity Food Distribution Program to the Food Stamp Program (which was mandated by 1974) were not allowed to participate in the CSFP; the eligibility of children over one year of age was discontinued; and the program was frozen at then current levels in 1971. Funds for the EFMS program were severely restricted, eliminating the largest source of administrative funds available to local programs. In addition, the dwindling supply of surplus agricultural commodities led to further diminution of the program.

In 1970, USDA explored other possibilities for improving the nutritional status of pregnant women and children. The Pilot Food Certificate Program (PFCP) was instituted on an experimental basis at five different sites to correct some of the problems inherent in a direct distribution program such as CSFP. The PCFP provided vouchers for the retail purchase of infant formula, infant cereal and milk to low-income pregnant and postpartum women (up to one year) and to infants less than one year old who were determined to be at nutritional risk. The average value of the foods supplied was $5 per month for women and $10 per month for infants. An evaluation of the program conducted by Cornell University researchers indicated that, while the program was well received both by the local agencies and the target population, it did not seem to have the desired effect of increasing the consumption (by infants, pre- and postpartum mothers) of the foods provided; the supplied foods were substituted for other foods in the diet (Wunderle and Call, 1971). Critics of the evaluation claim that since only dietary recall data were collected, with no backup of anthropometric or biochemical data, the conclusions may not be justified. USDA used the results of this one study to justify stopping the expansion of the PFCP and, later, as the basis for questioning the value of instituting the WIC Program. "USDA felt that the PCFP was expensive to operate, of dubious nutritional value and not target-specific" (Nelson, 1979, p. 24).

For many reasons--concern over a continued high infant mortality rate, evidence suggesting that improvement of the nutritional status of pregnant women leads to healthier mothers and infants, evidence suggesting that

suboptimal nutrition in the first few years of life can have significant effects on mental (and physical) development, and memories of problems of past attempts of USDA to provide supplementary foods to low-income, at-risk women, infants and children--Congress in September, 1972, passed the Special Supplemental Food Program for Women, Infants, and Children (WIC) as an amendment to the School Lunch and Child Nutrition Act of 1966 (PL 92-433). The program was to be administered by the Food and Nutrition Service (FNS) of USDA as a pilot program funded at $20 million for each of fiscal years 1973 and 1974.

The program was specifically identified as "a health program carried on to meet the health needs of the people" (U.S., Congress, Senate, Congressional Record, 1972). Funds were to be allocated through state health agencies to local health or welfare agencies (public or private nonprofit), to cover the costs of food supplied to participants plus adminstrative costs, which were not to exceed 10% of the total program costs. During Senate debate on the program, an amendment was added requiring USDA and the comptroller general each to submit evaluations (medical and administrative) of the program by March 30, 1974.

Because of the health aspects of the WIC Program, and especially the required medical evaluation, USDA felt that the program should be under the administrative authority of the Department of Health, Education and Welfare (DHEW). Uncertainty over which agency would issue regulations and otherwise administer WIC caused some delay in implementation of the program. In June 1973, a U.S. District Court ordered USDA to publish regulations, which it did on July 13, 1973. The regulations were quickly issued in final form, and the application deadline for local agencies wishing to participate was set for August 15, 1973. But the medical evaluation

contract had not yet been awarded; local agencies wishing to participate in WIC had no idea what additional requirements would be imposed on them.

The regulations issued by FNS in July 1973 indicated that USDA considered the medical evaluation to be the crucial objective of this pilot phase of WIC; the regulations (including criteria for local agency selection and required record keeping) were geared toward facilitating such evaluation, rather than toward providing the program to those most in need. FNS seemingly ignored the mandated eligibility of local welfare agencies and specified that only health clinics were eligible to operate local WIC Programs. Because there was no flexibility in the content of the food package, no allowances could be made for variations in cultural food habits and medical conditions (such as milk intolerances). Areas then operating a CSFP were given the lowest priority for receiving WIC approval, in seeming contradiction to the law which stated that program implementation should be "without regard to whether the area is under the food stamp program or a system of direct distribution" (PL 92-433).

In August, 1973, the U.S. District Court for the District of Columbia decided in favor of the plaintiffs in a class action suit against USDA (Dotson et al. vs. Butz et al., Civil Action No. 120-73) and ordered USDA to begin spending funds, specifying that the entire $40 million allocated by Congress for fiscal years 1973 and 1974 be spent by the end of fiscal year 1974. By December of 1973, although USDA had complied with the court order requiring publication of the regulations, no funds had been distributed to the states. Senator Hubert Humphrey noted in hearings held before the Select Committee on Nutrition and Human Needs, "Fifteen months after the law was passed, and funded, the USDA still has yet to feed one mother or infant" (U.S., Congress, Senate, Select Committee

on Nutrition and Human Needs, 1973). A contempt of court motion brought against USDA was denied, but the district judge ordered the announcement of all grantees by December 31, 1973.

Problems faced by state health departments and local agencies in trying to implement WIC Programs based on the law as executed by the first set of regulations were numerous. Although state agencies were required to administer, monitor and guide local agencies within their jurisdictions, FNS reserved the responsibility for approving local agencies. State agencies claimed that they knew better than FNS which local areas were in greatest need of the program and which agencies could operate it successfully. State agencies also claimed that under the system of FNS approval of local agencies, they would not know in advance how many programs they would have to administer, and could not realistically plan or budget for the WIC program at the state level. States also felt that the allowed administrative reimbursement (10% of total program costs) was inadequate, especially during the start-up period and in rural areas which would not have sufficient participation to cover their administrative costs completely. Allowable administrative costs also did not cover outreach or nutrition education activities, two areas which many felt were crucial to the program's success.

State and local agencies objected to the age limits for WIC eligibility, under which children were cut off from program benefits at the age of four years. FNS claimed that from the age of four until they entered school, low-income children were eligible for the Head Start Program and would receive a free meal as part of that program. However, due to the limited funding of Head Start, only a small percentage of eligible children were

actually being served by that program. Thus, a substantial number of children nutritionally at risk would receive no supplemental foods after the age of four. In addition, postpartum women not breast-feeding were only eligible for six weeks following delivery. FNS reported receiving many comments suggesting that a longer period of supplementation following delivery was necessary for the restoration of nutrient reserves depleted as a consequence of pregnancy. FNS also received comments claiming that FNS regulations discouraged breast-feeding by providing a bottle-fed infant and mother with a larger percentage of their caloric needs than would be provided to a lactating woman and breast-fed infant.

In November, 1973, Congress extended the WIC Program through June 30, 1975, at a funding level of $40 million for fiscal year 1975, extended the due date for the medical and administrative evaluations to March 30, 1975, and specifically allowed recognized Indian tribes to act as local agencies (PL 93-150). In June, 1974, Congress increased the funding level for fiscal year 1975 to $100 million (PL 93-326). The reason for the increase was to avoid program cutbacks rather than to allow for program expansion. Because of delays in program implementation, FNS was required by court order to spend the originally authorized $40 million over a three- to four-month period, ending June 30, 1974. This allowed for a much higher level of participation than was originally intended. Leaving the funding level at $40 million for the entire fiscal year of 1975 would have necessitated eliminating a substantial number of local programs which had only just been initiated.

FNS issued additional regulations in December, 1974, after a suitable period for public comment. To implement the requirements of PL 93-150,

Indian tribes were allowed as eligible local agencies. However, FNS still maintained that the program had to be carried out by health clinics, and continued to refuse to allow welfare agencies to operate WIC projects. Despite comments indicating the need for an extension of the program benefits to postpartum women for six months following delivery, FNS retained the regulations allowing postpartum women who were not breast-feeding to be eligible only for a period of six weeks. FNS also decided not to reimburse local or state agencies for expenses of nutrition education provided to program recipients, stating that such activities were not mandated by the legislation.

Because of the problems related to FNS's interpretation of both the actual legislation and the legislative intent behind the WIC Program, Congress rewrote the program during the summer of 1975 (PL 94-105). President Gerald R. Ford vetoed the resulting legislation, but was overridden by Congress in October, 1975. Authorizing legislation for WIC expired on September 30, 1975; the President vetoed the new legislation on October 3, 1975. The veto was overridden October 7, but for a short period, state and local agencies had been left unsure of the status of the program, and had been unable to plan adequately for future operation and expansion. The program was extended through September 30, 1978, at an annual appropriation of $250 million. Administrative costs were allowed at 20% of total program costs, with the stipulation that during the initial three months of the operation of any program (or until that program had reached its projected caseload, whichever came first) FNS would cover all the administrative costs of the operating agency. Nutrition education services were mandated, and the costs of providing such services were allowed as administrative costs. Nonbreast-feeding postpartum women were deemed eligible for program

benefits for six months after delivery, and the eligibility of children was extended to the age of five. The WIC program was to be "supplementary to the food stamp and food distribution program and operated side by side with existing supplemental food programs" (PL 94-105). FNS was required to implement affirmative action guidelines to insure that the program was extended to those most in need. The legislation also mandated the formation of two advisory committees. One was a special committee composed of members selected from various government agencies involved in maternal and child health as well as members of various professional organizations, whose purpose was to "study methods available to evaluate successfully and economically . . . the health benefits of the supplemental food program" (PL 94-105). This committee was to report its findings to USDA by March 1, 1976; USDA was to submit its recommendations, based on the committee's findings, to Congress no later than June 1, 1976. The second mandated committee, known as the National Advisory Council on Maternal, Infant, and Fetal Nutrition, was to be a standing committee composed of representatives from USDA, DHEW state and local agencies, professionals, persons involved in the retail sale of the WIC food package and WIC participants. This council was charged with the task of conducting a "continuing study of the operation of the Special Supplemental Food Program and any related Act under which diet supplementation is provided to women, infants, and children with a view to determining how such programs may be improved" (PL 94-105). The council was to submit an annual report to Congress covering its findings and recommendations.

In response to PL 94-105, FNS issued a set of interim regulations in January, 1976. Most of the provisions of the law were incorporated into the

regulations. However, FNS still maintained, in seeming contradiction to the law, that WIC could not operate in the same area as the Commodity Supplemental Feeding Program. The regulations expanded the eligibility of local agencies to include agencies other than health clinics which contracted with private physicians or a health agency to provide certification and ongoing health services to participants.

For the first several years of WIC's existence, actual spending levels were significantly below annual authorizations. In March, 1976, another lawsuit was filed against USDA in behalf of participants and clinics in ten states, charging USDA with impounding authorized funds and failing to establish WIC programs in the neediest areas (Durham vs. Butz, Civil Action No. 76-358). In June, 1976, the U.S. District Court for the District of Columbia ordered USDA to spend any funds left over from FY1975 and FY1976 along with the entire amounts authorized for the transition quarter and for fiscal years 1977 and 1978. In addition, the court ordered USDA to implement the Affirmative Action Plan mandated by PL 94-105.

The interim regulations were superseded by more extensive final regulations, issued in August, 1977. The major changes brought about by these regulations concerned the eligibility of participants, selection of local agencies for participation, and the food delivery system. FNS attempted to set specific income criteria for eligibility (at 195% of the federal poverty guidelines), but since these criteria differed in many instances from those used by health clinics in determining eligibility for their other services, FNS dropped the strict income criteria. It specified that the state agency could (but was not required to) set income standards of its own, or income eligibility would be based on whatever standards were used by the local health agency for determining eligibility

for its health services. Criteria for nutritional need were further defined and given priorities. Pregnant and breast-feeding women and infants with inadequate biochemical or anthropometric measures were given the highest priority; women, infants and children with inadequate dietary intake were given the lowest priorities. Local agencies were allowed to approve persons in the lower-priority groups only if spaces remained in their allowed caseload after all of those in higher priorities had been served. Likewise, the regulations concerning the state agencies' selection of local agencies were more extensive. State agencies were required to develop an Affirmative Action Plan which designated those areas within their jurisdiction which were most in need of the program, based on health and income indicators. Within any area, a priority system was specified for determining which local agency could be approved: health clinics interested in sponsoring a WIC program were to be given priority over other agencies. States were allowed to approve any of three food delivery systems (direct distribution, home delivery, or retail purchase with vouchers) for use by any local agency, but each system in use within a state had to be uniform throughout the state.

There were many aspects of the program for which regulations were not specific, pending further public comment and consideration. Final criteria for determination of income eligibility was one. Another concerned the cereals allowed in the food package for women and children. At issue was whether to reduce the iron fortification requirement to allow for a greater variety of cereals, including unfortified whole grain cereals, and whether to exclude highly sugared cereals, highly fortified cereals and cereals with artificial flavorings and colors.

Congress extended the authorization for WIC for four years in November, 1978 (PL 95-627). Funds were authorized at $550 million for 1979, $800 million for 1980, $900 million for 1981 and $950 million for 1982, with a specified amount (the lesser of 0.5% or $3 million) for use by FNS in evaluating program performance and health benefits. FNS was ordered to set aside 20% of the total funds to cover state and local agency administrative costs, but rather than allocating these funds to states based on their food costs alone, FNS was required to devise a formula for allocating administrative funds based in part on numbers of participating local agencies and recipients. Administrative costs as defined by the legislation currently include the costs of certification (including purchase of necessary equipment), monitoring, nutrition education, outreach, start-up and general administration. The legislation also allowed state agencies, with the approval of FNS, to substitute different foods for those in the food package, as long as the substituted foods were nutritionally equivalent to those replaced. Income criteria for determining eligibility were specified in the legislation; persons at nutritional risk were eligible only if they met the income standards for free and reduced-price school meals. This permitted participation by members of households with incomes below 195% of the poverty line.

The level of funding for FY1980, $750 million, is sufficient to provide a supplemental food package, nutrition education and supporting services to approximately 2.5 million persons. The most recent USDA estimate is that 8.7 million women, infants and children are income-eligible for WIC. (There is no information about what proportion of

these low-income individuals are at nutritional risk.) At the end of FY1978, 32,585 people were on WIC waiting lists--eligible end in need, but residing in areas served by local agencies that had already reached their maximum caseload.

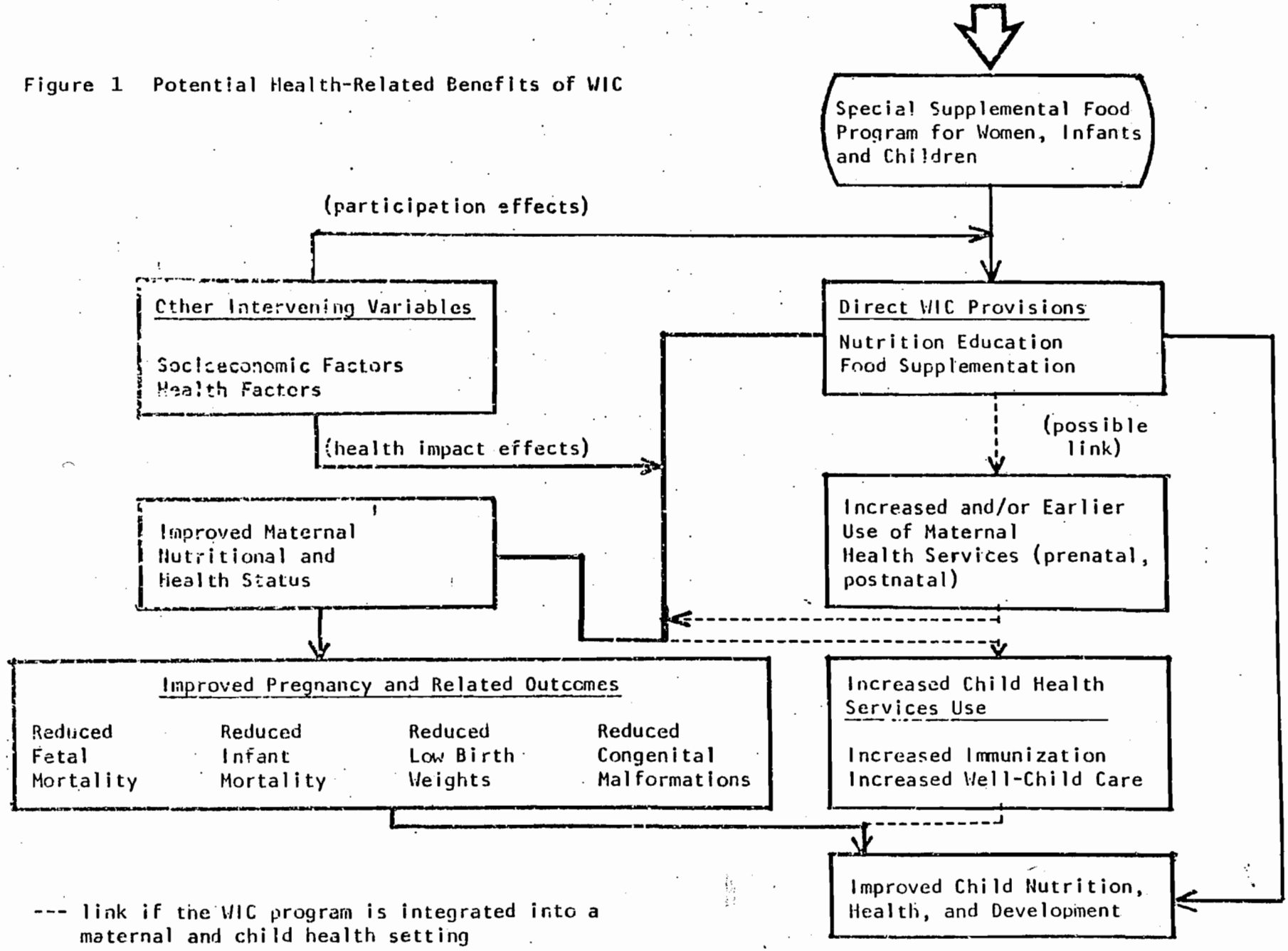
Evaluating WIC Benefits

The impact of WIC on maternal and child health depends on the level of participation in this program and the benefits received by participants. As the legislative history of WIC indicates, participation remains a key policy issue. Determining whether to expand WIC participation rests in part on an assessment of WIC benefits. After discussing these benefits and knowledge about their health impacts, the next section addresses the participation issue.

Pathways for improvement of health. The primary expected benefit of an individual's participation in the WIC Program is an overall improvement in nutritional status, with a subsequent improvement in health status. The achievement of this desired outcome for a particular individual involves, to varying degrees, the different components of the WIC Program (food supplementation, nutrition education and encouragement of the use of health-care services), as well as numerous external factors. To evaluate whether WIC has achieved the desired objective of improving nutritional status, it is necessary to consider pathways by which the components of the WIC Program interact with individual participants' characteristics and behavior to produce certain desired outcomes (see Figure 1).

The WIC Program provides two direct services to participants: supplemental nutritious foods and nutrition education. Food supplementation is

Figure 1 Potential Health-Related Benefits of WIC



--- link if the WIC program is integrated into a maternal and child health setting

available to all categories of participants--women, infants and children--but nutrition education is generally aimed only at the woman, because of the assumption that she is responsible for the selection and preparation of foods for participating infants and children. A third component of WIC is encouraging participants to make use of existing health care facilities. For the purpose of this analysis, the actual increased use of those facilities is considered a desired outcome of WIC.

Provision of supplemental foods and nutrition education to a pregnant woman potentially has a direct beneficial effect on her health and nutritional status through such measures as improvement in weight gain during her pregnancy and improvement in her iron level, and an indirect effect on the health of the infant through an improved pregnancy outcome, generally measured in terms of gestational age, birth weight and survival for the first year of extrauterine life. Provision of the same services to a breast-feeding woman has direct effects on the nutritional status of both the woman and the infant. Although it is as yet unclear exactly what effects maternal nutrient intake has on the quantity and quality of breast-milk, the production of an adequate supply of breast-milk does seem to require additional calories and protein in the diet of the lactating mother (Edozien, et al., 1976b; Gopalan, 1958a, b; Popkin, et al., 1979). Thus, intervention to improve the nutritional intake of the breast-feeding mother can have a direct impact on the health and nutritional status of the infant. Provision of WIC benefits to a postpartum nonbreast-feeding woman can lead to improved maternal nutritional status, as well as an improvement in the health of future offspring, inasmuch as one of the major determinants of pregnancy

outcome is the mother's nutritional status prior to conception. Likewise, nutrition supplementation and the results of improved nutritional awareness of the mother can lead to an improvement in the nutritional, health and developmental status or her infants and children.

Problems of evaluation. As is the case with evaluation of most health programs, evaluations of a nutrition intervention program such as WIC are fraught with methodological difficulties that often seriously compromise the usefulness of the information obtained. The evaluations which have been conducted regarding the benefits of the WIC Program all fall prey to one or more of the following methodological problems.

One major problem in conducting nutrition surveys and evaluations of the effectiveness of nutrition intervention strategies is the lack of adequate indicators and standards of nutrition. None of the indicators currently in use--anthropometric, biochemical, clinical or dietary--are specific for nutritional status; they can be affected by a host of other factors (including genetics, age, environment, sex and race), some of which are impossible to control. Therefore, improvement in any of these indicators does not conclusively signify improvement in nutrition. There are also problems in the standardization of methods for measuring many of the indicators currently in use, often making comparisons of results from different observers or laboratories meaningless. Moreover, there is no universal agreement on what levels of specific indicators should be used as standards against which to evaluate individual or population measurements. Different studies often use different standards, making comparisons of the results difficult.

A second serious problem, especially in evaluations of a federally mandated program such as WIC, is the difficulty if not impossibility of selecting a precisely comparable control group against which to measure the change in nutritional status of the experimental (WIC) group. Finding a statistically comparable control group would entail identifying and obtaining biological, socioeconomic and other data from a group of women, infants and children (comparable to the experimental group in terms of age, race, socioeconomic status and any other factor which may affect nutrition) who are at the same level of nutritional risk as the WIC participants while denying them the benefits of the WIC Program. This would usually be viewed as unethical.

Many of the studies which have been conducted have compared WIC participants to groups of nonparticipants. However, there is some difficulty in taking into consideration the selection biases in the WIC certification process. There may be significant differences between the backgrounds of participating and nonparticipating households and counties. Because of self-selection for WIC participation on the county and household level, WIC participants are likely to belong to different risk groups than non-WIC participants. In addition, WIC counties may have unique administrative, socioeconomic and health infrastructure characteristics. Consequently, it may be difficult either to find comparable non-WIC counties, or to extrapolate the findings of WIC evaluations to determine the potential costs and benefits that would result from increased WIC coverage.

