Progress Toward Eliminating Hunger in America

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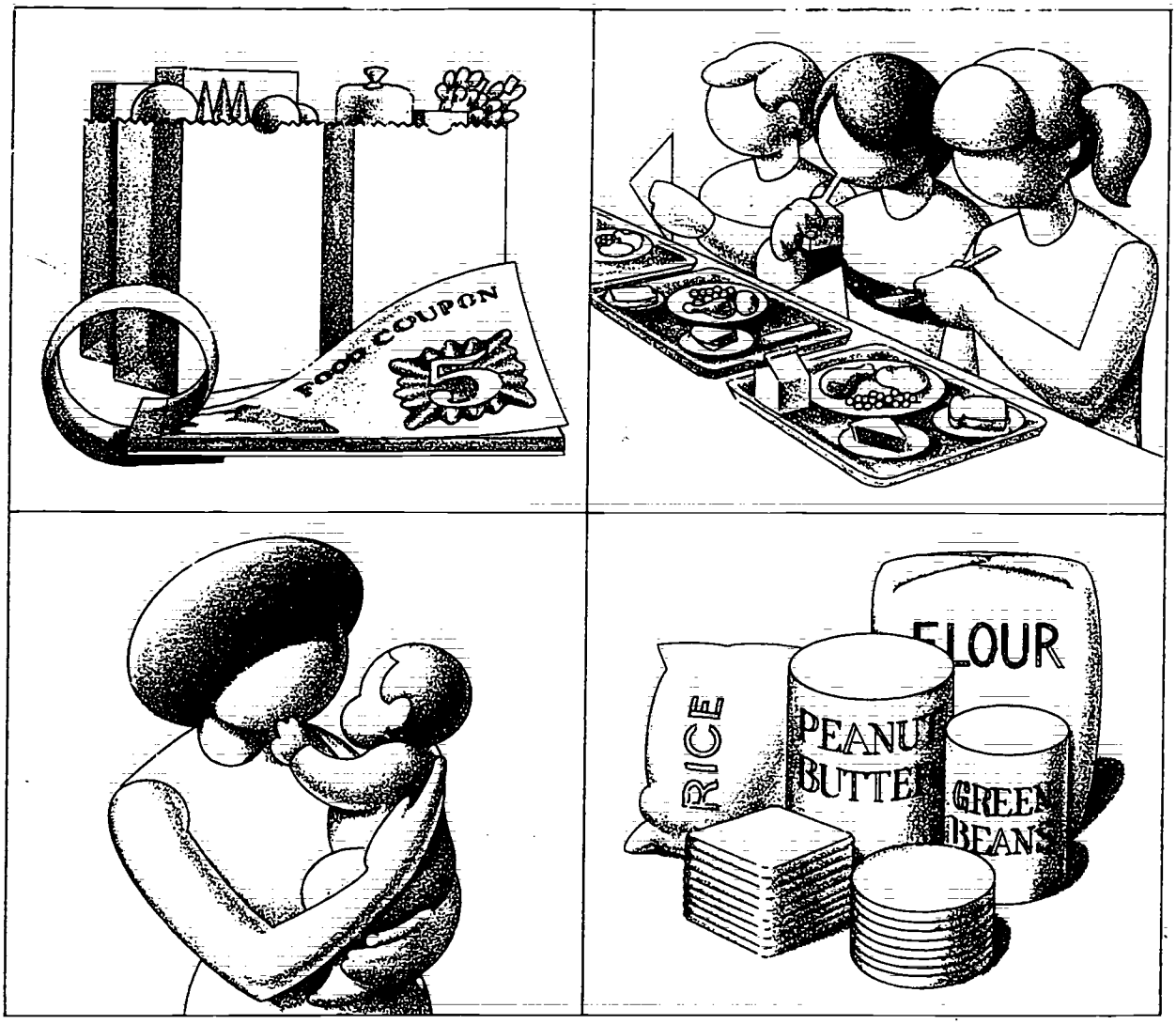

United States Department of Agriculture

Economics, Statistics, and Cooperatives Service

Agricultural Economic Report No. 446

PROGRESS TOWARD ELIMINATING HUNGER IN AMERICA; By William T. Boehm, Paul E. Nelson, and Kathryn A. Longen; National Economics Division; Economics, Statistics, and Cooperatives Service; U.S. Department of Agriculture. Agricultural Economic Report No. 446.