The lack of a suitable control group in evaluations of a program such as WIC makes it difficult to quantify (and to control for) a phenomenon known as regression toward the mean (e.g., Davis, 1976). This statistical term describes the natural tendency of a biological variable which is extreme on its first measurement to be closer in value to the mean on a subsequent measurement. The phenomenon of regression to the mean can be the result of the natural variability of certain indicators, as well as the difficulty of measuring them precisely. Any evaluation of the WIC Program begins with a group of people with extreme values of certain nutritional indicators. Thus it is difficult to discern how much of an improvement can be attributed to the nutrition intervention strategy and how much is the result of the natural tendency of biological indicators to regress toward the mean. The most effective methods for controlling for the phenomenon of regression to the mean are to obtain baseline data on the experimental populations several times, and then to measure the differences in the changes over time between the experimental group and a comparable, at-risk control group which has not been exposed to WIC or any other nutrition intervention strategy.

If a study could effectively identify and quantify the health and nutritional benefits of the WIC Program, it would be important but difficult to determine how much of the observed effect on nutritional status could be attributed to each component of the WIC Program, and whether any synergistic interaction occurred among components. Since all WIC programs must provide supplemental foods, nutrition education and the availability of health care services to participants, it is impossible to evaluate

any one of the components separately. If it were available, however, this type of information could be important for planning purposes, since only one or two of the components may account for a major portion of the observed effect, or, on the other hand, all three components may act synergistically.

A final problem encountered in evaluating the benefits of the WIC Program is the time period necessary for the program to become evaluable. The WIC Program has only been in operation since 1974. It may take a number of years to develop administrative, educational and other procedures which would allow significant effects on the target population to be observed and quantified.

Despite the methodological difficulties discussed above, several evaluations of the WIC Program have been performed. A medical evaluation of the program was carried out in 1974-75 under contract with the U.S. Department of Agriculture (Edozien et al., 1976a). Congress mandated this study to learn what impact participation in the WIC Program had on a variety of indicators of health and nutritional status. The sample included participants in 19 WIC projects located in 14 states. Initial evaluations at the entrance to the program were conducted on 41,330 infants and children and 9,867 women. Follow-up evaluations after six months of participation in WIC were obtained from 11,390 infants and children (after 72% dropped out); similar examinations after 11 months on the program were obtained from 6,256 infants and children (16% of the original sample). A total of 5,417 women were reexamined at intervals during their pregnancies and postpartum periods (representing a 45% drop-out rate from the initial sample). The data collected included demographic,

pregnancy-outcome, anthropometric, dietary and extensive biochemical measurements.

At the time of the study, the WIC Program was just being implemented and, because of funding constraints, was operating primarily in metropolitan health clinics. Ninety-two percent of the initial sample lived in urban areas with two-thirds of the households falling below the federal poverty threshold. The racial breakdown of the sample was: 22% white, 35% black, 40% Spanish American and 3% other. This sample of participants is probably not representative of the current WIC population or the population of potential eligibles.

The major conclusions reached by the study were as follows: (1) for infants and children, participation in the WIC Program was associated with an acceleration of growth in weight and height, an increase in mean hemoglobin values and a reduction in the prevalence of anemia, especially during the first six months of participation; (2) for women, participation in WIC was associated with an increased weight gain during pregnancy, an increase in birth weight, an increase in mean hemoglobin concentrations and a decrease in the prevalence of anemia. However, because of the large percentage of dropouts, time pressures on the study, inability to control for confounding variables and for the phenomenon of regression to the mean, and other constraints, conclusions must be drawn from this study with extreme caution (Advisory Committee on Nutrition Evaluation, 1977).

In 1973, the Center for Disease Control (CDC) began monitoring the nutritional status of children involved in health clinic programs such as Early Periodic Screening, Diagnosis and Treatment (EPSDT) and WIC. Data obtained on a subsample of children participating in the WIC Program in several states was used for an analysis of the effects of this program on their nutritional status (U.S., Public Health Service, 1977). Initial

visit data were obtained on 115,249 children; follow-up data (obtained on at least two subsequent WIC visits at approximately six-month intervals) were obtained on only 5,692 children. In addition, data were collected from a few states on the pregnancy outcomes of WIC mothers.

Results of the surveillance study indicated that, although a high percentage of the children were short for their age at the initial visit, the weight-for-height distribution did not contain a disproportionate percentage below the 10th percentile. However, there was a high prevalence (22.3%) of children considered overweight (defined as a weight-for-height index greater than the 90th percentile) at the initial visit. It appears that children who were overweight on entering the program showed a decline in their weight-for-height ranking, while many children who were not overweight on entering the program became overweight during the period of their participation in WIC. Children entering the WIC Program had a high prevalence of anemia; participation in the WIC Program for one year or more was associated with improvement in hemoglobin and hematocrit values. From the small sample of births to mothers participating in WIC during their pregnancy, it was found that the low birth-weight rates for the WIC mothers were comparable to those in the general population. This finding probably indicates considerable benefit from WIC participation: these mothers were considered high risk, and without intervention they would have been expected to have had a higher proportion of low birth-weight babies.

Quality control is a major problem with the data supplied by the Nutrition Surveillance Program. Data came from a large number of clinics which used different procedures for obtaining measurements. Selection of participating states and clinics was not random, and no comparison was made

with a suitable control group. There remain unanswered questions about differences in background between the very small percentage of children on whom follow-up measurements were available and the others who were not followed up. Therefore, results of this study cannot be attributed solely to intervention by the WIC Program, nor can results be generalized to the total WIC population.

Using data obtained from the Nutrition Surveillance Program, the Louisiana Division of Health in 1974 analyzed changes in nutritional status among children in parishes with and without a WIC Program (Langham, 1974). Data were collected before and after WIC Programs were introduced. All of the children involved in the study were screened through the EPSDT Program and were therefore assumed to be receiving comparable health care. It was felt that changes in nutritional status could be specifically attributed to the WIC Program. A separate analysis was made of the nutritional status of the WIC dropouts.

The study showed that approximately 20% of the population had initial low hemoglobin and hematocrit values, with higher percentages among blacks. Approximately 20% of the children were below the 5th percentile for height and weight standards. Participation in WIC was associated with increased anthropometric measures and increased mean hemoglobin and hematocrit values. Dropouts from the WIC Program had lower initial values on indicators of nutritional status than did those children who continued on WIC, indicating that WIC may not have been effectively reaching those most in need.

Recent well-controlled studies by Kennedy and Gershoff (1979) and others (Kennedy et al., 1979a, b) compared Massachusetts health centers

with and without WIC programs. When WIC women and children were compared with others enrolled in the center but not participating in WIC, the WIC infants were shown to have a significantly lower proportion of low birth weights than the non-WIC infants. This study, however, does not show whether it was WIC food supplementation or increased prenatal care which led to these birth-weight changes. The authors examined the impact of WIC on maternal weight gain and infant gestational ages in addition to birth weight. This analysis controlled for pregravid weight, previous low birth-weight infants and maternal age. The study also found WIC Program participation associated with later gestational age of the infant. This study was clinic-based and could not examine differences between clinic populations and the overall WIC-eligible populations. Although it is difficult to assess the implications of this study for other populations, the statistical controls and other attempts at controlling for non-WIC intervening factors were superior to those of other WIC studies. The results indicate that WIC Program participation in this population significantly reduced the probability that an infant would have a low birth weight. It may be the case, however, that the authors overstate the net impact on low birth weight attributable to WIC. This overstatement of the WIC benefits relates to differences between the WIC and non-WIC women. When the authors developed proportions predicted to have low birth weights they obtained much smaller differences, since the predicted data corrected for differences between WIC and non-WIC women.

Other recent evaluations of WIC programs associated the program with declines in infant mortality and other improvements in pregnancy outcome

(Carabello et al., 1978; Rye and Majchrezak, 1978; Fleshood, 1978). However, the results of these other studies are from single programs with no methods for controlling for differences in the socioeconomic characteristics between WIC and non-WIC populations. This is especially true for the often-cited Waterbury, Connecticut, study conducted by Yale Epidemiology Department students (1978). None of these studies addressed the differential health benefits of WIC in sites which were and were not integrated into other health services. In November, 1979, USDA awarded a contract to the Research Triangle Institute to conduct a national evaluation of the health impact of WIC.

One of the expected benefits of participation in WIC is an increase among participants in their use of maternal and child health-care services. The only study thus far to evaluate health-care services use by WIC participants was conducted by the Urban Institute as part of its larger study of the WIC delivery system (Bendick et al., 1976). Unfortunately, the study did not collect data on the actual number of clinic visits made by WIC participants and a control group. Instead, health clinic administrators were asked to estimate the number of clinic visits made by WIC participants and nonparticipants, and WIC participants were asked whether WIC had tended to bring them into the health clinics earlier or more often. Responses from both groups indicated that WIC participation does increase a woman's use of health-care services, including earlier prenatal visits and increased immunizations. This is also the general impression among state and local health agency staffs, but it has not yet been well documented. WIC is believed not only to attract mothers into the health-care system for prenatal care but also to keep them in for a longer period of time.

Nutrition education is a component of the WIC Program the benefits of which have not been adequately evaluated. There is, in fact, little documentation of the amount or quality of nutrition education which is delivered by the WIC Program. The Urban Institute Study (Bendick, et al., 1976) indicated that only 12% of the WIC participants who received nutrition education felt that they had learned anything. A study conducted in Arizona on nutrition education for WIC participants suggested that those who met a higher number of specified learning objectives showed a greater improvement in indicators of health and nutrition than those who met few or no objectives (Rye and Majchrczak, 1978). Nutrition education is now mandated as a component of the WIC Program, and state agencies are required to submit to FNS nutrition education plans which include plans for evaluation. It is hoped that more information will soon be forthcoming on its effectiveness.

None of the WIC evaluation studies performed to date provides conclusive evidence that participation in the WIC Program improves nutritional and health status. But taken together, the results seem to indicate that WIC does have the desired benefit. Much research remains to be done in order to document more conclusively the benefits of WIC participation, as well as to answer questions such as: Is WIC reaching those most in need? What would be the effects of WIC if it were divorced from the health-care setting? What individual characteristics of local agencies and participants produce the greatest benefits? And, what types of nutrition education programs are most effective?

To date, there is a dearth of dietary impact evaluations conducted by WIC researchers. Unlike most FNS programs--school feeding, the Food Stamp Program--where no health impact studies have been conducted, WIC researchers

have focused on health outcomes such as maternal weight gain, pregnancy outcomes, growth of children and anemia status. Questions regarding the use and appropriateness of the WIC food package and the nature and impact of nutrition education on the diets of those who are and who have been on WIC have not been addressed.

Participation in WIC

Opportunities exist for increasing WIC participation. The present WIC population is estimated to represent 15% of the potential population of income-eligibles for WIC. While there are data available on the number of counties and Indian reservations in the United States with and without WIC programs, it may be that the unserved areas have the greatest health and economic need. This section describes the FNS regulations which determine WIC participation and some of the barriers affecting participation at the agency and individual participant levels.

Participation by state agencies. Current legislation defines a state agency as "a health department or comparable agency of each state; an Indian tribe, band, or group recognized by the Department of the Interior; an intertribal council or group that is the authorized representative of Indian tribes, bands, or groups recognized by the Department of Health, Education and Welfare." Furthermore, FNS regulations define a state as "any of the fifty states, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Northern Marianas Islands, and the Trust Territory of the Pacific Islands" (Federal Register, 27 July, 1979: 44442). As of October 1, 1979, the 78 state agencies approved by FNS to operate a WIC Program

consisted of 49 states (all except Wyoming), Puerto Rico, the Virgin Islands and 27 Indian agencies.

In order to be approved by FNS for the receipt of WIC funds, a state agency must submit a comprehensive State Agency Plan, which is required by law to include: (1) a budget for the use of administrative funds at the state level, plus a description of how the state agency will distribute administrative funds to local agencies; (2) a description of the state's criteria for determining nutritional risk and income eligibility; (3) the state's nutrition education goals and plans for achieving them; (4) a priority ranking (based on relative need and termed the Affirmative Action Plan) of all areas within the state's jurisdiction, and the state's plan for initiating or expanding the program in those areas most in need; (5) the state's outreach plan, and (6) a description of the state's plan to coordinate the WIC Program with other health and nutrition services. Under current regulations, state agency plans must be submitted to FNS by August 15 of each year. On receipt of a completed application from an eligible state agency, FNS must notify the applicant agency within 30 days as to the approval or disapproval of the plan.

The willingness of some state agencies to participate in WIC may be dependent in large measure on the funding available to the agency for operation of the program. FNS is responsible for allocating the appropriated WIC funds among the various approved state agencies. Current legislation specifies a breakdown of the annual WIC appropriation into three components: (1) one-half of one percent (not to exceed $3 million) to be used by FNS to evaluate all aspects of the WIC Program; (2) 20% of the remaining funds to be set aside for state and local agency administrative costs; and

(3) the remaining funds to be used to cover food costs. Current legislation also specifies that administrative funds be allocated among state agencies based on a formula developed by FNS which takes into consideration the varying levels of need of each state agency, rather than by using a strict percentage of a state's food costs as was done in the past. Current legislation defines administrative costs to include costs for participant certification, food delivery, monitoring, nutrition education, outreach, start-up and general administration.

Formulas have been developed by FNS for the allocation to state agencies of both food costs and administrative costs. The food cost allocation formula (Federal Register, 16 October, 1979) is based on two need indicators: one measuring the degree of poverty in the target population (children under five years of age in households where income is less than 200% of the poverty level), and the second measuring the health status of the target population (infant mortality rates). Disbursement of administrative funds (Federal Register, 15 May, 1979) is accomplished using a formula which establishes a fixed grant, based on the current year's food grant for each state agency, with the remaining funds distributed according to factors reflecting variations in administrative needs among state agencies. The factors used by FNS in disbursing the remaining funds are: (1) percentage of rural births, assumed to reflect the higher costs of administering rural programs, and (2) salary differentials, assumed to reflect differences in the cost of living.

The formulas for the allocation of funds are based primarily on an estimate of the potentially eligible population under the jurisdiction of a state agency, not on the numbers actually being served. Since WIC

is not an open entitlement program, there is no guarantee that all those eligible can be served by it. It is quite possible, then, that an aggressive state agency with an expanding program and an effective outreach component could expend all of its allocation and yet have a substantial number of eligible persons on a waiting list, while a state agency with a less aggressive program could be serving a much smaller percentage of its eligible population and have funds unspent. FNS regulations attempt to rectify the inequities in this situation by periodically recapturing unspent funds from state agencies which are not operating at a level commensurate with their allocation, and reallocating these funds to state agencies which have exceeded their allocation. FNS, however, does not have any legal mechanism for forcing state agencies to exert greater effort to expend their total funds or to expend their funds in a more efficient manner.

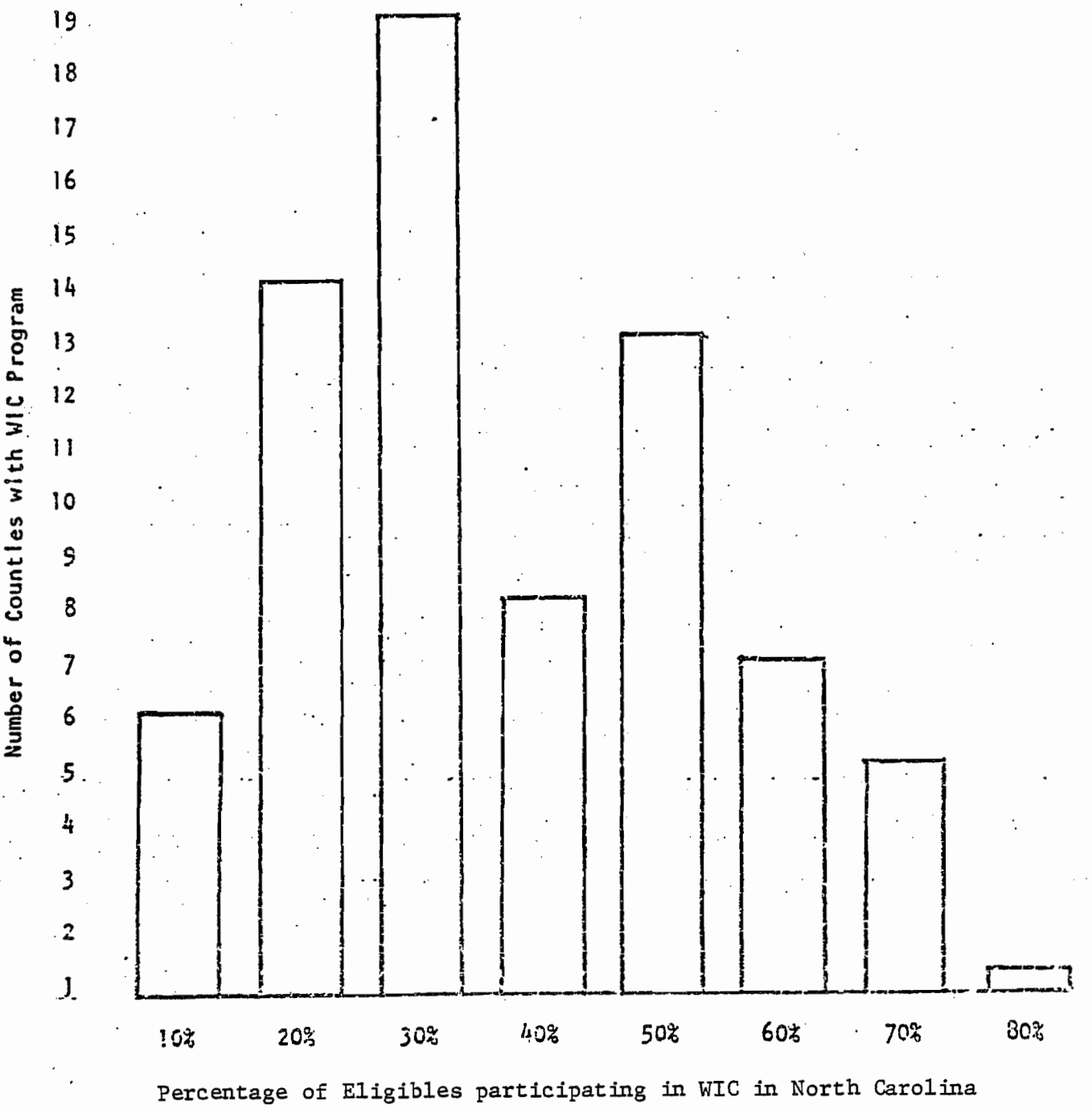
Participation by local agencies. Current legislation defines a local agency as "a public health or welfare agency or a private nonprofit health or welfare agency, which directly or through an agency or physician with which it has contracted, provides health services. The term shall include an Indian Tribe, band, or group recognized by the Department of the Interior or the Indian Health Service of the Department of Health, Education and Welfare" (PL 95-627). As of September 30, 1973, 1,034 local agencies were participating in WIC.

A requirement for FNS to take affirmative action to insure that the WIC Program was expanded to those areas most in need was first mandated by PL 94-105, which passed Congress in October, 1975. Regulations concerning this affirmative action requirement were issued in August,

1977. Current regulations attempt to promote expansion of the program to those areas most in need by requiring each state agency to develop a system for ranking areas within their jurisdiction according to need for a supplemental feeding program (the Affirmative Action Plan). The exact formula to be used to arrive at this ranking is left up to the individual state agency, but it must include a minimum of one health and one economic indicator. Allowable health indicators are: infant mortality rate, neonatal mortality rate, fetal mortality rate, perinatal mortality rate, incidence of low birth weight, adolescent pregnancy rate and prevalence of insufficient prenatal or perinatal care. The economic indicator used must incorporate the percentage of the population between 100 and 200% of the poverty level. The state agency must then "identify potential local agencies in the neediest one-third of all areas unserved or partially served and . . . encourage such agencies to implement or expand Program operations" (Federal Register, 27 July, 1979: 44443). The regulations do not require the state to reallocate existing funds from one WIC agency to another, nor do they specify how much of the additional funds should be given to each new agency. Moreover, the differences in criteria used in developing affirmative action plans developed by each state may make it difficult to judge the progress FNS has made in achieving its affirmative action goals.

Analyses conducted on WIC participation and eligibility data for the state of North Carolina indicate wide variations in WIC participation rates between counties within the state. Figure 2 displays the number of counties in North Carolina with specified proportions of eligible

Figure 2 Distribution of WIC: Participation Rates in North Carolina, 1978



persons participating in WIC in September 1978. An analysis of the Southern Regional Council suggests a similar disparity in the proportion of WIC eligibles reached both among and within the southern states (letter from Judith Ann Currie to Jennifer Nelson, USDA WIC Director, Feburary 21, 1979). Though an analysis of available data has not been made for all states in the U.S., similar disparities within states probably exist.

Regulations also specify a priority system which must be used by state agencies in selecting a local agency within a given area to sponsor the WIC Program. Highest priority is automatically given to a public or private nonprofit health agency which can provide both health and administrative services. Lower priority is given to human service agencies, which must enter into written agreements with health agencies or private physicians to provide health services.

When the WIC Program began operation in 1974, there was no requirement specifying that the neediest areas must be served first. With the lack of adequate start-up and administrative funds, and regulations specifying that only health clinics could operate WIC Programs, areas most in need may not have received WIC services. Table 9, comparing demographic and health statistics of counties with and without a WIC program in North Carolina, indicates that, in its earlier years, WIC may not have been serving those areas most in need, but that, with the advent of the Affirmative Action requirement plus an increase in administrative funds, more of the needy areas are now being served. Whether this trend holds true for other state agencies is not known; there have been no nationwide studies comparing the characteristics of areas with and without WIC programs.

Table 9. Socioeconomic and Health Factors Associated with Counties Participating and Not Participating in WIC in North Carolina, 1974-78

	% of Families below Poverty (1970)		Median Family Income (1969)	5-Year Infant Mortality Rate (1969-73 avg.) (deaths/1000 live births)
	Total	Non-White		
1974				
WIC Counties	10%	33%	$8,079	21.5
Non-WIC Counties	15%*	42%*	6,689*	24.9*
1976				
WIC Counties	16.6%	42.7%	6,632	24.9
Non-WIC Counties	14.3%	40.6%	6,860	24.6
1978				
WIC Counties	15%	41%	6,747	24.8
Non-WIC Counties	14%	41%	6,944	24.4

*Significant value at .05 level between WIC and non-WIC counties.

SOURCE: Ongoing research, Barry Popkin and Deborah Spicer.