ABSTRACT

Food assistance funds in the United States have generally gone to areas most in need. Assistance in the most needy U.S. counties averaged $21.98 per person in 1967. By 1976, it had increased to $153.91. Corresponding figures for the least needy counties were $2.04 in 1967 and $26.35 in 1976. Food assistance payments accounted for almost 18 percent of each real dollar increase in per capita retail food sales in the neediest counties. Additional food spending was influenced more by increases in food assistance payments than by increases in earned income.

KEYWORDS: Food assistance programs, food stamps, WIC, Child Nutrition Programs, Commodity Distribution Program.

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Washington, D.C. 20250 January 1980

SUMMARY

Progress has been made in providing food for poor people in the United States. Persons residing in counties with the highest rates of infant mortality received an average of $123.33 in Federal food assistance during 1976, up from $12.83 in 1967. In the Nation's lowest income counties the assistance rose from $21.98 to $153.91.

County groups with the lowest infant mortality rates in 1967 received food assistance of $2.04 per person in 1967 and $30.96 in 1976. The highest income counties received $2.04 and $26.35, respectively.

Retail food sales per person reflected the availability of food assistance dollars. The increase in real per capita retail food sales over the decade (1967-76) was most obvious for counties with the highest infant mortality rates. Food assistance in the form of bonus stamps accounted for 15.8 cents of each dollar increase in these sales. In the lowest income counties, the corresponding figure was 10.0 cents. In the other county categories, the impact was less pronounced. However, with but one exception, it was positive and statistically significant.

Food assistance distributed through the National School Lunch and Commodity Distribution Programs did not, with one exception, result in observable increases in retail food sales. Most food purchased under these two programs comes from wholesalers and food manufacturers. In the poorest rural counties, dollars which the U.S. Department of Agriculture transferred to schools for school lunches generated slight increases in retail food sales.

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INTRODUCTION

Our purpose in this report is to assess the impact of food assistance programs on hunger in America. An earlier study, published in 1968 by the Citizens Board of Inquiry into Hunger and Malnutrition in the United States (CBHM), documented the existence of hunger in America. In the current study, we assess the issue indirectly by treating two questions:

* Have counties where hunger was greatest in 1968 received relatively more food assistance per person since that time?

* To what extent have food assistance payments been reflected in per capita retail food sales in these counties?

Before answering these questions, we define hunger and identify groups of counties characterized as being the most in need and the least in need of Federal food assistance. We trace the development of domestic food assistance programs since 1968, and we assess the extent of their success.

The earlier CBHM study--Hunger U.S.A.--had reported the following findings:

* One-fifth of U.S. households had "poor" diets as determined by the U.S. Department of Agriculture (USDA).

* Thirty-six percent of low-income households subsisted on "poor" diets.

* People in 266 U.S. counties were living in such distressed conditions "as to warrant a Presidential declaration naming them as hunger areas" (1, p. 85). 1/

The current study was prepared in response to an inquiry from the White House Staff who wanted to know where food assistance dollars went from 1968 (the date of the CBHM study, Hunger U.S.A.) to 1976 (nearly a decade later). We have focused on those county groups identified by CBHM. Our tabulations were based on the most recent county-level records available, those compiled by USDA's Food and Nutrition Service (FNS) in 1976. Our study shows that Federal food assistance funds have generally gone to those areas most in need.

1/ Underscored numbers in parentheses refer to references listed at the end of this report.

HUNGER IN PERSPECTIVE

Hunger has been defined as a craving for food, a weakened condition brought about by prolonged lack of food, and an urgent need for food. Regardless of the definition, hunger is clearly a condition of degree. That is, the continuum describing hunger runs from a temporary (even self-imposed) discomfort to death.