Although the number of local agencies operating WIC programs has grown rapidly, there remain several significant barriers preventing full expansion of the program, especially to those areas whose characteristics suggest that they may be most in need. One of the most controversial barriers to local agency participation is the requirement, contained in both the legislation and the regulations, that no agency can operate a WIC Program unless either it can provide health services (defined as "ongoing, routine pediatric and obstetric care") to its WIC participants or it enters into a written agreement with a health agency or private physician to make such services available to WIC participants. The requirement is that health services be available, although participants are not required to make use of such services in order to remain in the program, nor will WIC reimburse an agency or private physician for the costs of such services. When a health agency acts as the local agency, or when the local agency contracts with a health agency to provide health-care services to WIC participants, the costs incurred during certification (including lab tests) are allowed as administrative costs and can be reimbursed. However, when an agency contracts with a private physician to provide health services, only the cost of providing the data (i.e., the time it takes to fill out a form from information already in the patient's medical record) is allowable as an administrative cost, not the cost of the examination from which the data are derived.

The requirement for the availability of health services stems from the legislative intent that WIC should serve as "an adjunct to good health care" (PL 95-627). The goal would seem to be to improve the health of the target population, not only by providing supplemental nutritious foods to

those in need, but also by exposing WIC participants to health care services and encouraging them to make use of such services. The two objectives of providing supplemental foods and maternal and child health (MCH) services are hypothesized to have a greater joint impact on health status than either would alone. However, a significant portion of the U.S. population in both urban and rural areas does not have access to adequate health services. National statistics indicate that there are 7,200 areas in the United States, with a total population of 45 million people, which are considered to be medically underserved (U.S. Comptroller General's Office, 1979).* Furthermore, these medically underserved populations are often likely to be those with the worst health and economic indicators. Under the current legislation, without the availability of health services, no agency in these underserved areas can operate a WIC program.

Although the WIC Program is expected to expand significantly in the next few years, there is currently no anticipated increase in DHHS funding for the establishment or expansion of local health clinics. In addition, there is no agreement between DHHS and FNS as to which areas are most in need of services. Since DHHS-funded clinics may serve target populations different from those served by WIC, criteria for determining need for the two programs differ. Using existing DHHS-funded clinics as sponsoring agencies for WIC programs has often been suggested as a means of expanding WIC while maintaining close ties with health services. However, according to a DHHS survey, only 38 of its existing clinics are potential sponsors for new WIC programs (U.S., Comptroller General's Office, 1979).

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*The term "medically underserved area" designates areas without adequate coverage of a wide variety of health services and may include areas which operate WIC programs and provide prenatal and child health services but lack other health facilities. However, it is one of the few indicies available to illustrate the point that health services are not available to everyone in this country.

Even areas with currently adequate health-care facilities are likely to experience difficulties in assuring the availability of health services to their WIC participants. Local agencies in areas served only by private physicians may not be able to convince the private physicians to cooperate with the WIC program in providing health services to WIC participants. Public health-care facilities may already be operating at full capacity and may not be able to handle the increase in the use of their services that a WIC program could bring about.

There are a number of approaches available to remedy this situation. One possible choice would be to expand the availability of health services until all persons have access to adequate care, and to continue to offer WIC solely within a health care setting. This solution, while admirable, and one which should be strongly encouraged, appears to be neither a politically nor an economically feasible short-term goal. In the meantime, there are women, infants and children in need of WIC who cannot be served. Another approach would be to encourage the use of physician assistants and nurse practitioners to provide health services to WIC participants.

A third approach involves changing the legislation and regulations to allow WIC to be operated without the requirement for the availability of health services in those areas where such services are not available, while simultaneously aiding and encouraging the development of adequate health services in these areas. A fourth possible approach would be to separate health-care and WIC programs completely and to provide WIC to those who need it irrespective of whether health care is provided. Such an approach would in no way preclude an extensive push to provide health care, but would get food to those who need it most.

The latter two alternatives may increase the probability that WIC will reach those most in need of the program; but they may be less cost-beneficial than the previous two, in the sense that it may be the synergism between maternal and child health services and food supplements, rather than the food supplement alone, which has led to the important WIC impact on pregnancy outcome and child health. Since WIC funding is limited and is not adequate to cover all those potentially eligible, expansion of the program into areas without health services may curb the increase of caseloads in areas which now operate WIC with the provision of the required health services. However, it is not clear from available evidence whether it would be more cost-effective to expand health services in areas already operating WIC programs in order to reach unserved eligible persons, or to introduce WIC programs into new areas which may not have adequate health services.

In the past, the lack of an adequate level of administrative funds has been a second deterrent to local agency participation. The total amount of administrative funding set aside at the federal level (through legislation and regulations) has been inadequate; the allowable categories of administrative costs were severely limited; the level of administrative funding distributed to each state agency (and in early years to each local agency) was calculated as a percentage of food costs alone, and no start-up funds were available. These practices favored the operation of WIC programs in urban areas with a large potential caseload, an already established organization and possible sources of additional funding or in-kind services. A study conducted by FNS during March, 1977, revealed that WIC funding covered only 60% of local agency administrative costs, while 39% of administrative

costs at the local level were covered by in-kind contributions from other agencies, and 1% of administrative funds came from other sources (U.S., Department of Agriculture, Food and Nutrition Service, 1978b).

In 1977, the national average of WIC administrative costs (including state agency and local agency expenditures), calculated as a percentage of total program costs, was 17.2%; federal regulations at that time allowed reimbursement to state agencies for administrative costs of 20% of total program costs. State agencies spent an average of 23% of the total WIC administrative funds, while local agencies spent the remaining 77%. There appears to have been much state-to-state variation in the levels of administrative expenditures. Although the average administrative percentage was within the limit specified by regulations, the FNS study on administrative costs found wide variations among local agencies in the level of administrative costs as a percentage of total program costs. Twenty-seven percent of local agencies had WIC administrative costs (not including costs covered by non-WIC sources) in excess of their allowed limit of 17% of total costs, subtracting from the total allocation of 20% of total program costs that portion retained by the state agencies to cover their administrative expenses. (See U.S., Department of Agriculture, Food and Nutrition Service, 1978b.) It is quite possible that there were (and still are) potential local agencies in unserved areas whose forecasted administrative costs would be even higher, who cannot participate because the available administrative funds are inadequate for their needs. This is most pertinent for rural areas due to their small and dispersed target populations and the lack of additional sources of funds on in-kind services.

There is now a mandated formula for allocating administrative funds among the states which is not based solely on food costs, but which takes into consideration other factors reflecting a state agency's relative administrative needs. However, there is no such formula required for the allocation of administrative funds by the state agency to local agencies. FNS must approve the state agency's plan for the distribution of administrative funds to local agencies, but there is no assurance that local agencies with higher administrative costs will get the funding that they need in order to operate WIC.

The inadequacy of the reimbursement for start-up costs has possibly also been a barrier to local agency participation. Until 1975, start-up costs were not specifically allowed as an administrative expense and there was no provision in the law or the regulations which would cover the higher level of administrative costs necessary during the initial period of a program's implementation by a local agency. In 1975, PL 94-105 attempted to remedy this situation by providing that "during the first three months of any program, or until the program reaches its projected caseload level, whichever comes first, the Secretary shall pay those administrative costs necessary to commence the program successfully" (PL 94-105). However, the Urban Institute study (Bendick et al., 1976) showed that the average WIC clinic was operating at only 50% of its maximum capacity by the third month of operation, and that start-up costs consumed an average of 20% of the first year's administrative funds. Perhaps three months is too short a period of time within which to expect a local agency to be operating most efficiently.

Continuation of the Commodity Supplemental Feeding Program (CSFP). In the early years of the WIC Program, FNS did not allow local agencies to operate WIC in areas which had an ongoing Commodity Supplemental Feeding Program (CSFP). More recently the emphasis has been on forcing the few remaining CSFPs to convert to WIC. Operation of both programs simultaneously in the same area duplicates services, because both programs are designed to provide supplemental foods to low-income, at-risk women, infants and children. The CSFP sites have resisted being incorporated into WIC, claiming that their program has several advantages over the WIC Program: It is better accepted by the communities in which it operates; food costs are lower since food for the program is purchased in bulk by USDA; administrative costs are lower, freeing a larger portion of the funds to be used in providing foods; a greater variety of foods is available (the package includes canned fruits and vegetables as well as peanut butter and some canned meats), and children can be fed up until the age of six years rather than being terminated at five years as on WIC.

Curiously, there have been no evaluations of the CSFP comparable to those performed on the WIC Program. There are some major differences in the design of the two programs (notably the absence of both a nutrition education component and a strong health care component in the CSFP) which may produce different levels of benefits. If it is true that certain characteristics of the CSFP make the program more acceptable to communities and participants, then those factors might be considered to be incorporated into the WIC Program design.

Participation by individuals. The law as currently written states: "Participation in the program under this section shall be limited to pregnant, postpartum, breast-feeding women, infants, and children from low-income families who are determined by a competent professional authority to be at nutritional risk" (PL 95-627). A woman is eligible through the duration of her pregnancy and for a maximum period of six months postpartum, unless she is breast-feeding, in which case she is eligible for a maximum period of one year postpartum. Infants are eligible up to one year of age and children up to five years of age. Once certified as eligible according to income and nutritional risk criteria, a woman must be recertified within six weeks of delivery in order to continue to receive program benefits and, if breast-feeding, again six months after delivery. Infants and children must be recertified every six months. As of year end 1978, there were 266,000 women, 332,000 infants and 674,000 children participating in the WIC Program, a total of 1,272,000 people.

Criteria for eligibility are specified at all levels of administration of the program. While federal legislation leaves the selection of criteria for determining nutritional risk to the discretion of FNS, the current law specifies an income-eligibility criterion. At present, due to concern expressed by state and local administrators over the difficulties of implementing this criterion at the local agency level, FNS has not incorporated the newly mandated income guidelines into federal regulations. The income guidelines in use currently specify that "recipients shall meet an income standard provided or approved by the state agency. If none are so provided or approved, they shall be eligible for health care free or at less than the full charge customarily made for health services

by the local agency" (Federal Register, 26 August, 1977: 43216). The imposition of federal income-eligibility criteria has been opposed by local and state health and social service officials who would be faced with responsibilities for administering dual income-eligibility systems. When different eligibility criteria are used for DHHS services and programs, or for other state services, and for the WIC Program operated by the same agency, great confusion is created among local staffs and clients. In addition, although national income standards have been proposed for all federally funded programs, the issue of states' rights has not been adequately resolved. WIC Program income-eligibility standards, based on gross income, have not been examined as carefully as those for the School Feeding Program.

Imposing a nationwide income-eligibility criterion would insure that WIC benefits are being delivered to those in need. However, because criteria for the use of local health facilities vary tremendously, imposition of a nationwide standard could produce significant administrative difficulties. For instance, if the criteria for receiving health care at the sponsoring health agency were below the income criteria for WIC, then many WIC participants could not receive their health care at the clinic. The local WIC agency would be in violation of the regulation that health services be made available to all WIC participants. The resolution of this issue undoubtedly requires considerable flexibility in the application of income criteria.

FNS has developed nutritonal risk criteria including: (1) anthropometric abnormalities; (2) suboptimal biochemical indices; (3) clinical signs of nutritional deficiencies or excesses; (4) poor dietary habits; and (5)

conditions which commonly predispose a person to inadequate nutritional patterns--chronic infections, drug or alcohol abuse, adolescent pregnancy, low birth weight or prematurity for infants, a history of low birth weights or premature births for women, interconceptual periods of less than 16 months, mental retardation, current multiple pregnancy, or status as an infant whose mother was at nutrition risk during pregnancy. Both nutritional risk and income criteria are further refined at the state agency levels.

Obviously, it is not possible with the current levels of appropriations for the WIC Program to serve all of those who are eligible. Therefore, in areas where the level of participation has reached the maximum caseload allocation, some method must be devised for maintaining a waiting list of persons who are deemed eligible by all appropriate criteria, but for whom there are currently no funds available to support them on the WIC Program. Rather than use a "first come, first served" policy in forming such a waiting list, FNS has established a priority ranking system, based on the belief that there are certain subgroups within the target population that are more in need of the supplemental foods. The procedure for assigning priorities described in the reulations in based strictly on nutritional status, although state agencies may set income priority levels within the nutritional risk levels set by FNS.

In general, priority is given to women and infants over children, and to those with suboptimal biochemical and anthropometric indicators or predisposing medical conditions over those at risk due to inadequate dietary intake alone. Infants of women who were on WIC during their pregnancies, or of women who would have qualified for WIC during their

pregnancies, are given a high priority, even though the infants themselves may not show signs of nutritional deficiency.

As agencies begin to reach their maximum caseloads and begin to institute priority systems, serving only those eligibles who are most critically in need of the program, the question arises whether WIC is actually functioning as a preventive program, or whether it is remedial in nature, attempting to correct identified nutritional problems. If WIC is to be an effective preventive program, then adequate funding should be available to ensure that all those potentially at risk of developing negative health consequences as a result of inadequate nutrition be served. Some supporters of the program feel that inadequate income alone is a significant risk factor. Others feel that persons with known inadequate dietary intakes (currently a low-priority group) should be immediately put on the program in the hope of averting the development of more advanced stages of malnutrition.

There is currently no precise procedure to follow in determining how long a participant should remain on WIC. FNS regulations specify that participants may remain on the program as long as they meet the eligibility criteria or "there is a possibility of regression in nutritional status without the supplemental foods" (Federal Register, 27 July, 1979: 44448), and as long as there are no persons on the waiting list who have a higher prioity. This can create difficulties if infants and children are dropped once they attain adequate nutritional status levels. The possibility of being removed from the program on improvement of one's nutritional status can act as a disincentive to using WIC appropriately and can have an effect quite the opposite of that expected in a preventive program.

FNS requires local agencies to submit periodically a Racial-Ethnic Group Participation Report. Based on these reports, the racial breakdown of participation at the end of 1978 is displayed in Table 10.

Although at the end of 1978 there were 1,318,000 participants in the WIC program, very little information has been gathered concerning their socioeconomic characteristics. The only nationwide data available on socioeconomic characteristics of WIC participants come from a survey conducted by the Urban Institute during April and May, 1975, as part of the congressionally mandated evaluation of the WIC delivery system (Bendick et al., 1976). Due to the sampling strategy employed, the sample surveyed cannot be assumed to be representative of the WIC population as a whole. Moreover, the nature of the WIC recipients may have changed greatly since 1975. However, since these are the only data available, they will be discussed briefly.

One of the characteristics covered in some depth by the Urban Institute's report was the income status of WIC participants. On the average, the income for WIC households was above that for poor households in general. However, because of the emphasis of the WIC Program on households with children, the size of WIC households was greater than that of poor households in general. Consequently, when comparing WIC household income to federal poverty levels (which take household size into consideration), it was found that 65% of WIC households had an income below the poverty threshold, and 90% were below 200% of the poverty threshold. The fact that 10% of the participants were above 200% of the federal poverty levels suggests that WIC may not have been serving those in greatest need, especially since there were no regulations specifying income-eligibility criteria

Table 10. Racial Breakdown of WIC Participation (in thousands), 1978

	Women	Infants	Children	Total
White	111.9	125.2	264.3	501.4 (38.0%)
Black	102.3	140.7	258.6	501.6 (38.1%)
Hispanic	51.8	62.2	133.7	247.7 (18.8%)
American Indian	9.3	11.9	31.8	53.0 (4.0%)
Asian-Pacific Islander	2.2	3.7	8.3	14.2 (1.1%)
Total	277.6	343.7	696.7	1,318.0

Source: Personal Communication, Rita Meyer, Supplemental Food Programs Division, Food and Nutrition Service, U.S. Department of Agriculture, December 18, 1979.

(other than eligibility for obtaining free or reduced-price health care) at the time of the study, and since 35% of the clinics surveyed indicated that they had used no income-eligibility criteria for determining participation in WIC. At present more refined income-eligibility criteria exist and are used extensively.

Information was also collected on the educational level of the head of household. The results seem to indicate that WIC household heads are less well educated than U.S. household heads in general, but that poor WIC household heads were somewhat better educated than poor U.S. household heads. The results give some weight to the hypothesis that WIC is actually serving the better educated among the poor, and that lack of education may be a barrier to participation in WIC.

With its emphasis on families with young children, the age of WIC household heads is expected to be younger than the age of poor U.S. household heads in general. The Urban Institute data confirm this expectation: 69% of heads of WIC households were less than 35 years old compared with 37% of the heads of poor households in general. Unfortunately, there was no indication in the report as to the percentage of WIC mothers in the 12-17 year adolescent age group.

Females headed 43% of the sample of WIC households. This compares with a figure of 45% for the population of all poor households as of 1975 (U.S. Bureau of the Census, 1977). A final characteristic concerning WIC households is the number of members of any one household who were participating in WIC. The Urban Institute study found that a WIC household contained an average of 1.46 participants. Approximately two-thirds of the households contained only one member on WIC.

The barriers affecting participation in the WIC Program at the individual level include characteristics of the individual, the local agency, the state agency, the legislation and the USDA regulations. The barriers blocking an individual's participation include those described above which prevent local agencies from operating a WIC program. For example, if a local agency cannot meet the requirements for availability of health services and thus cannot operate the WICA Program, eligible local persons are prevented from participating.

Given that a WIC Program is available in a specified area, one method of examining the effects that a multitude of factors (regulations, state and local agency policies, individual characteristics) have on participation is to consider the cost to individuals of participating in the program. Although federal regulations state that "participants shall receive the Program's supplemental foods free of charge" (Federal Register, 27 July, 1979: 44450), there are in fact real costs to an individual participant. These include the cost of transportation to the local agency for certification appointments and to pick up vouchers, the cost of time lost from work or school, and the costs of child care if it is inconvenient to bring children to the local agency. Inherent in this method of viewing barriers is the concept that the sum of the costs associated with participation can reach a threshold level above which a particular individual considers the costs of participation to outweigh the potential benefits and decides not to participate. Demand for the program is thus a function partially of these participation costs, and it is hypothesized that cost is a significant factor in controlling demand for persons of low income.

The Urban Institute study (Bendick et al., 1976) presents some information on the existence, magnitude and effects of some of the costs associated with

WIC participation. One-way transportation costs in 1975 averaged $.43 among the participants sampled. The average transportation cost was higher among those who expressed dissatisfaction with the program ($.58) than among those who were satisfied ($.42), suggesting that higher transportation costs may have been one of the causes of dissatisfaction. Approximately 5% of the sample had to miss some time from work for a visit to the local agency; the amount of time missed averaged 3.1 hours per visit. Nearly 20% of the sample had to make special arrangements for child care, with an average cost of $1.00 per visit. The hypothesis that these costs are more significant to persons of lower income was borne out by information collected from a small subsample of eligibiles who had decided not to participate in the program. Compared with higher-income nonparticipants, the lower-income nonparticipants more often cited specific cost barriers, such as time missed from work, transportation and child care, among their reasons for not participating. Higher-income nonparticipants more often cited the stigma of being on a "welfare" program.

Reducing the costs of participation or increasing the benefits can effectively remove some of these barriers. Levels of benefits are fixed by federal regulations, but factors influencing the costs of participation are often determined by local agency policies. Local agencies could expand their hours to include some evening and weekend hours so that working women could participate without having to miss time from work. In the Urban Institute study, only 11% of the sampled clinics reported being open either evening or weekend hours. Child care facilities could be provided at the local agency so that special and costly arrangements would not have to be made. In the Urban Institute study, although 53% of the clinics

sampled claimed to provide transportation to participants, only 1% of the participants claimed to use transportation provided by clinics. Convenient transportation facilities could be provided by the local agency, or satellite sites could be opened closer to certain subgroups of the agency's target population. It is important to note that WIC regulations allow local agencies to use administrative funds for client transportation, but there is little incentive for agencies to use funds for this activity. Possibly pilot studies in which WIC reimburses clients for their various costs could assist in considering how best to remove some of these participation barriers. Finally, greater consideration should be given to limiting the number of visits required to obtain WIC certification by coscheduling health clinic visits, WIC clinic visits, and food or voucher pick-up visits. Examples abound of women who required three visits to obtain WIC certification.

Alterations in the current food package could also promote participation and improve effectiveness of the program. FNS published proposed changes in the regulations concerning the food package (Federal Register, 30 November, 1979). Despite many changes in the right direction, controversy over the food package still exists.

Concern has been expressed at the lack of flexibility in tailoring the food package (either the quantity or the variety of foods) to meet the needs of individuals or groups. This lack of flexibility becomes a problem in connection with cultural variations in food preferences, food intolerances and allergies, and the specific needs of individuals with special dietary problems such as inborn errors of metabolism. The proposed regulations address the problem of varying cultural food patterns by specifying that a state agency may submit a plan (and rationale) for the substitution of

foods based on the food habits of cultural groups within the state agency's jurisdiction. However, there is no provision in the regulations requiring a state agency to make such allowances for cultural food practices. The problem of providing for children with special dietary needs was addressed in the report by the National Advisory Council on Maternal, Infant, and Fetal Nutrition (1977). Their recommendation was that, since DHHS provides special dietary products through Title V funds, inclusion of such foods in the WIC food package would be a duplication of services. If WIC services were tailored to the highly specialized needs of such infants and children the additional costs (including extra training of nutritionists, greater time needs per child and more expensive food packages) would reduce the number of children served by WIC.

The supplemental foods provided to a WIC participant are designed to be consumed by the participant only. However, it is unlikely that in a household WIC foods are maintained separate from other foods and reserved for the use solely of WIC participants. The Urban Institute study (Bendick et al., 1976) revealed that 81% of the households interviewed indicated that they used some WIC foods in preparing meals for the whole family. The problem of sharing WIC foods with non-WIC family members was not significant when the WIC participant was an infant receiving infant formula and infant cereals. Although the use of WIC foods solely by the WIC participant can be stressed by local agency personnel, it is not reasonable to expect this always to be the case, especially in a needy family where there may not be enough food available for other family members. One method reducing the prevalence of food sharing is to insure that other assistance programs for other family members are used (such as Food Stamps and School Lunch and Breakfast programs, where available). However, some sharing of foods is to

be expected, and should possibly be taken into consideration in designing the food package to insure that even with some sharing, the WIC participant receives the needed level of supplementation.

Another repeated criticism of the current regulations concerning the food package is that the same amount of food is provided to postpartum breast-feeding women and those not breast-feeding. This situation, whereby the combination of a woman and her bottle-fed infant can receive a much greater supplement than the breast-feeding woman and infant, serves as a disincentive to breast-feeding. Nutrition advocates claim that WIC should be doing more to promote breast-feeding. The proposed regulations make some attempt at providing more of an incentive to breast-feeding by designating a separate food package for breast-feeding women which contains more food than that for women not breast-feeding. However, calculation of the protein and energy content of the respective food packages reveals that the food package for the combination of bottle-fed infant and mother still provides a greater supplement than the package for the breast-feeding women.