The CBHM defined hunger as "a condition where people are forced to go days each month without one full meal." Although this definition contains some nonmeasurable and ambiguous elements ("forced," "full meal," and "days each month"), it does in general lend itself to measurement.

Furthermore, the CBHM definition embodies the element of force and the concept of degree. Self-imposed hunger, a refusal to eat when food is available, is likely to be viewed differently from hunger which exists because food is not available for consumption.

Data on Hunger

The only nationwide data relating to food consumption collected by the U.S. Government since the publication of Hunger U.S.A. are those of the U.S. Department of Labor's Bureau of Labor Statistics. These data, known as the Consumer Expenditure Survey (CES), reported food expenditures for about 12,000 households during 1973 and 1974 (18). Unfortunately, because of the need to protect the identity of reporting households, identifying the location of residence (except for the Census region) is impossible. Furthermore, these data record only expenditures on food and some nonfood items made during a 1-week period. They provide no information on either frequency of purchase or the consumption of food obtained through nonmarket sources (for example, gardens).

Data are being tabulated from the 1977-78 Nationwide Food Consumption Study (NFCS) of USDA's Agricultural Research Service (now part of the Science and Education Administration). When they become available in 1980-81, they will be the most comprehensive nationwide source on food consumption. These NFCS data (which are computed in pounds and ounces of food consumed) will be used to help define the incidence of hunger in the population at large.

The authors of Hunger U.S.A. relied heavily on the corresponding 1965-66 Household Food Consumption Survey to document the existence of poor diets in America (1). Those data showed, for example, that just over 50 percent of the low-income households in the United States had "good" diets; that is, they met the Recommended Dietary Allowance (RDA) for seven nutrients (16). From the available data, USDA analysts could not determine whether the diets of the poor had deteriorated more than those of higher income groups.

Several other data sources provide information on aggregate indicators of both poverty and hunger, by county. However, such data cannot be relied upon to define the existence of hunger very precisely, primarily because they provide no measure of total food intake and are available only annually. They are of little use in identifying the extent of the hunger problem as they mask the frequency with which it occurs.

Indicators of Hunger

Studies, like the ones conducted by CBHM, provide useful information by documenting the existence of hunger. But they cannot be relied upon to quantify its

severity. One can, however, monitor potential hunger by monitoring those factors that contribute to its occurrence. Three of these factors have long been recognized: (1) lack of resources to make food purchases, (2) lack of access to food distribution outlets or production resources, and (3) lack of knowledge regarding availability and/or selection of food.

Lack of Resources

The American food system is market oriented. That is, the available foods (like other goods and services) are rationed in the marketplace to those with the resources to purchase them. In one sense, it is very much like barter--people trade their dollars for food. Those without dollars are in a poor position to trade. However, as food is necessary to survival, available resources tend to be allocated to food purchases first--although not sufficiently to provide an adequate diet. Thus, data indicating the proportion of total income spent on food by income class help measure the extent of potential hunger domestically.

The U.S. Department of Labor's CES for 1973-74 (19) can help define the boundaries of this income-related hunger (table 1). During that period (1973-74), USDA estimated that a low-cost nutritious diet for a family of four required about $150 per month. The income group reporting less than $4,000 pre-tax income per year (including meals as pay) earned 6.5 percent of all income, but accounted for 15.4 percent of all food expenditures and totaled 18.2 percent of the population. Except for the highest and lowest income groups, the percentage of the population in each group was roughly equivalent to the percentage of total food expenditures it made (table 2 and fig. 1).