Migrant participation. One special population identified as being at high nutritional risk consists of families of migrant and seasonal farm workers (Kaufman et al., 1973). By nutritional-risk and income criteria, many of the infants, children, and pregnant and lactating women of this population are eligible to participate in the WIC Program. However, the migratory life-style of this group of people has made it difficult for them to participate effectively in WIC. Often they are not aware of the availability of WIC. If they are enrolled in WIC in one location, there is no continuity of service delivery as they move from one location to the next:

1. There may not be a WIC Program operating in the next location. If there is, it may have reached its maximum caseload. Then the migrant participant is put on a waiting list (albeit the top of this waiting list).
2. The local WIC agency and the available health facilities may not be able to handle the large seasonal influx of migrants into the program.
3. A WIC agency serving a migrant participant who was enrolled in WIC at another location has no record of the history of that participation and no knowledge of the original need for WIC, whether any improvement in nutritional status has been observed, or what educational needs of the participant have been identified and met.
4. Local WIC programs in different states may vary in procedures, food delivery systems, etc. This can confuse the migrant client.

The special needs of migrants have been recognized in recent regulations. State agencies are required to identify any such groups which reside within their jurisdiction for any period of time during the year, and to design specific plans for meeting their needs. A recent Migrant Demonstration Project has been implemented by FNS in conjunction with 13 midwestern states which experience a seasonal influx of migrant workers (U.S., Department of Agriculture, Food and Nutrition Service, 1978a). The heart of this project involves the issuance of a WIC certification card which enables a migrant to receive WIC benefits at any WIC agency within the project (as long as the agency has space available). Other innovative approaches

to the problems of service delivery to migrants in need of WIC need to be explored. Flexible funding must be available to local agencies to enable them better to handle the seasonal influx of migrants, and migrant populations must be taken into consideration when determining a state agency's or a local area's need for a WIC program.

CHAPTER III

THE NATIONAL SCHOOL LUNCH AND BREAKFAST PROGRAMS

Lunches are served to approximately 25 million school children each school day by the National School Lunch Program (NSLP)--the oldest and largest of the child nutrition programs. The program originated in 1935 when commodities were first donated to schools. Officially it became a school lunch program with the National School Lunch Act of 1946. The School Breakfast Program (SBP) was first introduced in a two-year pilot project in fiscal year 1967. In 1975 the SBP was made permanent and available to all schools that apply. At present it serves three million children.

In the sections that follow we will summarize the history of these two child-feeding programs, discuss participation by geographic areas, schools and individual children; evaluate the child health benefits of the programs and suggest possible ways to add to the positive child health outcomes of the NSLP and SBP.

Legislative History

In 1935, Section 32 of the Agricultural Adjustment Act of August 24 (PL 74-320) authorized the expenditure of up to 30% of customs receipts to purchase surplus domestic commodities for donation to school lunch programs. (See Nelson, 1979, for a detailed discussion of this program in the 1935-46 period.) The USDA began in 1940 to provide lunch milk to school children, and it expanded its lunch program. By 1940-41, over five million school children received school lunches. The

war effort had exhausted much of the commodity surplus by 1943, so Section 32 funds were used to compensate states for local purchases of foods used in lunch programs. This compensation was continued until passage of the National School Lunch Act in 1946.

The National School Lunch Act (PL 79-396) was an outgrowth of the national agricultural policy to develop new markets for domestic commodities. The Act states:

> It is declared to be the policy of Congress, as a measure of national security, to safeguard the health and wellbeing of the Nation's children and to encourage the domestic consumption of nutritious agricultural commodities and other food, by assisting the States, through grants-in-aid and other means, in providing an adequate supply of foods and other facilities for the establishment, maintenance, operation and expansion of nonprofit school lunch programs.

Some interest in child nutrition and health existed at the time of the passage of the National School Lunch Act. The relatively high rejection rate by the Selective Service for young men with poor nutrition histories had attracted national notice. The Senate version of the bill included a provision for the establishment of nutrition education programs. Not only was this provision deleted in conference, however, but a stipulation was added that the Secretary of Agriculture was forbidden to impose any requirement with respect to teachers, curriculum, methods, or materials of instruction, in deference to the autonomy of local educational systems (Martin, 1978; U.S., Senate, 1972).

Despite the initial agricultural emphasis in the motivation behind the precursors of the National School Lunch Act, feeding children and surplus disposal were both stressed as aims of the 1946 act. Program regulations and implementation at the federal, state and local levels have allowed development of national agricultural, welfare and child health priorities through the school food program in ensuing years.

The initial legislation contained open-ended authorization of reimbursement funds, as necessary, for lunches meeting federal nutritional standards. Apportionment to the states was based on the states' total number of 5- to 17-year olds, but there was an upward adjustment if state per capita income was less than the national per capita average. Ten million dollars in nonfood assistance for equipment and training was also authorized. Direct federal purchase and distribution of commodities was continued. At the state level, the state education agency was authorized to enter into agreements with local schools and school districts. A state matching fund schedule was established. From 1947 through 1950, equal state and federal matching was required. For 1951-55 the state-to-federal ratio increased to $1.50:$1. After 1955, the states were required to match each federal dollar with three state dollars. The major source of the state matching funds was (and is) children's meal payments. Although Congress intended to make all children eligible for program participation, states were allowed to determine which schools were eligible to apply for federal reimbursement on the basis of need and attendance. Local authorities were given the responsibility of establishing eligibility guidelines for free and reduced-price lunches.

Three meal patterns were eligible for federal reimbursement. As described in the initial regulations:

> The Type A lunch shall consist of a complete lunch, hot or cold, providing one-third to one-half of one day's nutritive requirements for a child...The maximum rate of reimbursement with respect to the Type A lunch is nine cents. The Type A lunch must contain at least:
>
> 1/2 pint fluid whole milk
>
> 2 ounces meat, poultry, fish, cheese or 1 egg or 1/2 cup cooked beans, peas or 4 tablespoons peanut butter
>
> 6 ounces (3/4 cup) of raw, cooked or canned vegetables and fruits
>
> 1 portion bread, muffins or other hot bread made of whole grain cereal or enriched flour
>
> 2 teaspoons butter or fortified margarine

Type B and C lunches were also defined. (They are no longer served.)

Throughout the 1950s, a number of factors limited the growth in numbers of schools that chose to participate in the National School Lunch Program. Despite the authorization for funding "as necessary," appropriations increased very slowly between FY1947 and FY1955 from $65 to $83 million. USDA was consistently reluctant to use appropriated funds. The budget request for FY1956 totaled only $69 million. During the 1950s, cash reimbursement was not secure from year to year; cash appropriations could be cut and commodities of equal value substituted as commodity avalability changed. Schools did not know what commodities they were to receive or when they would receive them. In this situation, effective planning was difficult and

the commodities tended to become meal supplements. Despite a 9 cent per meal maximum, the average federal reimbursement rate had dropped from 8.7 cents per meal in 1947 to 4.4 cents per meal by 1960. Throughout the 1950s, the $10 million annual nonfood authorization of the 1946 Act was never appropriated. It was only in the 1960s under the Kennedy administration that the USDA ceased to oppose expansion of the School Lunch Program. Instead, the USDA became an advocate of reform and larger appropriations (Nelson, 1979).

Minor Type A pattern changes were made during this time and Type B reimbursement was discontinued. Schools were allowed to serve smaller quantities to younger children in elementary grades "provided that such allowances were based on the lesser food needs of younger children."

PL 87-823, passed in 1962, was the first federal recognition that in order for poor children to receive free or reduced-price lunches, federal assistance would be required to enable schools with a high concentration of needy children to participate in the NSLP. PL 87-823 altered the apportionment formula to reflect the lunch participation rate of the state, rather than total children. A new special assistance authorization of $10 million (Section 11) was based on the number of free or reduced-price lunches served in the state during the preceding fiscal year and the state "assistance need rate."

The states were instructed to define schools eligible to receive the supplemental funds on the basis of "economic conditions from which the school draws attendance, the needs of the children for free and reduced-price lunches and the percentage of free and reduced-price lunches served, prevailing price of lunches in such schools as compared

with the average prevailing price in the state, and the need of such schools for additional assistance as reflected by the financial position of the School Lunch Program." Despite the need for a change in the apportionment schedule, the final version of this bill phased the reapportionment formula over three years. No money was appropriated for Section 11 until 1966, when $2 million was voted.

Child health received explicit attention in 1966. With the passage of the Child Nutrition Act of 1966 (PL 89-642), the congressional intent to influence child health through participation in the school food programs was clearly stated. With reference to the National School Lunch Program, the Act specifies that "efforts shall be extended, expanded and strengthened...to meet more effectively the nutritional needs of our children." This legislation established the School Breakfast Program (SBP) as a two-year pilot project, with authorizations up to $7.5 million for fiscal year 1967. Each state was initially allocated $37,000 (making up about $2 million for the total U.S.), and somewhat over $1 million was used the first year. After reallocation, state expenditures ranged from $0 in Nevada, Georgia and Idaho to $116,807 in North Carolina (Federal Register, 5 January, 1967). Preference was given to pilot projects from applicant schools serving low-income populations or from schools which required long-distance travel. The one implicit assumption regarding the SBP was that it would serve primarily poor children from needy schools. It was believed that the additional meal would act as a supplement to help these children to compensate for years of malnutrition.

The breakfast pattern (Federal Register, 5 January, 1967) included:

1/2 pint fluid whole milk

1/2 cup fruit or full strength fruit or vegetable juice

> 1 slice whole grain or enriched bread, or an equivalent serving of cornbread, biscuits, rolls, or muffins made of whole grain or enriched meal or flour or 3/4 cup whole grain or enriched or fortified cereal or an equivalent combination

The regulations also suggested:

> To improve the nutrition of particular children, breakfast shall also include, as often as practicable, protein-rich foods such as one egg, a one-ounce serving of meat or other protein-rich foods. Additional foods may be served as desired.

In order to enable more inner-city or rural schools to participate in the NSLP or SBP, funds were appropriated under the 1966 Act for the nonfood assistance equipment category--the first such appropriation since 1947.

Poverty and hunger came to national attention in the late 1960s with the publication of The Other America (Harrington, 1962) and the creation of the Senate Select Committee on Nutrition and Human Needs and the White House Conference on Nutrition. It is not too surprising, therefore, that the main thrust of legislative changes in the school food programs in the early 1970s centered on reaching more needy children with free meals. At this time, neither the quality of the lunches nor the magnitude of nutritional benefit to participating children was questioned. "Meeting the nutritional needs of the children" was interpreted to mean increasing the accessibility of the program to children of all economic categories.

PL 91-248, 1970, was the first in a series of legislative enactments to assure children from low-income households school meals

priced within their means. The Secretary of Agriculture was instructed to establish national minimum guidelines for free and reduced-price meal eligibility, heretofore the responsibility of a school or school district. Appropriations for the National School Lunch Act and the Child Nutrition Act were to be authorized one year in advance of the fiscal year in which they were to be spent, in order to allow local authorities greater certainty regarding the size and type of program for which they could plan. Local schools were required publicly to announce local eligibility standards for free and reduced-price meals. Apportionment of the Section 11 special assistance funds was to be based on numbers of children age 3 to 17 from households with incomes less than $3,000 per year, plus numbers of children in households receiving more than $3,000 per year including federal assistance payments. The Secretary of Agriculture was to establish a maximum per-meal reimbursement, with additional assistance of up to 80% of operating costs allowed for schools in severe need. A ceiling of 20 cents on the price charged children was placed on reduced-price meals. It was also stated that the same eligibility for free and reduced-price meals was to be followed by both lunch and breakfast programs. PL 91-248 also authorized use of up to 1% of the appropriated funds for nutrition training and education for workers and participants, and for the "necessary surveys and studies needed for a more efficient child feeding program."

A Citizens Conference, sponsored by the Children's Foundation in June 1970, made some recommendations regarding PL 91-248 regulations. The conference for the first time focused national attention on the quality of the food available in the school nutrition programs, suggesting that:

- Schools with programs selling candy, soft drinks, and such during the lunch period should be required to put the full income from such sales into the school food service programs.
- Type A lunch standards should be based on nutritional characteristics, not on arbitrary food groups. School districts should be allowed maximum flexibility in developing food programs for the community.

PL 91-248 instructed the Secretary of Agriculture to establish uniform national eligibility standards for free and reduced-price lunches, but the resulting regulations stipulated simply that the guidelines were to be those used by HEW and OEO, giving no income figures. The regulations gave no indication of when a reduced-price meal should be served as opposed to a free meal.

Eventually, the income poverty guidelines for households of different sizes were designated as the national minimum standard for free and reduced-price meal eligibility. Free meal eligibility was set at 125% of the income poverty guidelines. Reduced-price eligibility was set at 175% by PL 93-326 in 1973, and was increased to 195% by PL 94-105 in 1975. PL 94-105 also required that reduced-price meals be served in each school. Previously the serving of reduced-price meals had been a local option.

The availability of federal per-meal reimbursement changed during the early 1970s. In 1972, PL 92-433 guaranteed a new minimum federal cash allocation system, based on actual meals served during the previous year multiplied by a national average payment per meal. In 1972, the minimum federal subsidy was 8 cents per lunch. It also provided an

automatic semiannual reimbursement increase in which average federal payments were tied to increases in the Consumer Price Index (CPI) for foods consumed away from home. The 1973 minimum level was set at 10 cents per meal. In 1974, PL 93-326 set a minimum level of commodity assistance at 10 cents per lunch and also tied this amount to increases in the CPI.

Although during the early 1970s the School Breakfast Program remained a pilot project, its availability increased. PL 92-32 provided preferential funding to applicant schools with high percentages of children with working mothers. It also extended eligibility to all public and private nonprofit schools. By 1975, PL 94-105 made the SBP permanent. The law authorized an annual appropriation and extended funding availability to all schools that apply.

PL 94-105 made several administrative changes which modified numbers and types of schools that could participate in the school food programs. It expanded the definition of a school to include public or nonpublic private residential child care institutions--including orphanages, homes for the mentally retarded, and homes for unwed mothers. It exempted the additional federal supplement for reduced-priced and free meals from the amount states were required to match.

To some extent, the 1975 legislation provided continuing evidence of the belief that if a school lunch or school breakfast program were available, proportional health and nutritional benefits would automatically accrue to children in participating schools. An example of this belief can be found in a subsection added to the Child Nutrition Act of 1966, which stated, "As a national nutrition and health policy,

it is the purpose and intent of Congress that the School Breakfast Program be made available in all schools where it is needed to provide adequate nutrition for children in attendance." Little attention was being paid to participation rates within a particular school, or the acceptability of the meal served. PL 94-105, however, authorized a study to examine the degree and cause of plate waste, and the possible relationships between plate waste and inadequate menu development, service of competitive foods, and the nature of the Type A lunch. This legislation also authorized full meal reimbursement rates to secondary schools in which students could select three of five Type A lunch components offered in place of the previous requirement that all five components be served to each child for reimbursement.

The National School Lunch Act and Child Nutrition Amendments of 1977 (PL 95-166) contained further provisions to modify federal reimbursement levels to needy schools. The "offer-versus-serve" provision was extended to junior high or middle schools, on approval of the local school district. (This provision allows students to select any three of five Type A components.) However, the unique provision of this legislation was the addition of Section 19 to the Child Nutrition Act of 1966, authorizing 50 cents per child for nutrition education and training. Its purpose was:

> ...to encourage effective dissemination of scientifically valid information to children participating or eligible to participate in the school lunch and related child nutrition programs by establishing a system of grants to state educational agencies for the development of comprehensive nutrition information and educa-

tion programs. Such nutrition education programs shall fully use as a learning laboratory the school lunch and child nutrition programs.

Increased awareness of the potential nutritional impact of the school food program was beginning to be evident. Minor meal pattern changes had been made: in 1969 the butter/margarine requirement was reduced to 1 teaspoon, and it was eliminated totally from the meal pattern in 1974. In 1977 proposed regulations specified, rather than suggested, different portion sizes for children of different ages. As of December 1979, after interim regulations, public comment, and field testing, the portion size regulations have not yet been published in final form. However, effective for the 1979-80 school year, schools must now serve either skim, lowfat, or buttermilk. If whole milk is served, it is to be in addition to the lower fat alternatives.

Throughout the preceding review of the legislative history of the school food programs, it has been apparent that food programs have acted as vehicles to further national policies. After the national priority given to agricultural commodity support in the 1950s and early 1960s, the school food programs became a vehicle for the amelioration of the effects of poverty. From the national priority to expand the school food programs to as many schools as possible during the early 1970s, attention in the second half of the decade shifted to the nutritional implications of participation and to the identification of ways in which the child food programs could be used to improve child health.

Participation

Macro trends. Since enactment of the National School Lunch Act in 1946, changing federal standards have influenced the decision-making processes of states and school districts. Federal per-meal reimbursement, commodity and nonfood assistance have influenced the level of resources available to each state. In turn, state allocations of both federal and state resources have influenced the decisions of individual schools and school districts to initiate and operate school lunch and school breakfast operations. Table 11 summarizes availability, participation and enrollment information for school lunch and school breakfast programs.

Currently, the National School Lunch Program is available in 75.1% of all schools or to approximately 90% of all school-age children. As Table 11 shows, participation by individual schools increased at a fairly constant rate from the time of enactment until the early 1970s, when the rate of NSLP expansion into new schools increased. The SBP, not a permanent program until 1975, is currently available in 25% of all schools and to 30% of the U.S. enrollment.

A number of factors were related to the increasing rate of participation by schools in the school food program during the 1970s. The Child Nutrition Act of 1966 appropriated cash for the nonfood assistance provision of the 1946 National School Lunch Act. These funds could be used to purchase new equipment with which a school could initiate a food service or improve an existing facility. Table 12 shows appropriation levels, numbers of schools benefitting, and total enrollment in schools which initiated food service with these funds.

Table 11

Participation in School Feeding Programs

	Totals		NSLP			SBP		
	U.S. Schools[a]	U.S. Enrollment (millions)	No. of Schools	U.S. Schools with NSLP (%)	% of U.S. Enrollment with NSLP Available	No. of Schools	U.S. Schools with SBP (%)	% of U.S. Enrollment with SBP Available
1946-47	188,077	26.6	44,537	23.7		NA		
1954-55	149,562	34.0	58,438	39.1		NA		
1959-60	137,836	40.7	62,325	45.2		NA		
1964-65	122,101	48.2	70,132	57.4		NA		
1969-70	116,307	52.1	75,593	65.0	78.5	4,399	3.8	4.2
1970-71	116,307	52.2	79,924	68.7	83.0	6,609	5.7	5.9
1971-72	113,332	52.0	83,333	73.5	84.6	7,868	6.9	7.5
1972-73	109,406	51.4	86,381	79.0	85.2	9,706	8.9	7.7
1973-74	110,746	51.4	87,579	79.1	87.2	11,902	10.7	9.8
1975-76	110,519	49.1	89,432	80.9	88.9	16,868	15.3	17.6
1976-77	106,348	49.6	91,299	85.8	90.8	21,855	20.6	20.0
1978-79	122,515	48.0	94,535	75.1	90.8	30,984	25.3	30.0

[a]Includes public, private, residential schools.

Table 12

Food Service Equipment Assistance Program (FSEAP)

FY	Appropriations (thousands)	Program Level	Total No. Schools Helped	Schools with Existing Program	No. of New Schools	Enrollment New Schools
1967	$750	698	586	NA	NA	NA
1968	750	736	775	NA	NA	NA
1969	750	717[a]	5,727	NA	NA	NA
1970	10,000	9,848[b]	7,974	7,440	534	265,234
1971	15,000	15,318[c]	15,378	13,775	1,603	1,352,600
1972	16,100	14,758[d]	6,603	5,377	1,226	587,178
1973	16,100	14,083	6,442	4,817	1,625	712,796
1974	23,425	25,962	8,489	7,047	1,442	665,870
1975	28,000	27,738	8,347	7,019	1,328	569,123
1976	35,000	31,228	8,823	7,889	934	374,852
1977	28,000	27,058	8,694	7,743	951	697,621[f]
1978	28,000	28,000	7,228[e]	6,709	519	345,228[f]
1979	24,000					
Total					10,162	5,570,502

[a]Supplemental appropriation = $9,647,635.

[b]Supplemental appropriation = $6,741,336.

[c]Supplemental appropriation = $20,925,039.

[d]Supplemental appropriation = $1,379,654.

[e]Preliminary.

[f]Enrollment, rather than attendance data.

Increased federal reimbursement probably led to increased participation by local schools. The original maximum per-meal reimbursement, set in 1946, was 9 cents per meal. In 1953 up to 15 cents was allowed for lunches in "especially needy" districts, and in 1967 reimbursement of up to 15 cents, or 80% of cost for school breakfasts in "especially needy" districts, was in effect. By 1979 the federal reimbursement reached 17 cents for full-price, 73 cents for reduced-price and 93 cents for free lunches, and 13, 39 and 47 cents for full-price, reduced-price and free breakfasts. In 1979 up to $1.08 for lunch and 57 cents for breakfast could be reimbursed to "especially needy" districts.

Despite attempts during the 1970s to apportion funds on the basis of meals served with additional financial incentives going to schools classified by state agencies as "especially needy," wide variations in the percentage of schools not participating existed across regions and states. By 1979 more than 94% of schools in the Southeast and Southwest had food service. Every other region had at least two states in which less than 90% of schools had food service.

The availability of the breakfast program has lagged behind that of the lunch program. By 1979, North Carolina, the state with the largest number of breakfast programs relative to lunch programs, had the SBP in only 54.5% of the number of schools which had the NSLP. Only 19 states had the breakfast program in as many as 25% of the number of schools having the lunch program. As with lunch, the Southeastern and Southwestern states have a much higher percentage of schools with break-

fast programs than do the other states. The Midwestern and Mountain Plains states have the lowest relative frequency of breakfast programs.

A national school breakfast mandate was debated and defeated for the Child Nutrition Amendments of 1978. However, several of the more populous states, including Texas, Massachusetts, Michigan, California, New York and Ohio, have legislation which mandates school breakfast programs for some or all state schools.

A school's decision to offer a breakfast program has involved greater administrative difficulties and local opposition than did decisions to participate in the NSLP. Administrative problems have occurred regarding simultaneous scheduling of breakfast and busing, lack of storage and preparation facilities for two meals per day, and the financial capability of a school to operate two meal programs. There have been local disagreements over the level of school responsibility for providing food to children, and the extent to which the social custom of family breakfast will decline if breakfasts are offered at school.

PL 94-105 requires that the SBP "be made available in all schools where it is needed." A lawsuit was filed and dismissed in 1978 (Charette vs. Butz) which would have required SBP implementation in all schools eligible for Title I assistance under the Elementary and Secondary Education Act (SEA), and in all schools in which at least 25% of the children were eligible for free or reduced-price meals. As a result of the suit, however, each state's child nutrition plan is now required to include either the state definition of a "needy" school, or information regarding participating and nonparticipating schools, receipt of Title I funds and/or the percentage of children in attendance eligible for free or reduced-price lunches (CNI, 1978a).

In order to encourage participation in the SBP by schools in low-income areas, since 1971 the federal government has provided 100% of all breakfast programs costs up to a maximum of 45 cents to those schools designated by the states as being "especially needy." Federal recommendations for this classification include three categories:

- schools financially unable to support free and reduced-price breakfasts at regular rates, due to an especially high percentage of poor students,
- schools with unusually high costs, despite sound management practices, and
- schools which show other unusual factors of special need.

Table 13 lists the number of schools that had been classified by the SEA as especially needy by March, 1977 (CNI, 1978b).

In 1977, most states had no specific criteria by which to classify schools as needy. One criterion used in Louisiana and Missouri schools was having a student population which was 100% low-income. Virginia stipulated that a breakfast program must already exist, 75% or more meals must be served free or at reduced prices and the program must be experiencing higher breakfast costs than could be covered by existing normal reimbursements. In August, 1979, final federal regulations set minimum national standards for the classification of especially needy schools (now known as schools in "severe need"). The final regulations require, at minimum, that states classify as needy schools which serve 40% or more lunches free or at reduced prices, in addition to schools required by state law to serve breakfast. Presently, the reimbursement rate for free and reduced-priced meals in schools classified as in

Table 13

Schools Classified as Especially Needy, March 1977

Alaska	0	Connecticut	1
Arizona	112	Maine	0
California	1,076	Massachusetts	615
Hawaii	102	New Hampshire	21
Idaho	0	Rhode Island	0
Nevada	0	Vermont	0
Oregon	0		637
Washington	0		
	1,290	Alabama	0
		Florida	531
Delaware	0	Georgia	0
D.C.	187	Kentucky	0
Maryland	291	Mississippi	0
New Jersey	44	N. Carolina	0
New York	1,200	S. Carolina	0
Pennsylvania	251	Tennessee	28
Virginia	0		559
West Virginia	18		
	1,991	Illinois	0
		Indiana	0
Arkansas	0	Michigan	NA
Louisiana	0	Minnesota	0
New Mexico	0	Ohio	371
Oklahoma	0	Wisconsin	8
Texas	0		379
	0		
Colorado	0		
Iowa	0		
Kansas	0		
Missouri	193		
Montana	0		
Nebraska	0		
North Dakota	0		
South Dakota	138		
Utah	5		
Wyoming	6		
	342		

"severe need" is 10 cents per meal greater than the normal free or reduced-price reimbursement.

While the local availability of free and reduced-price meals has affected participation rates within any one school, local costs and the decision to provide a lunch or breakfast program have also been affected by the availability of additional federal funding per meal for reduced-price and free meal service, and by changes in the requirements for state matching funds.

In general, the distribution of funding sources for school food programs has changed over time. The absolute federal contribution in cash and commodities for the NSLP more than quadrupled between 1969 and 1977. Table 14 presents the federal, state, local and child contributions between 1969 and 1976.

The percentage of the federal contribution in the form of commodities has also changed over time. In 1971 commodities were valued at $277.3 million and were 33% of the federal outlay for NSLP and SBP. By 1975 they were valued at $421.3 million but accounted for only 21% of the federal contribution.

In 1975, PL 94-105 resulted in regulations providing that "where a state has phased out its commodity distribution facilities prior to July 1, 1974, such states may elect to receive cash payments in lieu of donated foods." Since that time, only one state, Kansas, has chosen the cash versus the commodity option. More recent federal efforts to improve the usability of commodities at the local level have included provisions to allow schools to refuse to accept delivery of not more than 20% of the total value of agricultural commodities offered in any school year, with

Table 14

Sources of Funding, National School Lunch Program

FY	Federal Funds (millions)	% of Total	Child Participant Funds	% of Total	State/ Local Funds	% of Total	Total Expenditures
1969	$ 475.8	23.9	$1,041.2	52.3	$475.3	23.0	$1,992.3
1970	565.5	25.5	1,105.0	49.8	546.6	24.7	2,217.1
1971	809.5	32.5	1,090.2	43.7	593.3	23.8	2,493.0
1972	1,050.8	38.5	1,080.4	39.5	599.0	21.9	2,730.0
1973	1,210.7	40.0	1,123.7	38.0	692.7	23.4	2,958.8
1974	1,401.4	41.6	1,174.2	34.8	796.8	23.6	3,372.4
1976	1,705.0	44.2	1,308.5	33.9	848.8	22.0	3,863.0
1976	1,920.3	46.2	1,310.0	31.5	930.0	22.4	4,160.3

selection of alternate commodities which are available to the state during that year. Since one complaint of school food service directors has been excessive commodity provision of selected items which are not usable in the quantities supplied (e.g., peanut granules), this provision should affect local operating costs favorably.

Other federal efforts to increase participation by schools in either the NSLP or SBP have been the approval of food service management companies and the approval of processing contracts in which commodities have been used to fabricate products that can be used by local programs with less on-site preparation.

At this time little is known about the availability of the NSLP or SBP at aggregation levels smaller than states. Information regarding urban versus rural participation, participation by income level, by elementary as distinct from junior high and senior high schools, and by school size, would be useful. Figure 3 summarizes some of the important possible linkages among factors affecting a school's choice to participate in lunch and/or breakfast programs. Little information and essentially no analysis is available to help us understand the relative importance of the specific linkages. It would be most desirable for future researchers to provide the information needed to describe and understand the relationships shown in this figure.

Micro determinants. A summary of factors which may affect the decision of a particular child to participate in either the School Lunch or the School Breakfast Program appears in Figure 4.

Very little data exist which characterize NSLP or SBP participants or nonparticipants. The Food and Nutrition Service (FNS) does collect

Figure 3. Determinants of School Participation in School Feeding Programs

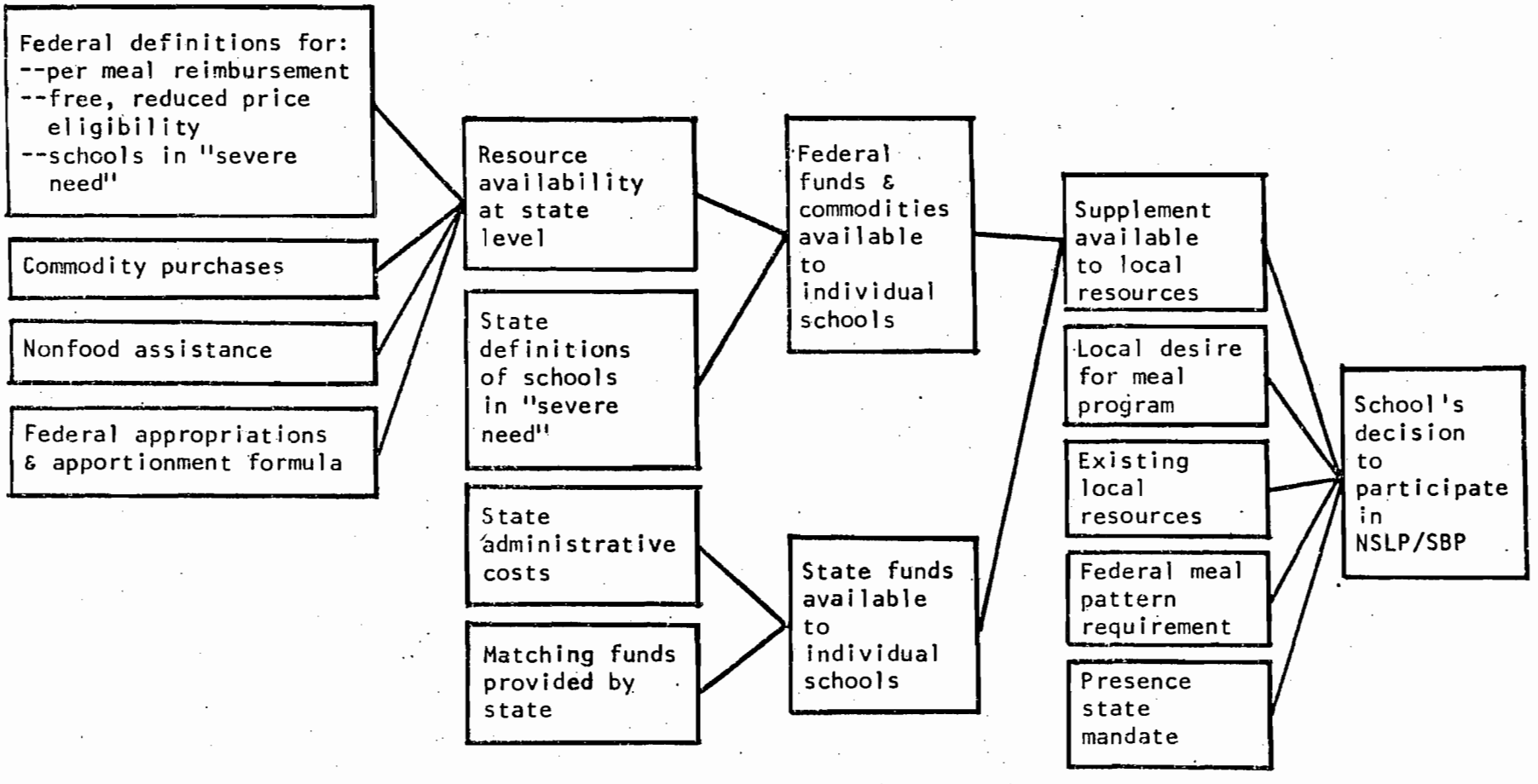
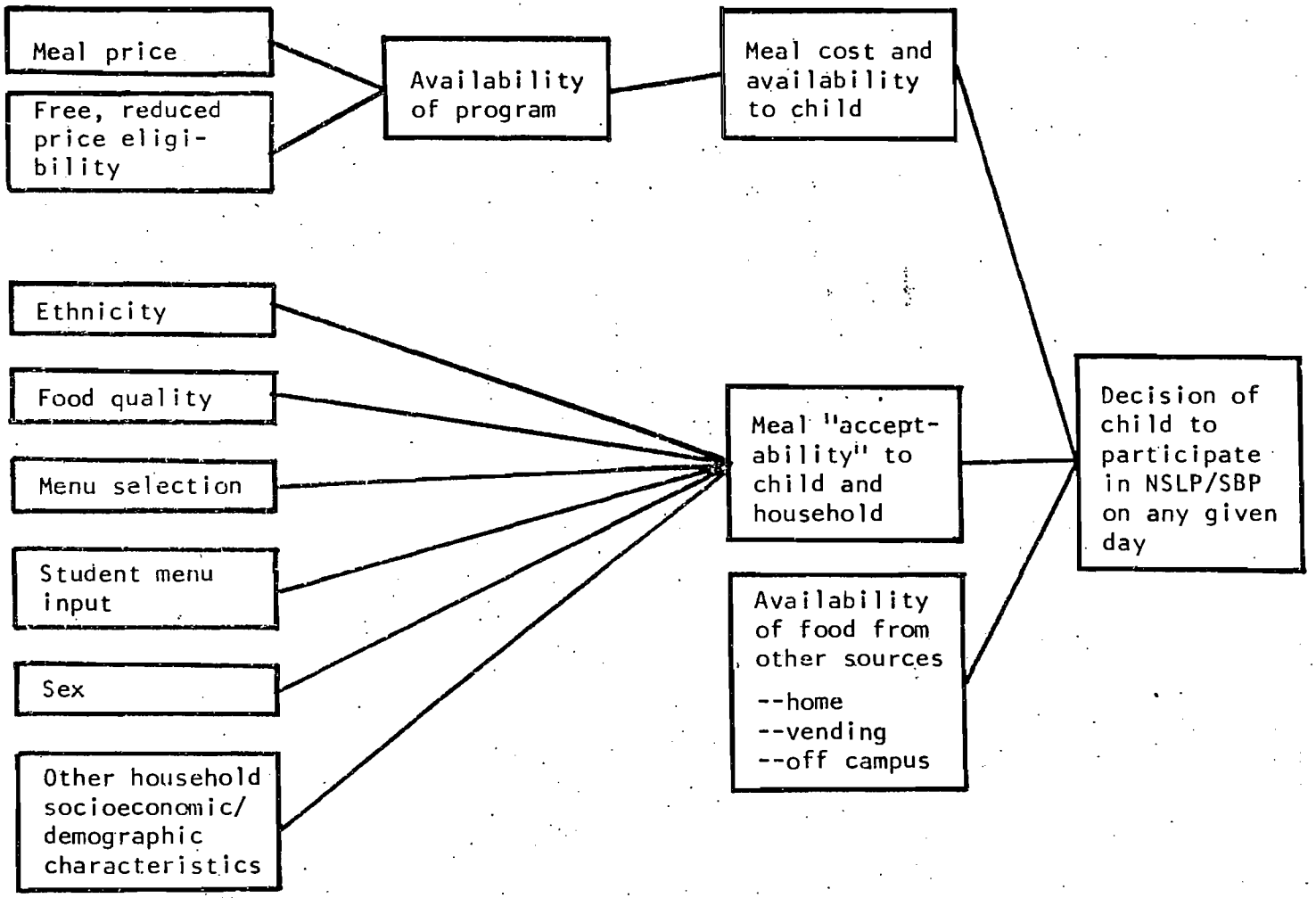


Figure 4. Determinants of Individual Participation in the National School Lunch Program



administrative information identifying total numbers of meals served to students. In 1946-47, approximately 24% of U.S. children participated in the National School Lunch Program, and no School Breakfast Program existed. By 1975 over 23 million children, or approximately 50% of all children, participated in the NSLP, and less than 2 million children participated in the SBP. The percentages of children participating varied considerably by geographic area. In 1973 over 70% of children ate school lunches in Alabama, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Arkansas, Louisiana and Hawaii, while fewer than 30% participated in New Jersey, California and Nevada.

An important determinant of individual participation should be the price charged to children. Charges for full-price lunches averaged 37 cents in 1971, 49 cents in 1975, and 53 cents in 1979. Public Law 91-248 in 1969 set a maximum price of 20 cents for reduced-price lunches, still in effect.

The patterns of participation by free, reduced-price, and full-price categories (Table 15) are consistent with the fact that full prices are increasing, while prices in the other categories remain unchanged. These patterns also may show responses to the changing eligibility standards for the two less than full-price categories, and changes in attitudes toward the program on the part of students and families in each income group.

As described in the U.S. Comptroller General's report, "The National School Lunch Program--Is It Working?" (1977), participation rates of students paying full prices differed markedly from those of students paying reduced prices or receiving free meals. The relative growth in the free

category over time, as seen in Table 16, is due to absolute growth in the numbers eligible for free and reduced-price meals, combined with a reduction in the full-price population. The percentage of eligible students participating has not changed much in the full-price category, and has actually gone down by almost 5% in the free and reduced-price category.

The Urban Feeding Study conducted by USDA for FY1973 broke participation rates down to compare elementary with secondary and low-income with other schools. Overall participation rates were 63% cent in elementary schools and 38% in secondary schools. Table 17 shows participation rates in low-income areas as compared with other areas having school lunch programs.

A few studies have looked at the price-participation relationship for children in NSLP schools. From a 1970-71 sample of North Carolina schools selected to represent the three regions of the state, urban-rural location and varied socioeconomic conditions, Nicholson (1973) concluded that participation rates among junior and senior high school students paying full price were not significantly affected by price level. For elementary students, price elasticities were statistically significant, and equal to approximately -.3. These elasticities suggest that doubling the price of school lunches would cause approximately a 30% reduction in participation. The results also suggest that it would be reasonable to predict a 30% increase in participation if lunches were made free for all at the elementary level in North Carolina (see Table 18). To attempt to draw nationwide implications from such a sample, however, would be questionable.

Table 15

Proportion of NSLP Participants in Each Price Category

FY	% Regular-Price	% Reduced-Price	% Free
1972	67.6	2.0	30.4
1975	60.1	2.2	37.7
1978	55.3	5.9	38.8

Table 16

Relationship between NSLP Price and Proportion of Eligible Students Participating

	Regular-Price		Free and Reduced-Price	
FY	Millions Participating	Participation Rate	Millions Participating	Participation Rate
1971	17.5	49.6	7.1	90.7
1972	16.9	48.7	8.0	86.7
1973	16.6	49.7	8.5	82.8
1974	15.9	46.8	9.2	82.9
1975	15.5	46.6	9.9	85.9

Table 14

Relationship between NSLP Participation and School Income, 1973

	% Participation		% Meals Served Free or Reduced Price
	Primary	Secondary	
Low Income NSLP	72	41	76
Other NSLP	56	36	45

Table 18

Relationship between School Lunch Price and Student Participation in North Carolina, 1970-71

Price (cents)	Estimated Participation Rate	Elasticity at This Price
30	.90	-.252
34[a]	.87	-.295
35	.87	-.307
40	.83	-.367

[a]$.34 represents average elementary full-price lunch, 1970-71 (prices varied from $.25 to $.40).

Source: Nicholson, 1973.

Table 19

Relationship between School Lunch Price and Participation in the State of Washington

Size District	Price	Meal Participation Rate	Elasticity at This Price	Participation Increase with 5¢ Price Decline
Small	30.9¢	60.7	-.5335	8.5%
Large	36.4¢	37.5	-.1198	16.8%

Source: West and Hoppe, 1973.

West and Hoppe (1973) looked at pricing and participation rates in the state of Washington during the 1970-71 school year. After stratifying by size of school district, they concluded that price reductions of 5 cents would be associated with participation increases of 5 to 6% in both large and small districts. Interpreted in elasticity terms, these results appear in Table 19. (Ninety percent of sample meal prices ranged between 20 cents and 45 cents.) Obviously these elasticity estimates are much greater than Nicholson's. Because the sample is not broken down by grade levels in this study, it is impossible to make more specific comparisons to the Nicholson results.

The USDA Comprehensive Study of Child Nutrition Programs (U.S., Senate, 1974) used price-participation relationships to forecast 1974 participation rates. This study concluded with the prediction that paying students will stop participating by 3 to 6% for every 10% price increase. The Comptroller General's report contends that these estimates are valid only for meal prices betwen 20 cents and 35 cents. Participation rates are determined by other factors in addition to price. However, the regression analysis method used to calculate price elasticities assumes additional effects of price and other potential program variables. Therefore, the price-participation relationship can explain significant variation in participation rates. The results, in fact, suggest that price is a strong factor in participation decisions and that elasticities probably range between -.25 and -1.2.

Braley and Nelson (1975) did the only study which analyzed the effect of a price increase on student movement between participation categories. They concluded that when large price increases occurred,

approximately one-fifth of the regular price category's dropouts joined the free lunch program, while the remainder either shifted to alternative food sources or went without lunch.

MacDonald (1981) analyzed the impact on participation of experimental regulations to vary minimum meal portion sizes for children of different age grades and other changes to improve the nutritional adequacy of the NSLP meal pattern requirements. The data for this analysis were obtained by FNS from 352 schools that implemented experimental meal pattern requirements during the 1978-79 school year, and from 28 control schools. School food service manager reports and meal portion quantities were collected prior to and during the experiment. Pre- and post implementation comparisons of experimental and control school average participation rates revealed no significant participation differences. Variables that indicate the degree of compliance with the experimental meal patterns were also used in multivariate analyses of participation after implementation. There were no significant effects for the meal pattern compliance indicators. Apparently student participation was affected more strongly by factors other than the experimental meals.

No study using a representative national sample has characterized the beneficiaries of the school food programs. Similarly, factors which affect students' acceptance of meals and, thereby, their degree of participation, have not been ranked. Determinants probably include the quality, quantity and preparation of food, menu variety, choice, availability of alternative food sources, and the length of the lunch period. Factors which indirectly affect the decision to participate may vary by grade, sex and ethnic background. Work now being begun by the

Office of Policy, Planning and Evaluation of the Food and Nutrition Service of USDA will attempt to provide evidence related to most of these topics. Additional research is being undertaken by the Food and Consumer Economics Institute of SEA/USDA. The major ongoing research projects funded by USDA are: the System Development Corporation analysis of the nutritional impact of school feeding, the Mathtech study of school feeding production costs, and the University of North Carolina at Chapel Hill study of school feeding participation and dietary impact.

Comprehensive information directly detailing the age, sex and ethnic composition of school program participants is unavailable. The Comprehensive Study of the Child Nutrition Programs (U.S., Senate, 1974) characterized nonparticipating children as apt to be:

1. urban residents,
2. not needy (approximately 50% participation compared to 80% for needy children), and
3. of secondary (versus primary) school age (50% participation versus 60% respectively).

Two studies have used different national data bases to estimate numbers of children eligible for free, reduced-, or full-price meals. Beebout and Kendall (1978) used the 1976 Survey of Income and Education (the primary purpose of which was to characterize those in poverty in the U.S.) to estimate children eligible for free and reduced-price lunches in 1978-79. The file was edited for underreporting and projected to reflect 1978 economic and demographic conditions. Gross incomes were adjusted for excessive medical expenditures, shelter costs in excess of 30% in income, and disaster and casualty losses. It was assumed that the

distribution of low-income students was the same in schools with and without the NSLP. Upper-bound estimates were calculated by using unadjusted income and adding two standard deviations to the point estimate.

According to the point estimates, 7.2 million children could be expected to be eligible for free meals in 1978 (i.e., to live in families with incomes less than 125% of the poverty standard) with an additional 5.4 million eligible for reduced price meals (195% of the poverty level). The upper-bound estimates were 9.3 and 6.6 million children, respectively. These figures are notable when compared to Food and Nutrition Service (FNS) administrative data, which show an average 10.3 million free and 1.5 million reduced-price meals actually served on a given day during 1978. Some of the differences between the actual numbers served and the Beebout and Kendall estimates may be due to the fact that schools classified as in "severe need" often provide free meals to children from households with incomes above 125 and 195% poverty. However, the accuracy of the projections depends on the representativeness of the original sample and of Kendall and Beebout's income adjustments to simulate 1978 economic conditions.