Figure 1

Distribution of Total Income and Total Food Expenditures, by Percentage of Population, 1973-74

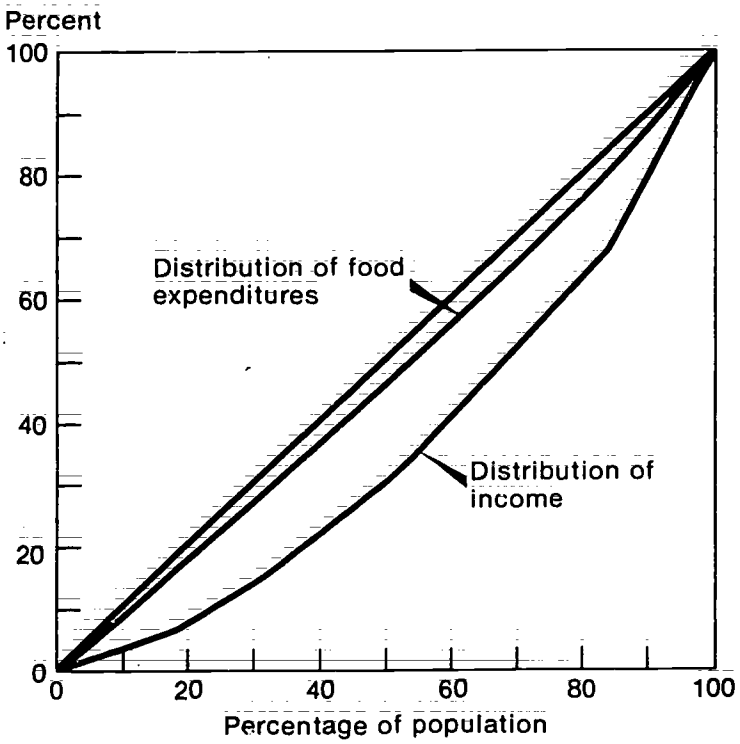


Table 1--Relationship between income and expenditures for food, 1973-74 1/

Income class	Total population	Total reported income	Total food expenditures	Food as a percentage of income	Food expenditures as a ratio of Thrifty Food Plan cost 2/
	---------Percent---------				Ratio
Less than $4,000	18.19	6.47	15.39	38.88	1.09
$4,000 to $7,999	14.14	9.31	13.09	23.01	1.19
$8,000 to $11,999	21.17	17.79	20.35	18.72	1.23
$12,000 to $14,999	14.47	14.65	14.08	15.75	1.26
$15,000 to $20,000	16.07	19.86	17.29	14.26	1.39
More than $20,000	15.96	31.92	19.80	10.17	1.60
Total	100.00	100.00	100.00	--	--

-- = Total is not applicable.
1/ Data from 1973-74 Consumer Expenditure Survey, Bureau of Labor Statistics.
2/ Adjusted for a family of four (1.00 = $150 per month).

Table 2--Relationship between income and food expenditures, cumulative totals, 1973-74 1/

Annual income	Total population	Total reported income	Total food expenditures
		Percent	
Less than $4,000	18.19	6.47	15.39
Less than $8,000	32.33	15.78	28.48
Less than $12,000	53.50	33.57	48.83
Less than $15,000	67.97	48.22	62.91
Less than $20,000	84.04	68.08	80.20
All classes	100.00	100.00	100.00

1/ Data from 1973-74 Consumer Expenditure Survey, Bureau of Labor Statistics.

Weekly food expenditures per person totaled $10.24 in the lowest income group and $15.02 in the highest income group. Households in the lowest income group spent almost 40 percent of their pre-tax income on food. Unfortunately, these 1973-74 CES data are too old to reflect any increases in food-buying resource availability for low-income consumers that may have occurred since the expansion of the Food Stamp Program in 1974.

Lack of Access

Even if purchasing resources are available, consumers must have access to food. Lack of access is a potentially serious problem for those living in remote areas such as on Indian reservations or in the Appalachian Mountains. Lack of access may also be a problem in the ghettos of our industrial cities, among the elderly, and among some children.

Data from the 1972 Census of Retail Trade show that half of all U.S. cities had absolute declines in grocery store sales area (store space) during 1972 (13). Supermarket sales capacity increased in about 85 percent of the surburban areas as compared with 65 percent of the cities. Such data, although not sufficient to indicate that food availability is a problem, suggest it may be a greater problem in urban areas where high concentrations of poor people reside.