G. William Hoagland of the U.S. Congressional Budget has provided the only national distributional analysis of children actually participating in the child nutrition program (1978). His data are for 6- to 21-year olds in the first Health and Nutrition Examination Survey (HANES I). This data set permits estimates of joint participation in the NSLP and SBP. The mean income of all families with children in school as estimated from the HANES sample is $11,077. This compares to the census mean for all households of $11,703. From the data it can be ascertained that

the mean income of participants is lower than that of nonparticipants. As expected, the mean income of breakfast participants is significantly lower than mean family incomes of children who do not participate in any program or who participate in lunch only. However, the means analysis gives no information with respect to the shape of the participation distributions. The actual degrees of poverty are difficult to interpret on the basis of the means analysis, because any given absolute money income can be related to varying degrees of poverty for different size families.

Table 20 presents results from Hoagland's simulation model for percentages of children within each poverty classification who participate in the feeding program, do not participate in the program, or do not have the program available. These results clearly indicate that huge numbers of poor children have no breakfast program available. They also suggest that a surprisingly large 18.3% of children who should be eligible for free lunches either have no available program or do not participate. An equally astonishing 37.1% of children eligible for reduced-price meals either do not participate or do not have NSLP available. Obviously much opportunity remains to help low-income children by increasing both school and individual participation in the program.

To summarize, very little information exists which describes school food participants versus nonparticipants. The evidence that exists suggests that males and children from households with lower incomes participate at higher rates than do females and children from higher-income households. However, within each administrative category (i.e., less than 125% poverty, 125-195%, greater than 195%), the impact on the

Table 20

Proportion of Children Participating in Food Programs by Poverty Group

	Less than 125% Poverty	125-195% Poverty	Greater than 195% Poverty
Breakfast			
Participants	6.3	1.9	0.9
Nonparticipants	4.5	5.1	5.1
Nonavailables	89.2	92.9	94.0
Lunch			
Participants	81.7	62.4	56.3
Nonparticipants	11.2	19.4	24.8
Nonavailables	7.1	17.7	18.8

Source: Hoagland (1978).

decision to participate of such factors as family size, age, sex, ethnicity, menu quality and choice is unknown.

Benefits of School Feeding Programs

This section will address the questions: What benefits may accrue to children who participate in the School Lunch and/or School Breakfast Programs? What determines the level of benefits a particular child receives? How might nutrition education affect these benefits?

Benefits of the school feeding programs can be categorized as direct or indirect. Direct benefits include the amount and quality of food made available to the child. Indirect effects result from the impact of altered dietary intake on health status. (See Pollitt et al., 1978, for a literature review of the behavioral and scholastic benefits of school feeding programs.) For the purposes of measuring health outcomes, the direct benefits are most easily defined as levels of available or consumed nutrients. The School Lunch Type A meal pattern was designed to provide approximately one-third of the Recommended Dietary Allowance (RDA) for children of age 10 to 12. A number of studies have assessed nutrient availability of the Type A lunch. To our knowledge, to date no studies have assessed the nutrient contribution of the School Breakfast Program.

Nutrients as served. In the late 60s, the Agricultural Research Service and Consumer Marketing Service of USDA conducted a study to determine the nutrient content of Type A lunches as served in 300 schools in different regions of the country. In each school, a homogenate of foods from four sample trays was collected on each of five

consecutive days and was frozen until analysis took place. Levels of all nutrients except ascorbic acid were determined. One-third of the RDA (1968) for children age 10-12 was used as the nutrient standard. A series of findings are reported in Murphy et al., 1969, 1970a, 1970b and 1971.

Since the analysis covered five days' meals, the results are based on school averages over a one-week period. Over one-third of the schools failed to serve an average of one-third of the RDA for vitamin A. Nearly one-fifth failed to serve even one-quarter of the requirement. One-fifth of the schools provided less than one-quarter of the RDA for vitamin D. Less than one-third of the RDA for the B vitamins--thiamin, niacin and B_6--was served in large numbers of schools. Tryptophan niacin equivalents were not included in the niacin calculation, so that nutrient was probably available in adequate quantities. Thiamin and B_6 tended to be least adequate in meals which were also deficient in calories.

Magnesium as served was less than one-third of the RDA in 60% of the schools, but 91% of them served more than one-fourth of the RDA. Although the mean iron provided per meal was 4.2 mg, more than 90% of the schools failed to provide the 10- to 12-year old female requirement of 6 mg (e.g., one third of the iron RDA). Two-thirds failed to provide even one-quarter of the total female iron RDA.

This study also calculated several micronutrients and lipids. An average 3.9 mg zinc was provided each meal. Zinc first appeared in the RDAs in 1974, and the 1979 revision of RDA requirements established requirements of 10 mg for 7- to 10-year olds, and 15 mg for 11- to 14-year

olds. Fats contributed approximately 40% of the calories of the average school lunch, or an average 31.8 gm per meal.

In a sample of 21 schools from North Carolina, the amounts of proteins, fat, calories, vitamin A, ascorbic acid, thiamin, riboflavin, iron and calcium found in the Type A lunch were both calculated and analyzed (Head et al., 1973). The sample was stratified into elementary and secondary schools. No average school lunch met even one-third of the RDA for energy, and 30% provided less than one-quarter of the RDA. Analyzed ascorbic acid levels were also low. Although all calculated ascorbic acid values in the studies exceeded one-third RDA, only about 40% of the analyzed values in North Carolina exceeded one-third of the RDA; nearly 25% averaged less than one-sixth. Since considerable differences existed between calculated and analyzed ascorbic acid values, it would appear reasonable that if a nutrient ascorbic acid standard is used, a correction factor may need to be considered.

In the North Carolina study, thiamin, iron and calcium were provided in inadequate quantities in many schools. Eighty-five percent served less than one-third of the iron RDA; more than 30% met only one-sixth. Twenty percent served one-third of the RDA for thiamin; 10% served less than one-sixth. Seventy percent of the schools served between one-fourth and one-third of the RDA for calcium.

As the results above show, the Type A menu-planning method does not uniformly assure the goal of serving one-third of the RDA. A number of studies have compared alternative menu-planning strategies including the nutrient-standard method (NSM) and/or computer assisted menu planning (CAMP).

In 1975 Frey et al. reported comparing a nutrient-standard menu method to Type A menu plans. The NSM method used nutrient-analyzed standardized recipes, where each recipe was subdivided into nutrient "beads"--e.g., 50 kcal was one blue bead; 1.5 gm protein, one brown bead. A nutrient abacus was then used by the food service personnel in one elementary and one high school of 29 school districts representing the FNS Midwest, Southwest and Western administrative districts. A comparison of the nutrients as planned with those served was made by weighing five actual trays with nutrients calculated from Handbook 8. For the elementary schools, Type A and NSM menus as planned exceeded the nutrient goals for all nutrients except calories and iron. The NSM menus were significantly higher in calories and iron than Type A as planned and served; thiamin was significantly higher as served. As planned, mean nutrient values for secondary menus exceeded the one-third RDA goal for all nutrients but calories. As served, mean values were most apt to lack in calories, iron and thiamin, although NSM menus provided significantly more iron than Type A menus.

Computer-planned (Computer-Assisted Nutrient Standard, or CANS) menus have been compared to Type A menus in the Memphis and Dade County, Florida, school systems. As in all previous studies, as served, the nutrients most likely to be below the one-third RDA standard were calories, iron and thiamin. Of these three nutrients, in Memphis the CANS menus as served provided significantly more energy than did Type A menus. In Dade County, CANS menus as served provided significantly more energy and iron (USDA, FNS, 1977).

The type of food service may be a determinant of school food nutrient availability. Harper and Jansen (1978) chemically analyzed ten menu items prepared in each of four ways (on-site preparation, central preparation with hot bulk delivery, central preparation with chilled preportioned delivery, and frozen preportioned). The results suggested that all food service systems were capable of serving food of comparable nutrient value, but that it would be necessary to train school food service personnel to minimize nutrient preparation losses.

Adequate quanitity and nutritional quality of school meals as served must be considered as the first "potential benefit" from school meals programs. Available information indicates, however, that calories, iron, and thiamin are the nutrients most commonly in inadequate supply in school lunches. Availability of vitamins A and C may be insufficient in selected schools. Little information is available regarding micronutrient content for nutrients such as sodium or zinc. Neither fluoride availability nor the cariogenic potential of school meals has been analyzed. The percentage of calories from fat has generally averaged approximately 40%, well in excess of the suggested level of 30% given in the Dietary Goals (U.S., Senate, 1977). The new lowfat milk standard should decrease total fats available per meal. Average cholesterol or dietary fiber content have not been measured in any study.

Nutrients as consumed. If the supply of nutrients served has been determined, the measure of potential benefits to any given child is then determined by which food items are selected and how much of each item is consumed. A number of studies using varying sampling methodologies and of differing analytic quality have been published. Table 21 provides a

brief summary of conclusions which have been drawn with respect to plate waste and nutrient consumption.

As reviewed by Altschul (USDA, FNS, 1979), factors related to food acceptability include familiarity with the food offered, whether a choice of foods is allowed, portion sizes, and the presence of allergies or lactose intolerance. Food service logistic factors potentially affecting consumption include long waiting times in line resulting in short time left for eating, impersonal food service personnel or staff relationships, and unpleasant (noisy, dirty) eating areas. Personal/social factors include peer-group pressure or the self-image weight consciousness of many teen-agers.

Two recent studies have compared nutrient availability and consumption by NSLP participants in nationwide samples.

Harper and Jansen (1978) conducted a pilot study to compare alternative meal patterns for high-school age students. The USDA/FNS was responsible for selection of 48 high schools meeting four criteria: on-site preparation, no satelliting, menu selection choices, and voluntary participation in the study. The levels of ten nutrients--calories, protein, calcium, phosphorus, iron, vitamin A, vitamin C, riboflavin, thiamin and niacin--and the percentage of calories from fat were calculated from selected plate samples. Consumption was defined as the percentage of selected foods eaten. During a baseline period, all 48 schools implemented the TAOS (Type A offer-serve) pattern, in which students could select any three of five Type A components. After four weeks of the TAOS pattern, each school switched to one of three alternative meal patterns for six weeks, the first two weeks of which were

Table 21

Summary of Selected Plate Waste Studies

Year	Main Author(s)	Location	Conclusion
1971	Martin	Pennsylvania (E, S)	Lunch consumption: 80% cold, 84% hot, elementary; 89% cold, 90% hot, secondary
1976	Walling	Albuquerque (E, JH, SH)	Overall plate waste, 25%; 12.7% meat, 52.5% vegetables, 29.4% fruit, 5.8% milk; % waste same at all levels
1971	Doucette	Hawaii (SH)	% eating no: vegetables: Girls 42, Boys 22; meat: Girls 10, Boys 2; milk: Girls 10, Boys 3; fruit: Girls 45, Boys 24
1977	Head & Weeks	North Carolina (E, S)	Higher % of meals containing formulated (specially fortified) foods were consumed than conventional meals. Elementary students consumed significantly more iron, vitamin A, thiamin in formulated meals; secondary students consumed more iron, thiamin, ascorbic acid. Formulated meals provided less zinc, as consumed, for elementary and secondary students
1977	Harper & Jansen	Midwest, Southwest, West	On site preparation resulted in significantly less plate waste than preportioned delivery systems
1977	Voichick	Chicago (6 schools)	Overall food waste, 14.4%. Avg. of 50% calories, 55% niacin, 57% thiamin, 39% vitamin A, 40% iron nutrient goals consumed

Code: E = Elementary; JH = Junior High; S = Secondary; SH = Senior High

counted as an adjustment period. The alternative patterns included traditional Type A (TA), one food from each group in the basic four (BF), and a free-choice lunch pattern, in which selection of even one item was considered a lunch.

In discussing their findings, the authors acknowledged that the schools selected were not representative of all NSLP schools, that the students under study may have altered their consumption patterns, and that potential bias existed in selecting five trays in each school as representating nutrients selected by the school population in the TAOS pattern.

Three-way analysis of variance was used (two phase levels, two sex levels, three meal pattern levels) for the data analysis. Tukey's test was used to determine differences in means. The most important result was that no differences were found in nutrients served or consumed between the TAOS pattern and any of the alternative patterns.

The information on what students did consume was also of interest. For males, energy, thiamin and iron consumption was consistently below the RDA goal in all meal patterns. For females, iron was the only nutrient consistently consumed below standard. With the exception of vegetables and nonmilk beverages, males consistently wasted less food than did females. Overall food waste was 6% for males, 14% for females.

The second large sample study in which nutrient consumption has been examined is a USDA pilot study, "Food and Nutrient Consumption in the National School Lunch Program, 1977" (USDA, FNS, 1977). The sample consisted of 80 elementary schools, 17 junior high schools and 7 senior high schools. The fifth grades of the elementary grade schools were compared

to the grouped ninth and tenth graders of the junior and senior highs. One-half of the sample used on-site food preparation, the other half served preportioned food. Nutrient composition was calculated, or nutrient analysis was obtained from the commercial sources of preportioned food. To calculate nutrients served, five random servings of each menu were averaged. Waste was collected from 30 randomly selected students per grade and calculated as a percentage of the average portion size.

As in the Harper and Jansen study of high school students, both elementary and secondary students consumed inadequate quantities of calories, iron and thiamin. Secondary-age females consumed closer to one-third of the RDA for energy and thiamin than elementary females or their secondary male counterparts. However, secondary females had the poorest mean iron consumption--about 58% of the RDA.

There were consistent differences in percentage of nutrient consumption by sex and by type of food service system. Frequency distributions of the percentage of food consumption for selected items were also derived from the data. Using raw vegetables as an example, the mean would lead one to conclude that about 50% were wasted. However, from the frequency distribution it was seen that slightly more than one-third of the children ate 100% of the raw vegetables. Between 20 and 28% ate no raw vegetables. Similarly, most other distributions are bimodal. Although identification of mean percentages of nutrient or food consumption may be useful for overall program planning, the mean values provide little predictive information about the numbers of children consuming less than the recommended amount, or the magnitude of underconsumption.

From frequency distributions in the Harper and Jansen study, it can be determined that for almost every food served, some children ate none. Assuring proper nutrient levels in the foods as served gives little nutritive aid to such children. An important goal would be to increase the numbers of participating children who consume important food items of the lunch as served.

Hoagland's 1978 report, already mentioned, was the first major study which attempted to evaluate modification in total dietary intake and nutritional status for a national school-aged population resulting from participation in the NSLP/SBP. Dietary intake data from HANES I were used for the analysis. The population sample subset, age 6 to 21 years, was designed to be reprsentative of the U.S. noninstitutionalized population. Food intake was obtained by means of a 24-hour dietary recall. When the child was under the age of 12, both parent and child were interviewed. Hoagland found that nearly 40% of the entire population of feeding program participants failed to consume two-thirds of the RDAs for iron, while 34% failed for calories and 30% for niacin.

It is notable that adequacy for most nutrients is not greatly increased by program participation. Participation in the NSLP is associated with higher intake of vitamin A and riboflavin than is nonparticipation. No other significant differences are foreseen between participants and nonparticipants in the NSLP alone. As compared to children to whom a lunch program is unavailable, lunch participants do consume greater quantities of calcium, phosphorus and riboflavin. For breakfast participants the only significant difference is higher niacin adequacy. The milk program has significant program effects on calcium, phosphorus and riboflavin.

Summary. To date, most studies have assessed either the nutrient availability or the nutrient consumption of the school lunch. These studies consistently show that calories, iron and thiamin are the nutrients most likely to be both inadequately available and inadequately consumed by students. Means analyses distort the percentages of children consuming less than the RDA for selected nutrients, so it is possible that consumption of selected nutrients may be inadequate for certain groups of children. The one-meal only analysis gives no indication of total nutrient consumption throughout the day or of modifications in total intake which may be associated with program participation.

Research priorities. Ideally, health indicators such as anthropometric measurements, measures of dental health and biochemical indices would be some of the measurements used to evaluate the impacts of the school food program. In lieu of such measurements, in the studies done to date it is assumed that "adequate" nutrient intakes result in appropriate growth patterns and biochemical values consistent with health. Research in the following areas would be appropriate to clarify the potential long-run benefits of the SBP and/or the NSLP.

1. Anthropometric measurements of participants versus nonparticipants should be made. No national study has compared population frequency distributions of height for age, weight for age, or weight for height. Prevalence of short stature, underweight, and obesity have not been identified by participation status in the school food programs.

2. School food program analyses should address the issue of dental health. No study has identified the availability of fluoridated water

supplies. No national study has identified the extent to which competitive foods are available in different types of schools, the types of foods available, the cariogenic potential or the per capita nutrient contribution when such foods are available.

3. Inadequate iron nutriture, as indicated by large percentages of low hematocrit or hemoglobin, and by percentage of transferrin saturation, has been identified as one of the major health problems of the school-aged population. Dietary iron has also been found to be the nutrient least available and least consumed. It is unknown if provision of and consumption of the iron standard of one-third of the RDA in the school meals will significantly improve the biochemical indicators of iron nutriture for the deficient population. Such research is therefore needed, but can only be done in the context of a full dietary study, of which school food consumption (or the lack of it) is only one element.

4. School meals containing selected formulated and fortified foods may be lower in selected trace minerals than diets of nonformulated foods (Head and Weeks, 1977). Therefore, if a nutrient-standard approach is adopted for menu planning, it may be necessary to analyze the comparative availability of selected trace nutrients such as zinc, magnesium, copper and sodium.

5. The Dietary Goals recommend that the percentage of calories from fat be reduced to 30%. At this time it is not known if serum lipid components (triglycerides, LDL cholestrol, HDL cholesterol) differ between school meal participants and nonparticipants. It should be a research priority to find out.

6. From dietary intake surveys such as HANES and the National Food Consumption Survey, it is clear that larger percentages of low-income persons have deficient dietary intakes than do higher-income persons. However, the absolute number of persons with deficient intakes is greater in the higher-income category. A few studies such as Emmons et al. (1972) have tried to evaluate the efficiency of income as the best predictor of nutrient need. Alternative techniques are also needed to identify children who have either iron deficiencies which cause growth failure, or other dietary inadequacies.

7. The problem of childhood obesity has not been addressed in any studies of the school food programs. It is not known if the content of school meals, the availability of alternative foods within the school or off campus, or foods consumed during hours away from school are major contributory factors to obesity. Similarly, the relative physical activity of students at and away from school is unknown. This is another invaluable set of information which will only be obtained in the context of a more inclusive study of dietary behavior in U.S. children and their families.

8. None of the studies examined here have addressed the impact of school vending machines on student diets or health status. The number of vending machines in schools, the patterns of consumption from vending machines, and their dietary and health impacts (especially on dental caries, obesity, and serum lipid components) need to be measured.

Nutrition education. Because of the wording of the original School Lunch Act of 1946, nutrition education has been largely the responsibility of the local school districts. Twenty-five million dollars were

authorized for nutrition education and training (NET) during each of the 1978-79 and 1979-80 school years.

NET has fostered a highly decentralized effort, and it is difficult to generalize on its focus in each state. Nevertheless, a number of issues to be considered in future NET activities include:

1. The need to provide school food service supervisors and staff with an understanding of basic child nutrition, the role of diet in dental caries, obesity, hypertension and hyperlipidemia, and the health value of small changes in meals served.
2. The need to coordinate NET efforts with school health programs, county health department, school and community health campaigns.
3. The need to develop clearer nutrition goals to replace the service delivery goals extant in most meal programs (e.g., to reach a number of teachers or school food supervisors).

The school lunch and school food service journals contain numerous examples of nutrition education projects that have increased nutrition knowledge or interest (Brown et al., 1979; Picardi and Porter, 1976; Spitze, 1976, to list a few). Examples have been presented in which educational efforts have encouraged children to consume unfamiliar or previously disliked foods (Gifft et al., 1972; Hofacker and Brenner, 1976). Far fewer examples are presented for which percentage consumption of the school meal has been measured for a particular student population after nutrition education efforts. To our knowledge, no large-scale representative studies have been conducted which measure changes in school food or 24-hour dietary intakes after a period of nutrition education.

The results of showing the "Mulligan Stew" nutrition education film series are typical. As reported by Jenkins et al. (1975), the six 30-minute "Mulligan Stew" films were shown to 144 fourth grade students with two additional classes serving as controls. No significant knowledge differences existed between classes as determined by a pretest. Children in experimental schools scored significantly higher in nutrition knowledge post-test than did the control group, but school lunch consumption per se was not measured. A second three-day post-test diet history also failed to show significant changes in nutrient intake. The children learned about nutrition, but food behavior did not appear to change.

A number of FNS-funded nutrition education projects have attempted to measure the effect of education on plate waste. As reviewed in "Food Consumption and Nutrition Evaluation" (USDA, FNS, 1979), California primary-level students increased consumption of the foods given particular emphasis in the education program. In selected Nebraska schools, consumption of seven items increased by 20% or more after nutrition education. In pilot studies in Montana and West Virginia, plate waste was lower among children who had received nutrition education than among children in control groups. Head (1974) tested plate waste before and after nutrition education for fifth, seventh and tenth grades. Nutrition education reduced the plate waste of the fifth graders. It had little impact on the older students.

We can summarize by suggesting that some nutrition education efforts have been shown to have positive short-term effects on food consumption--particularly of younger students. Since an appreciable number of nutri-

tion education efforts have resulted in increases in nutrition knowledge, but no food behavioral change, we need to identify which types of nutrition education methods have been effective, for which types of students. We also must carefully ascertain whether the effects carry through life or only lead to short-lived behavior changes.

Policies to Increase Participation

In the past, federal attempts to encourage more schools to participate in the NSLP have included providing at least minimum reimbursement for full-price, reduced-price and free meals, and minimum levels of commodity assistance. Nonfood assistance funds have been made available with which to purchase equipment or renovate existing food service facilities. Until 1979, it has been the responsibility of the states to establish their own definitions of schools in "severe need" and thus to become eligible for additional federal reimbursement. A minimum level of federal funding for state administrative services has been established, as have minimum levels of state matching monies.

In 1978, approximately 30,000 schools did not participate in the NSLP. Twenty-six thousand schools were providing no food service, and of these approximately two-thirds did not even have any food service facilities. Continued availability of federal nonfood assistance would encourage some of these schools to start operating lunch programs. If all the no-facility schools were to participate, the NSLP would be available to an additional 6.5% of the U.S. enrollment. We must determine the cost of providing equipment for this and then decide whether the increased participation would merit such an expenditure. The cost would

be small and the added children served would be among the country's more needy. Therefore the effort seems eminently justifiable.

Increased federal per-meal reimbursement rates would also encourage participation by non-NSLP schools. However, equally high reimbursement rates might have to be offered to all schools. If per-meal reimbursement were to increase by 1 cent, annual federal expenditures would increase, not counting the new schools that would be encouraged to participate, by approximately $45 million per year. Similarly, the federal government could agree to reimburse schools for nonfood costs to cover labor or utility costs. However, these benefits would also probably need to be extended to all schools.

It is possible that a number of non-NSLP schools do not participate because of administrative ideology with regard to the role of the school and the role of the federal government. Participation in any federal program requires regulations, paper-work and loss of local autonomy. It is therefore quite possible that marginal increases in federal monetary incentives would do little to encourage substantial increases in NSLP participation by schools.

The provision of the School Breakfast Program must be evaluated in the context of a very difficult situation. Currently the SBP is available in about 30,000 of the nation's 120,000 schools. In addition to per-meal reimbursement, federal reimbursement for all program costs, not simply food costs, has been available to schools designated as being in "severe need." While lack of facilities may be a problem for some schools, in some states as few as 5% of the schools that have the NSLP have the SBP. Despite federal monetary incentives, net program availabi-

lity has increased by only 15,000 schools since the program was made permanent in 1975. Administrative reluctance was the predominant reason cited by state food service directors for nonparticipation in 1975 (U.S. Senate, 1975). Unwillingness to attempt to adjust busing schedules to allow sufficient time to eat, increased paper-work, and the belief that the morning feeding of children was the role of the family--not the school--were mentioned most frequently as factors contributing to this reluctance. Very few of the state directors felt that increased federal legislation (outside of more money) would improve the situation; rather it was seen as a local problem to solve.

The federal government has been reluctant to mandate SBP service in all schools. It does not mandate NSLP participation. A total mandate would increase nutrient availability to the children, many of whom are needy, but would not assure that the children were provided the time to eat or that they would choose to eat breakfast. Such a mandate would be difficult to endorse, since if lunch reimbursement were withheld, it is improbable that comparable quality lunches would be served. However, the potential health benefits of a breakfast mandate would appear to be substantial. While it is now known with certainty that children attending schools in economically deprived areas eat breakfast at home less frequently than do children in more affluent schools, HANES data indicate that the mean percentage of RDA consumed by males from households below the poverty level is lower for energy, calcium, iron and vitamin A than for males above the poverty level. For females, however, income is not a consistent indicator of nutrient adequacy. It can be inferred that a partial breakfast mandate based on school district econo-

mic criteria alone would fail to reach large numbers of students with inadequate diets and irregular consumption of breakfast. If only limited funds are available, the evidence suggests that low-income area schools should receive first priority for the addition of SBP programs. It is in these schools that the greatest need is evident for supplements to the food received at home.

An increased scope for the school breakfast program in poor areas might in fact be one of the most cost-effective poverty alleviation programs possible in our society, given the group of children which would be most quickly and directly affected. Even if the cost to the government were a full 50 cents per breakfast, we could feed each additional million children a nutritious morning meal for $90 million per year. Given the cost of many of the programs aimed at increasing the future earnings and health of today's poverty-level children, the benefits of introducing school breakfasts into poverty areas appear to be purchasable at affordable rates.

Some financial incentives for breakfast program participation now appear to exist and could certainly be increased. Outreach from the state level could also be encouraged to inform local school districts of financing options. Consultant services could be provided to work out suitable bus schedules. Definitive data regarding the numbers and characteristics of children most likely to come to school without breakfast would be useful to convince local administrators and parents of the merit of a breakfast program.

Within given school lunch programs, approximately half of all children participate on any given day. It must be remembered, however,

that nearly 25 million children in these schools do not participate. Almost 5 million children have no program available. Participation rates of children receiving free or reduced-price lunches are considerably higher than for those purchasing full-price meals. It is highly likely that those children who can be enticed by lower prices will tend to include a large percentage of poor and nutritionally needy children.

Nationwide food purchasing contracts or contracts to process commodity foods into products more readily usable at the school level are now in use to lower the cost of foods to the school and thus costs to the children. Further federal intervention might take the form of increased direct meal subsidization or reimbursement for nonfood costs such as labor or utilities.

Using -0.5 as a representative meal price elasticity, if the average lunch price drops from 50 cents to 40 cents, we can anticipate a participation increase of 10%. This would correspond to 2.5 million additional students eating lunch daily. Breakfast price elasticities have not yet been estimated, so it is impossible to predict participation increases if the price to full-paying students were lowered. Assuming the same elasticity for the SBP as that for the lunch program, we could expect a drop from 20 cents to 10 cents to add over 500,000 students to the School Breakfast Program's present numbers of approximately 2.5 million who participate daily. The 10 cent reduction in lunch prices would cost approximately $2,750,000 per day, or $495 million for a 180-day school year. The 10 cent per breakfast price reduction would cost must less, approximately $300,000 per day or $54 million per year.

Meal acceptability and quality also play an important role in

determining if a child will participate in the school meal program on a given day. However, participation per se and nutrition may be two quite diferent objectives. As one state school food service director suggested, participation could be increased if vegetables and salads were eliminated from the Type A pattern. The offer-versus-serve provision (i.e., selection of three out of five Type A components) was promulgated to increase participation and reduce food waste. While the provision may indeed reduce waste, it does nothing to encourage consumption of foods containing nutrients that are lacking in the school child's diet. The case of inadequate vitamin A consumption in the diet of many teen-age girls is a good example of a nutritional inadequacy that might be magnified rather than alleviated if participation were increased through the offer-versus-serve provision.

Other policy alternatives have keyed on the provision of nutrients rather than on Type A pattern foods to allow more food flexibility and thus to increase participation and consumption. Specification of a nutrient-standard menu rather than the Type A pattern has been one alternative suggested to provide food flexibility. From a child health perspective, this is a promising approach, though it has a number of drawbacks. A nutrient standard encourages fortification of foods with selected nutrients. Important issues in planning overall meal composition, such as nutrient density per calorie, percentage and source of calories from fat, and provision of dietary fiber, trace minerals and nutrients which are not included in the nutrient standard, are not addressed by this menu-planning criterion. Of course, these issues are not addressed by the Type A method either.

In the long run, if maintenance or improvements in the level of child health are to be affected by school meals programs, more comprehensive health objectives must be specified than merely providing one-third of the RDA for selected nutrients per meal. For planning purposes, a nutrient-standard approach might be preferred, specifying desirable ranges for nutrients most apt to be lacking--thiamin, iron, vitamin A, zinc--and imposing constraints on levels of fat, cholesterol, refined carbohydrates and sodium. This approach would limit the use of fortification and still address such long-range health concerns as obesity, hyperlipidemia, hypertension and dental caries.

CHAPTER IV

THE FOOD STAMP PROGRAM

Food Stamp Program operations and policies have been at the center of the controversy over the role of government in supplementing the diets of low-income households. The recent congressional struggle to establish the fiscal 1980 limit on funds for food stamps augurs the protracted debate that will occur when the current entitlement for the program ends in 1981. This section provides a perspective for considering how the Food Stamp Program might be improved to reduce the nutritional risks facing low-income families.

During FY1978, an average of 16 million persons received food stamps, including about 1.4 million in Puerto Rico. About 43% of households receiving food stamps also receive Aid to Families with Dependent Children (AFDC). Thus over 6.5 million single mothers and their children receive food stamp assistance, in addition to many two-parent households. Ninety percent of the recipient households have incomes below $600 per month, because of the program's limitation to needy households. Recipient households obtain an average food stamp benefit worth $75 per month. Total benefits paid to recipients in 1978 amounted to 5.2 billion dollars. Recently program costs and caseloads have increased. Due to reforms implemented in 1979, participation has risen to a level of 19 million recipients.

Food stamp benefit levels are designed to supplement household budgets to permit the purchase of a nutritionally adequate diet. Eligible households are provided stamps sufficient to supplement income

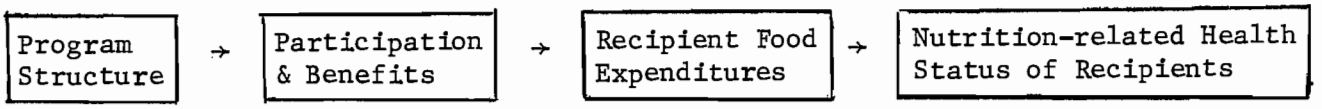
to permit the purchase of food for use at home at the cost of the household-size specific Thrifty Food Plan. The amount of stamps provided depends on household net income after allowable deductions. Eligible households with zero net income receive stamps sufficient to pay for the entire Thrifty Food Plan. Otherwise the household receives stamps equal to the difference between the Thrifty Food Plan's cost and 30% of net income.

The Thrifty Food Plan currently in use was developed by USDA in 1975, based on average quantities of foods consumed by low-income households surveyed for the 1965-66 Household Food Consumption Survey. Usual consumption patterns were adjusted to meet nutritional goals within restrictive cost limitations. These adjustments imply the use of more cereal and bread and less meat, poultry, fish, fruits and vegetables than most families customarily eat. Living within the Thrifty Food Plan requires selection of inexpensive foods with little waste and careful shopping.

Federal, state and local governments share the administrative tasks required in operating the Food Stamp Program. At the federal level, the duties of the USDA Food and Nutrition Service include: instituting program rules and structure; producing, handling and distributing food stamps; supervising data collection for program monitoring and quality control procedures; and generally overseeing program activities. State governments are responsible for conducting outreach campaigns to inform people who are eligible about the program, collecting data on program operations and maintaining federal standards of administrative efficiency. At the local level, county food stamp agencies deal directly with stamp recipients and are responsible for serving them.

The arrows in Figure 5 depict linkages that will be discussed to evaluate how food stamps ultimately affect maternal and child health and to consider policy options for meeting the program's nutritional objectives. The program's availability and the benefits received influence the rate of participation by an eligible population as defined in program regulations, and control the dollar value of food assistance benefits. These benefits increase household food purchasing power, inducing greater food expenditures. It is assumed that increased food purchases will result in improvements in the nutritional and health status of the households. Each of the next three sections discusses a link in this chain. A final section discusses options for reforming the food stamp and related programs in order to improve health and nutrition through food assistance.

Figure 5
Food Stamp Linkages



Past Changes in Program Structure

In order to assess the policy options for reducing nutritional risk through further expansion of the food stamp caseload, it is important to understand the effects of past changes in Food Stamp Program operations on enrollment in the program. This section first reviews the legislative history of the program and the associated caseload growth prior to the 1979 implementation of the Food Stamp Act of 1977. Then, to assess the

effects of that implementation, the current eligibility regulations and benefits are compared to the pre-1979 program structure. Current program operations are described in some detail.

The legislation first authorizing food assistance was introduced during the Great Depression, and was intended to support food prices. Section 32 of Public Law 74-320 (The Potato Control Act of 1935) provided that customs receipts could be used to encourage the domestic consumption of agricultural products. This permitted the Federal Surplus Commodities Credit Corporation (FSCC) to distribute surplus farm products to needy families and school or church programs. However, advocates for needy households complained that the kinds of foods received depended on whatever happened to be in surplus. As the severity of the depression generated widespread public concern about nutritional deficiencies, this complaint became a potent argument for change. Food retailers joined the call for reform, because they disliked having the FSCC bypass their normal trade channels. Therefore, Congress authorized the first food stamp program, which operated from 1939 until 1943.

A recipient household which bought orange stamps was given free blue stamps (usually on a 2:1 orange to blue stamp ratio), which could be used to purchase foods from a monthly list of surplus commodities. The orange stamps were intended to equal the recipient family's normal food expenditure, and could be spent on any food item. Together the orange and blue stamps enabled households to spend more on food than they could before. This program annually served approximately 4 million persons at a cost of $261 million. As World War II progressed, the number of unemployed fell and the farm surplus disappeared. Both FSCC

and the food stamp program withered. Expenditures for the FSCC reached their low point of $180 million in 1945.

During the decade after the end of the first food stamp program, Senator George Aiken of Vermont introduced seven separate bills proposing another food stamp program. His persistent efforts and those of Congresswoman Leonor Sullivan of Missouri led to the enactment of Section 201 of PL 84-540 (the Agricultural Act of 1956), which directed the Secretary of Agriculture to prepare an analysis of food stamp plans. The Department of Agriculture analysis found that food stamps would be less effective for removing surplus than continuing commodity distribution efforts. However, many saw food stamps as having nutritional benefits; they believed that better nutrition would result if households were permitted to choose the foods they desired, instead of relying on available surplus commodities. In the 1958 extension of PL 480, Congress authorized a two-year pilot food stamp program. However, the Dwight D. Eisenhower administration chose not to conduct this experiment. It was not until after the 1960 elections that the executive branch began to embrace a nutritional objective for federal food programs.

In his first executive order as president, John F. Kennedy instituted eight pilot food stamp projects. Later these were expanded to 43 sites, so that by March, 1965, there were 392,000 persons participating at an annual federal cost of $29 million. On average, for a mother and three children, the program provided $82 in stamps per month, for which the family paid $30 of its average monthly income of $70 (Schlossberg,

1975). Studies of the diets of participating families in two pilot projects revealed that between 33 and 50% of the families had diets that supplied 100% of the allowances for eight nutrients recommended by the National Research Council. Among comparable nonparticipating households, only 28% had good diets (Steiner, 1971). Nevertheless, when a bill to authorize a nationwide program was introduced, Southern Democrats and Republicans were reluctant to endorse this form of public assistance. The Food Stamp Act of 1964 resulted from a logrolling arrangement between backers of wheat and cotton price supports and food stamp proponents (Steiner, 1971).

> The 1964 Act initially authorized a three-year program, directing: that the nation's abundance of food should be utilized cooperatively by the State, the Federal Government, and local government units to the maximum extent practicable to safeguard the health and well-being of the nation's population and raise the levels of nutrition among low-income households. (PL 88-525, 78 Stat.)

The cash amounts purchasers had to pay for their stamp allotments were specified at the federal level by the U.S. Department of Agriculture (USDA). Reflecting the basic orientation of the act toward state jurisdiction, eligibility for public assistance through the state became the standard for allowable income cut-off levels. Considerable interstate variation in implementation of the Act resulted. One difference of particular interest to food assistance advocates was that some states had relatively more stamp recipients than others, even after crude adjustments for variations in the size of the target populations. In particular, seven states had programs that reached fewer than 15% of their poor (U.S. Congress, 1969). Therefore, the food stamp program

became subject to considerable scrutiny. The 1967 Senate Subcommittee on Employment, Manpower, and Poverty, the 1968 Citizen's Board of Inquiry into Hunger and Malnutrition, and the Poor People's Campaign, among others, complained that the 1964 regulations were deficient. In response to these concerns, the Senate established a Select Committee on Nutrition and Human Needs, chaired by Senator George McGovern. Food stamp policy became an important issue in the 1968 presidential campaign.

Major program modifications finally occurred in May, 1969. In a message to Congress on hunger, President Richard M. Nixon recommended that there be a purchase price ceiling of 30% of income, that the most destitute receive free stamps and that stamp allotments be increased. After interim regulations during 1969, Congress adopted these Nixon proposals in the 1971 amendments to the 1964 Act (PL 91-671, 1971). These amendments also set uniform national limits for income and resource eligibility and decreased the federal share of state administrative costs to 50% (Hoagland, 1976). On average, recipient benefits doubled from 1970-72, which rapidly accelerated costs and caseload growth.

In 1973, Congress further mandated that all counties offer food stamps as of July, 1974, to accomplish a complete switch from commodity distributions to food stamps. Guam, Puerto Rico and the Virgin Islands also began distributing food stamps in 1974.

Soaring food prices and the dramatic increases in unemployment associated with the mid-70s recession contributed to further increases in numbers participating. These occurred during the two years after the 1973 mandate for geographic extension to all counties.

From 15 million in the third quarter of 1974, by the second quarter of 1975 the number of participants had risen to 19.2 million. With improved economic conditions, the food stamp caseload gradually declined to a 1978 level of 16 million recipients. Since that time, program growth has resulted from reforms instituted by the Food Stamp Act of 1977 and from continuing food price inflation.

The reasons for the growth of the food stamp program prior to 1977 were summarized in MacDonald (1977):

> Analysis of the three major changes in program regulations since the enactment of the Food Stamp Act of 1964 demonstrates that the most important modification affecting program growth occurred when the Nixon administration effectively doubled the average benefit available to recipient households. Subsequent nationwide expansion of the program also had a substantial impact on costs and caseloads. However, the most recent burst of program activity can be attributed to the recession (p. 16).

A clamor to reform the food stamp program developed during the rapid growth of the caseload in the recession period. The Gerald R. Ford administration specifically objected to the fact that the new regulations governing allowable income deductions permitted households with incomes above the official poverty line to become eligible. In January 1976, the Ford administration proposed, but could not pass, a bill which would have reduced benefits for some recipients. Thereafter, other bills intended to restrict program costs were

introduced in Congress. A lengthy debate on food stamp reform began, which led to the Food Stamp Act of 1977. This Act expanded the number of program participants, while tightening eligibility limits.

The Food Stamp Act of 1977 was implemented in two phases. In January, 1979, the regulation requiring households to purchase their stamps was eliminated. As intended, this Elimination of Purchase Requirement (EPR) encouraged an immediate increase in program participation such that in early 1979 over three million more persons were added to the rolls. Until that time, stamp benefits had taken the form of bonus stamps. To obtain bonus stamps, households had paid a purchase requirement that was less than the total value of their entire stamp allotment. Thus the intent of EPR was to encourage participation by households which had great difficulty in acquiring sufficient cash to buy their allotment.

Beginning in March, 1979, the second phase of the new program eliminated eligibility for approximately 600,000 recipients who had incomes exceeding the new, more restrictive resource limits. Secretary of Agriculture Robert Bergland concluded that 2.9 million persons were added to the caseload in 1979.

The new rules for determining program eligibility maintain the general structure that applied under the 1964 Act. In addition to the requirement that employable food stamp household members register for and accept suitable work, food stamp applicants must demonstrate that their household resources do not exceed either of two maximum limits--one for countable assets, one for net income. The asset

limits apply to households of every size, but the net income limits rise with household size to reflect increasing dietary needs. The new net income maximum limits are established by using an adjusted value of the current Office of Management and Budget (OMB) nonfarm poverty guidelines. The guidelines are revised annually in July for cost of living changes. For a four-person household, the monthly net income limit for eligibility was approximately $600 per month for July 1979-June 1980.

Under both the old and the new law, countable net income included the earnings of all adults, all returns from assets or self-employment, and any cash payments from public assistance programs, pensions, veterans' benefits, farm subsidies, worker's compensation, unemployment compensation, scholarships or training subsidies. Prior to the implementation of the 1977 Act, a host of deductions were subtracted from gross income to determine household net income. These included 10% of wages and salaries (not to exceed $30 per month), income taxes, Social Security taxes, union dues and any other mandatory payroll deductions. Furthermore, there were deductions for all medical expenses in excess of $10 per month, payments for child care when necessary for employment, tuition and educational fees, and unusual expenses (e.g., funerals). Finally, all shelter costs in excess of 30% of gross income minus all other deductions were deductible. Average total household deductions ranged from $48 for single person households to $147 for households of four.

Under the 1979 regulations, 20% of earnings may be deducted from gross income, but no itemizing of work-related expenses or taxes is

permitted. There is also a $60 standard deduction, which replaces itemized deductions for medical care, educational and miscellaneous expenses. This standard deduction is adjusted semiannually to reflect changes in the consumer price index for items other than food. The new regulations also set a maximum amount for dependent care and shelter costs. Before, all expenses for dependent care and 30% of excess shelter costs were deductible. In 1979 all households were restricted to a $90 maximum for actual dependent care and excess shelter costs combined. However, on January 1, 1980, new medical and expanded shelter deductions became effective for the elderly and disabled. Under PL 96-58, Congress responded to complaints that the standard deduction system was harmful to persons on fixed incomes. Therefore, the law now allows households to deduct medical and dental expenses over $35 monthly of any member who is 60 or over or receiving Supplemental Security Income benefits. PL 96-58 also eliminates the current ceiling on the excess shelter deduction for elderly and disabled households.

Changes in eligibility rules on household assets were also enacted by the 1977 law. The limit on liquid assets (cash, bank accounts, stocks and bonds) was raised from $1,500 to $1,750 for most households. A $3,000 asset limit remains for households with two or more persons when one or more of them is age 60 or over. A new provision now counts the fair market value of any household vehicle in excess of $4,500 toward the liquid asset test, along with the equity value of any other licensed vehicle that is not used for commuting to work.

Participation

Although food stamp participation has increased dramatically in the last five years, a sizable contingent of eligible persons still does not use food stamps. This section provides a perspective for evaluating whether it is desirable to encourage further increases in the food stamp caseload. Participation rate estimates are presented. Then what we know about the reasons for state and local variation is discussed.

Bickel and MacDonald (1975) estimated that less than 40% of the national eligible population received food stamps. In addition, they found widespread variation among state participation rates. Although low participation levels were concentrated in Mountain West and Midwest states, every region of the country had states with below-average participation. When MacDonald (1975), Sexauer et al. (1976) and others analyzed participation at the local level within states, they found dramatic differences among counties. MacDonald speculated that these differences stemmed from administrative practices of county welfare agencies that could "encourage or discourage participation by the extent to which they conduct food stamp transactions with convenience and dignity for recipients" (p. 96). Researchers also considered variation in demand for stamps among recipients, particularly with respect to differences in severity of need. When MacDonald (1977) and Coe (1979) analyzed data from the Panel Study of Income Dynamics, they found that households eligible for small benefit amounts were much less likely to participate in the program. However, MacDonald's study also revealed a significant fraction of eligible nonparticipants who did not obtain benefits worth more than $300 per year.

According to more recent estimates of program participation rates by the Food and Nutrition Service, the 1978 national participation rate was about 47%. Because these estimates do not account for turnover in the recipient population between years, the actual participation rate is probably about 60% of all eligibles. Due to elimination of the purchase requirement, the current participation rate probably exceeds that for all previous years. However, no official estimates are available for 1979.

As required by the 1977 Act and previous regulations, the states and local food stamp agencies are responsible for informing eligibles about the availability of stamp benefits. Such outreach efforts reduce the information costs of participating in the program. However, based on an analysis of reasons for nonparticipation among eligibles in the 1976 wave of the Panel Study of Income Dynamics, Coe (1979) found 66% of these eligibles did not know they were eligible.

Two additional costs of participating remain once an eligible household is informed about the program: (1) access costs--the time and trouble it takes to be certified eligible and to obtain the stamps--and (2) stigma costs. Stigma costs are associated with any loss of self-respect and perceived acceptance by the rest of society that can occur when persons make their poverty known in order to receive and use food assistance (or any other welfare program).

On the benefit side, another factor that influences participation is the importance the household attaches to food, relative to other goods. Households that want additional food to enhance family health would be expected to participate more often. As yet, no study has evaluated the impact of this important consideration.

To study the reasons for nonparticipation, Coe (1979) and MacDonald (1977) conducted multivariate analyses of the characteristics that distinguish the food stamp participant households from the eligible nonparticipant households which were surveyed for the Panel Study of Income Dynamics. Because a single characteristic may be associated with more than one barrier to participation, it is very difficult to establish the relative importance of each. Still these multivariate analyses do account for varying benefit entitlements, and thus permit valuable insights about other characteristics that inhibit participation. Holding benefits constant, the program fails to enroll eligibles who have strong labor force attachments and receive little or no welfare income. Furthermore, eligible households headed by aged persons are also less likely to enroll. From the standpoint of the present focus on maternal and child health, the reluctance of working poor households is particularly disturbing. Difficulty of certification access or coupon pickup may be one deterrent. However, it is often asserted that food stamps are particularly stigmatizing, due to their visibility when spent. In considering policy options for program expansion, proposals to replace stamps with cash to eliminate stamp stigma will be considered.

Impacts on Food Expenditures and Nutritional Status

The food stamp program plays a fundamental role in reducing nutritional risk. Without an adequate budget, a household cannot buy enough of the

foods that provide necessary nutrients for health. Providing food stamps is also intended to induce the household to buy more food than cash would. To the extent that stamps do induce more food expenditure, they may be nutritionally more effective than cash transfers. Food stamps have two separate budget impacts: (1) stamps supplement income, permitting the purchase of more nutrition; (2) providing stamps instead of cash seems to induce some households to increase the proportional food share of their total budget. An important related issue is how much this actually improves household nutrition.

Policy analysts have been concerned with two distinct approaches to understanding how food stamps affect food expenditures. Some (MacDonald, 1977; Smeeding, 1977; Smolensky et al., 1974) have sought to determine the extent that the stamps actually require recipients to spend their income on food. These researchers have emphasized that the use of stamps releases some cash that would otherwise have been spent on food, enabling the purchase of whatever the household desires. Detailed comparisons have been conducted between what households normally spend on food and what participation in the program requires them to spend. The results imply that 80 cents or more of every food stamp dollar added to the average recipient budget is spent entirely as the recipients choose. Nevertheless, other evidence demonstrates that households do choose to spend more for food with the additional purchasing power the stamps provide. Based on the results of studies by Hymans and Shapiro (1974), Hu and Knaub (1976), and others, the Food and

Nutrition Service concludes that approximately 50 cents of every stamp dollar added to participants' budgets is spent on food. For FY1979, this implies that 3.2 billion dollars in additional food expenditures resulted from total stamp benefits of 6.4 billion dollars (U.S., Food and Nutrition Service, 1979). Because it has eliminated the purchase requirement and thereby reduced the proportion of the recipient budget that was "tied up" in stamps, the current program will induce less food expenditure per stamp dollar.

A recent study by West (1978) analyzed data from the 1972-74 Consumer Expenditure Survey to compare the food purchasing patterns of survey food stamp households relative to those of eligible non-participants and all other households. Food stamp households spent significantly more on a per capita basis for food at home and total food, but less for food away from home, than eligible nonparticipants. Food stamp households also spent more on food at home than all non-participants (including households not eligible for the program). Thus, it appears the program is very successful in raising participants' expenditure levels.

With respect to general purchasing patterns, West demonstrated that food stamp households allocated a higher percentage of their budgets for food to be eaten at home to meats, poultry, fish, eggs, fats and oils, than did eligible nonparticipants. Participant households also spent less on fruits, sugars and sweets. In reference to the concern that food stamps might be used more frivolously than cash, it is interesting that West found that food stamp households actually spent less than nonparticipants on snacks (crackers, chips, etc.).

West's findings are generally supported by Nelson's analysis of computerized check-out data for eight randomly selected supermarkets (Nelson, 1976). Nelson analyzed approximately 4,100 sales receipts, 1,500 of which were paid for in food stamps. His findings showed more of the food stamp dollar going to fruit and vegetable purchases and less to dairy products than West's, but otherwise the percentage distribution of foods purchased by food stamp recipients was similar to West's results.

In summary, it appears food stamp households use their stamp benefits to spend more than they otherwise would for food, and that they purchase foods of higher quality than comparable nonparticipants do.

It is difficult to say whether these improved expenditure patterns are associated with better nutrient intake. There is a general relationship between nutritional adequacy and household income in the U.S. Abdel-Ghany (1974) found a positive and statistically significant relationship between household income and the adequacy of niacin, vitamin A, iron and protein, based on 1965-66 USDA Household Food Consumption data. Food stamps may be associated with better nutrition simply because the stamps increase household purchasing power. Only a few in-depth studies of food stamp effects on nutrient intake have been conducted, however, and these are limited to a few counties. The evidence these studies provide is not conclusive.

Lane (1975) compared the food consumption and nutritional intake of food stamp participants to that of nonparticipant low-income households in Kern County, California, during 1973. Household nutrient intakes were measured by the 24-hour recall method.

According to Lane's findings, less than 85% of both participant and nonparticipant households obtained the National Academy of Science National Research Council's Recommended Daily Allowance for seven nutrients. Moreover, only about half of both groups obtained the standard for calories, calcium and vitamin C. Yet there were more participant than nonparticipant households at 100% of the standards for calories, protein, calcium, thiamin, riboflavin and niacin. These findings suggest that food stamps have a positive influence in achieving nutritional adequacy. However, there may be important differences in the characteristics of participant and nonparticipant households unrelated to the food stamp program that actually account for the observed differences in nutritional achievement. Taking account of this possibility requires a multivariate analysis incorporating many explanatory variables.

An earlier study by Madden and Yoder (1972) used a number of explanatory variables to analyze the nutritional benefits of the food stamp program in rural Pennsylvania (Huntington and Bedford counties). In addition to variables indicating whether or not the household used food stamps, the list of explanatory variables included the amount and frequency of income receipt, the education and age of the homemaker, household size, whether home-produced food was consumed, monthly food expense per person, and the frequency of any nutrition aide visits. Approximately 1,000 households were studied, of which roughly one-half received food program benefits. Madden and Yoder concluded that the dietary impact of food stamps was statistically significant and positive

only under unfavorable conditions, such as more than two weeks since payday or obtaining food stamps. Apparently during periods of temporary cash or food stamp shortage, households were nutritionally more effective in their food purchases than they were at other times.

Another early study by West and Price (1976), conducted in the state of Washington on a small sample, found that although the Food Stamp Program (FSP) increased the value of food obtained by the household, there was no evidence that this led to any increase in the nutrient intake of 8- to 12-year-old children. This is the only study which has looked at the FSP's impact on children.

In summary, studies have not established the extent to which food stamps have impacts on household nutrient intake, and more specifically on diets of children and mothers. Although the Lane study of California households suggests there may be a positive impact on nutrient intake due to food stamp usage, it could be that some factor spuriously related to food stamp usage caused the greater nutrient intake of food stamp users. Indeed, multivariate studies fail to provide evidence that food stamps have strong nutrient intake effects. However, because all studies rely on respondents' recall of the food intake of every household member for a 24-hour period, and since these studies are geographically restricted, it seems best to withhold judgment about the program's nutritional effectiveness until other studies become available.

The Office of Policy Planning and Evaluation of the FNS is currently sponsoring a number of studies and demonstration projects that will obtain better information about the effect of food stamps on nutrition. In

addition the Consumer and Food Economics Institute (Human Nutrition Center) is undertaking studies on the dietary impact of the FSP as part of its analysis of the 1977-78 National Food Consumption Survey. Additional research is needed on the FSO impact on the diet of children and women of child-bearing age.

Nutrition Education Efforts

Within a stamp program context, increasing the likelihood that recipients will improve their nutritional status seems to require either restrictions on choice of foods or an effective educational component. Following the WIC model, stamps could be restricted for use in purchasing foods selected for nutrient quality. This has some potential for discouraging participation, since recipients presumably bear the burden of separating listed from non-listed foods in budgeting and shopping. It may be more effective, if more expensive, to require that recipients be exposed to some intensive nutrition education. The Agriculture Department's Expanded Food and Nutrition Education Program (EFNEP) provides a possible model for this educational option.

EFNEP employs indigenous paraprofessional nutrition aides working primarily on a one-to-one basis with program participants to improve nutritional knowledge and food buying, selection and preparation skills. Limited research has been conducted on the nutritional impact of EFNEP or on ways to improve its efficiency. One case study conducted in a rural Florida county (Neenan and Davis, 1978) concluded that concurrent participation in the food stamp program and EFNEP was associated with

households improving their dietary intakes of iron, vitamin A and vitamin C, relative to households which received food stamps but no nutrition education.

It is clear that an increase in income can induce greater food expenditure. However, the relative increase in consumption of different commodities will vary by the "desirability" of each food. One would suspect that without nutrition education, relatively more meat and animal products would be purchased in comparison to other goods. If one considers that commonly identified dietary deficiencies in children are for iron, vitamin A or vitamin C, EFNEP provides an alternative to encourage purchase and consumption of foods rich in these nutrients.

A number of issues must be addressed with respect to EFNEP and the nutrition education issue. First, while EFNEP's approach may be shown to play a major role in improving maternal and child nutrition, more research is needed on the nutritional impact of EFNEP before we can clearly state that it represents a positive nutritional force. Consideration should be given to refinement of the training of EFNEP aides and program supervisors. There is a great degree of local program autonomy. Increased uniformity and improved training content for program aides is needed. Additionally, minimum nutrition background standards and in-service training for program supervisors is necessary.

Questions regarding the feasibility of EFNEP's reaching the target population must also be answered. The caseloads of individual EFNEP aides are approximately 50 households per annum; tremendous resources would be required if EFNEP were to reach all food stamp recipients. From

a child health perspective, we must ask whether EFNEP should be expanded to reach a national population, or whether these funds would be better expended on improvement of the existing maternal and child health network. Finally, in most communities there are a large number of existing programs besides EFNEP which could be used to assist food stamp households.

Food Stamp Policy Options for Reducing Nutritional Risk

Briefly consolidating the main conclusions of previous remarks about the linkages between food stamp program structure, participation, expenditure effects and nutrition will help us to focus on the most relevant food stamp policy options for improving the health of low-income children. Two general points suffice.

1. Although the food stamp program has gradually been expanded to serve nearly 19 million low-income persons, a substantial eligible population remains unwilling or unable to participate. To the extent this means that low-income families have less than adequate diets, policies to enroll more eligible persons are desirable. Studies of the characteristics of nonparticipants reveal that "working poor" and aged households are most likely to benefit from enrolling. If the remaining nonparticipating households contain few mothers or children, resources to improve maternal and child health might be allocated to efforts other than inducing greater Food Stamp Program participation.
2. Providing food stamps does help households spend more on food, but it is less clear if the related dietary changes from purchasing higher quality foods are nutritionally beneficial. However, establishing

scientifically that there is a strong impact of food stamps on measured improvement in nutritional status is very difficult. Because food stamps only provide families with the ability to buy more nutritious foods without ensuring they do so, policies to ensure that this actually happens might be appropriate. Similarly, programs that intervene more directly, such as school feeding or WIC, might be expanded to guarantee that nutritious meals are the end result of food assistance.

Three separate policy questions emerge. (1) Assuming food stamps ultimately do have positive effects on nutritional status, how can program participation of families with children be expanded? If health and nutrition are to be primary objectives of the food stamp program, program eligibility criteria may need to incorporate components for health and nutrition education. (2) With respect to ensuring that food stamps do improve nutrition, what methods are available and congruent with the existing delivery system? Finally, should other nutrition programs that restrict food choices take priority over food stamps? Each of these will be addressed in concluding.

To expand food stamp enrollment, two basic strategies are available. The first would emphasize continued outreach and associated efforts to facilitate access to food stamp agencies. This incremental approach requires extensive cooperation from state and local agencies. Related to this is the need for USDA and state agencies to focus more on efforts to get local agencies to remove the variety of physical and psychological barriers that discourage participation. A very different approach would also rely on existing delivery mechanisms, but would provide cash instead

of stamps. Since a "cash out" eliminates stigma, it encourages participation. Whether and for whom to cash out food stamps has long been a welfare reform issue.

By shifting from the food stamp program to more emphasis on delivering meals, we can stipulate what kinds and amounts of foods recipients obtain. A major issue in this regard is whether to require School Breakfast Programs in low-income areas, perhaps at the expense of funds for food stamps. However, any decision to rely more heavily on direct meal delivery also makes it imperative that these meals be better than those which food stamp recipients already consume. To date no direct comparisons between institutional and home-prepared meals have been conducted.

The issue of whether total food assistance benefits per household ought to be limited also arises in discussing methods for targeting limited nutrition program funds. If it is nutritionally desirable to expand meal delivery and/or to restrict food choices, it might be sensible to reduce the stamp benefits of households that also receive other subsidized meals. The administrative feasibility of this is questionable. However, if savings could be realized without impairing the nutritional status of affected stamp recipients, funds released could help to extend the food stamp program to new participants.

CHAPTER V

SUMMARY AND CONCLUSION

Nutrition is one of the major influences shaping a child's health and development. Emerging research findings also suggest that dietary factors early in life affect the course and rate of development of chronic degenerative diseases in later life. Major nutritional problems which adversely affect maternal and child health have been shown to exist in the United States, particularly in high-risk populations with specific age, sex and race characteristics. The extent and duration of the breast-feeding of infants, which according to some reports is improving, remains very low. Poor iron nutriture, poor growth, underweight, obesity, and low intake and serum levels of vitamins A and C remain problematic.

To improve the nutritional status of mothers and children, a range of regulatory and programmatic options are available to the U.S. government. Changes can be made which would affect the level and nature of food demand and supply. This report has considered demand-side effects.

The United States Department of Agriculture (USDA), particularly in its Food and Nutrition Service (FNS), has several large programs affecting the nutritional status of mothers and children. Three programs--the Special Supplemental Food Program for Women, Infants, and Children (WIC), the National School Lunch (NSLP) and School Breakfast Programs (SBP), and the Food Stamp Program (FSP) have been reviewed. These and other USDA food and nutrition programs now face the challenge

of responding to newly emerging nutritional concerns, namely the role of diet in health promotion and in the prevention of chronic degenerative diseases, while continuing to address the problems of hunger and undernutrition for which they were initially designed. USDA programs also face the major policy issues of the need for more equitable and increased access to WIC and the SBP, and of the integration of WIC with public health systems.

The Supplemental Food Program for Women, Infants, and Children (WIC) follows smaller USDA programs to provide supplemental nutritious food to low-income pregnant and lactating women, infants and children who are at nutritional risk. (Earlier programs included the Commodity Supplemental Feeding Program and the Pilot Food Certificate Program.) Passed by Congress in September, 1972, as a pilot program with an annual budget of $25 million, WIC has grown, despite administrative and political impediments, to a program financed at $750 million annually and reaching 1.3 million women, infants and children.

The WIC program is unique among federal food programs in that although it is administered at the federal level by USDA, it is operated at a local level with close ties to local health-care delivery systems. In fact, local agencies operating WIC programs are required to see that health services are available to WIC participants. This linkage of WIC to prenatal and child health-care services is one of the more controversial aspects of the program. In many areas in this country which do not have access to the required health services, women, infants and children may not be able to

receive supplemental foods through WIC. Some local WIC programs have expanded in size and scope so rapidly that they have exceeded the capacity of existing public maternal and child health services. Consequently, one option for expanding WIC services is to make maternal and child health services universally available, while the reverse is to permit services independent of health care.

The WIC program is also unique in having been more extensively evaluated than other food and nutrition programs. This results partly from the requirements for evaluation of program benefits included in the authorizing legislation. Although the evaluations performed to date cannot be considered conclusive, they suggest that the WIC program has had a positive impact on the health of its participants. Included are improvements in birth weights and in the growth and iron levels of infants and preschool children. However, many aspects of WIC remain to be examined. There are political questions such as: Which individuals and local areas receive WIC benefits? Are the participants the most needy? There are administrative questions such as: Which local, state, and federal policies enhance and which hinder the operation of the program? What types of nutrition education are most effective? And there are medical questions, such as: What component of WIC (food supplementation, nutrition education, or the linkage with maternal and child health services) has the most significant health impact, or do the components act synergistically? Are the health benefits maintained once individuals are no longer eligible for WIC?

WIC participation has grown rapidly since its implementation in 1974 (the first year of operation), when 206,000 people were par-

ticipating. By the end of 1978, there were 1,318,000 participants. However, this is but a small fraction of the 8.7 million women, infants and children estimated to be eligible by income criteria to participate in WIC. Many of those who are nutritionally in need of the program cannot participate because of inadequate funding of the program or because of policies (determined at the federal, state or local levels) which make it difficult and costly for low-income people to participate. Operational directives must be flexible and outreach activities must be encouraged and expanded if those in need are to be reached and brought into the program.

The National School Lunch Program (NSLP) is currently available in 75% of all schools to approximately 90% of all school-age children. On a given day, approximately 50% of all eligible students participate. In general, participation rates within elementary schools are greater than within secondary schools; participation rates of children eligible for free or reduced price lunches now exceed those of students paying the full price (85% vs. 46% in 1975).

The School Breakfast Program (SBP) is currently available in approximately 25% of all schools to about 30% of all children. Average daily participation of students in these schools is approximately 25%. Although 85% of all breakfasts are served free or at reduced prices, little is known about how price and other factors affect participation in the breakfast program.

A number of federal options are available to encourage adoption of school lunch or breakfast programs in additional schools. Aid for

equipment would probably have the most significant impact in encouraging NSLP adoption. Increasing the per-meal reimbursement rate is another means of encouraging non-participating schools to participate. Commodity processing contracts which increase the ability to use commodity foods are another means of making a meal program more feasible. It may be, however, that schools which have not added a lunch program by now do not desire a program regardless of federal reimbursements.

Since many schools which provide a lunch program do not offer a breakfast program, different incentives may be necesary. Federal mandates for either "severe need" schools, schools which participate in the NSLP, or all schools, are an option. Financial incentives, possibly including reimbursement for nonfood costs, could help schools pay labor and utility expenses. Consulting services could also be provided to help school systems modify busing schedules to coordinate them better with breakfast program schedules. At the local level, information on the benefits of a breakfast program and the numbers of children who would benefit could be used to solidify community support. Because so few schools now participate, expansion of the SBP may be one of the most cost-effective means both to alleviate poverty and to increase the amount of nutritious food available to children. Although program benefits must still be carefully identified, it is likely that significant nutritional and learning benefits accrue to participants.

Another possible means of achieving added benefits from the school meal programs is to encourage higher participation rates within

existing programs. A SBP price subsidy of 10 cents per breakfast would cost USDA about $54 million per year and probably add over 500,000 participants. Menu selection and food quality also affect participation rates. Nutrition and health education may affect the decision of a child to participate and the degree of food waste. Policies regulating the availability of foods which compete with the nutritious meal--that is, those sold a la carte or in vending machines--are also likely to influence participation rates. The relative cost and impact of each approach on participation rates must be identified.

If child health is to be maintained or improved by the school meal programs, health objectives must be specified in a more comprehensive manner. For planning purposes, a nutrient meal standard and competitive food classification might be used to specify desirable ranges for those nutrients which are apt to be lacking--e.g., thiamin, iron, vitamin A, zinc--and to set acceptable ranges for fat, cholesterol, fiber and sodium.

An important and overriding policy issue related to both the school lunch and the school breakfast programs is the extent to which they are to be targeted toward poor or undernourished children versus all children. There are arguments to be made for either emphasis. While subsidizing only needy children appears to be cheaper in dollar terms, the added benefits of an all-encompassing emphasis may be great. The stigma for those who need to participate is almost certainly reduced in a more general program. The original legislative emphasis of school feeding programs was to feed all school children--

not to focus on needy or poor children. Whether a change in emphasis would better serve the nation depends on current national objectives and priorities.

The Food Stamp Program (FSP) benefits a large number of poor U.S. households with mothers and children. The FSP can be viewed either as a nutrition program or as an income supplement. Little is known about the nutritional impact of this program, which provides a significant addition to household food expenditures and overall economic welfare. It has been postulated that the transformation of the FSP to a cash-providing program would increase participation, but would probably reduce its nutritional benefits. Additional restrictions on food purchases (e.g., color-coding of stamps for purchase of specified food types) might restrict program participation. An alternative approach would be to improve nutrition education efforts for participants. However, much research must be done to determine whether the USDA's Expanded Food and Nutrition Education Program (EFNEP) and/or other nutrition education programs can be demonstrated to be cost-beneficial.

A major policy question for the 1980s is whether and how to alter the mix of food programs we now have. This question is often posed in a context of restricted prospects for continued program expansion. Much was done in the 1970s, and the 1980s are likely to be a period of consolidation and attention to program coordination.

The current nutrition program mix emphasizes delivery of restricted food packages to a broadly defined eligible population under WIC and

school feeding, and specifies narrow eligibility restrictions for food stamps, which do not provide any particular food package. Since food stamp benefits greatly exceed those of the child nutrition programs, the current mix is not well designed to alter dietary patterns. Recently Congress "capped" the food stamp program, but has continued gradually to expand child nutrition programs. However, there has been no serious attempt to provide benefits to a more substantial fraction of the population eligible for WIC, nor has there been any effort to offer or to require lunches and/or breakfasts for all needy school children. Senator Helms and others, in a proposal to count child nutrition benefits against food stamp aid, have focused on linkages between the programs.

Whatever the intentions of the Helms proposals are with regard to eliminating any program benefit duplication, the focus on multiple benefits deserves careful consideration. The multiple benefits view automatically raises the issue of how the funds at issue might be used in the other programs whenever there is an attempt to expand or to restrict one of the individual programs.

A related and crucial question is how best to evaluate program effects on nutrition. Artful judgment and common sense must play a major role: Studies to evaluate nutrition effects are expensive, yielding results that are difficult to interpret, due to the inherent difficulty of the studies. Nevertheless, because food programs have been justified by the aim of reducing nutritional risk, policy-makers must be prepared to get and to evaluate whatever scientific evidence can be obtained. Therefore, whatever happens to program growth, program research and evaluation efforts will probably increase.

Finally, because each program's success depends on the way recipients use the food they obtain, nutrition education will be viewed as an alternative to expanding benefits to reach more eligible people. If program growth is to be restricted, ensuring that current recipients use their aid wisely will become a more popular goal.

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