Other data, however, indicate that significant quantities of nonmarket food are consumed by some persons. In a recent USDA survey, 44 percent of all households indicated that, during 1976, they had a home fruit or vegetable garden (3). Thirty-one percent reported having a garden for more than 11 years. Per capita consumption of processed fruits and vegetables from home gardens has been estimated at about 12 percent of all processed fruits and vegetables for 1976 (3). In addition, it is likely that among some groups of low-income people and in some rural areas significant quantities of meat and dairy products are produced for home consumption and are, therefore, not reflected in aggregate food purchase data.

Lack of Knowledge

Individual choice plays a substantial role in determining what people eat in the United States. The food selection and consumption processes are related in a rather complicated fashion to other aspects of life. For example, the per capita consumption of dairy products among black Americans may be low because blacks often have difficulty digesting lactose. Teenage school children may choose not to participate in the National School Lunch Program to spend their lunch hour away from school. Such personal decisions influence nutritional status and may contribute to malnutrition in America.

Educational level has been identified as one of the most important factors influencing food choice. Data from both the 1955 and 1965 Household Food Consumption Surveys indicate that, on average, the highly educated homemaker spends more for food per person in the household (15). This individual tends to purchase more milk, fruits, and vegetables and less flour and fewer cereals, dry beans, and peas. But even when income is excluded as a variable, education is a factor in food selection. After a thorough analysis of the data, one researcher concluded:

> Regardless of the amount of money spent per person for food, among households with less education, there was a larger proportion with poor diets. Among households earning under $3,000 the percent of poor diets increased as education decreased (8).

DOMESTIC FOOD PROGRAMS

Hunger indicators have been used extensively in the development of public programs to eliminate or reduce the severity of hunger in America. Such indicators provide a convenient mechanism for identifying target groups. Typically, eligibility for food assistance is related to income. Only in rare instances has hunger itself been considered a sufficient condition for participation in public domestic food assistance programs. When it has, the program has often been viewed as temporary and emergency relief (usually resulting from a national disaster).

USDA has operated food assistance programs since 1935. Emergency food distribution during the early thirties expanded into a family of related programs aimed at improving the nutritional status of infants, children, and low-income families. Until recently, such programs were operated largely as mechanisms for surplus removal, designed primarily to help support farm income. Events of the late sixties, including publication of Hunger U.S.A, began to change that policy perception. Today, while the food programs continue to contribute to the support of farm income, they are more generally regarded as programs of income assistance that improve the diets of poor families and children.

Domestic food assistance has expanded greatly since 1967. Hunger U.S.A. reported that food programs in that year reached "18 percent of the 29,900,000 poor" (5.4 million) (1). In first quarter 1979, more than 18 million persons each month participated in the Food Stamp Program alone. Participation exceeded 19 million per month when unemployment was at 7.5 percent in early 1976 (7). Total Federal expenditures for all food programs increased from $1,063 million in FY 1969 to $7,825 million in FY 1976 (table 3).

Programs now in operation include basic commodity distribution; child feeding programs; a national food stamp program for households; a food program for pregnant and lactating women, infants, and children; feeding programs for the elderly; and an array of nutrition education programs designed to help low-income shoppers and children improve their ability to select and use nutritious foods.

Food Stamp Program

The Food Stamp Act of 1964 established the Food Stamp Program as a part of permanent legislation. The program was designed to correct deficiencies in commodity distribution programs by permitting households to purchase food through regular market channels. Under the act, eligible households were required to pay about 20 percent of their money income to receive stamps worth enough to purchase foods considered necessary for a low-cost nutritious diet. However, as a result of changes adopted in the Food and Agriculture Act of 1977, eligible households are no longer required to commit cash resources for food to participate in the Food Stamp Program.

In its early years, the Food Stamp Program encountered some resistance from potential participants. Poor people often indicated a preference for direct commodity distribution. Hunger U.S.A. reported: "In areas where the Commodity Distribution Program was being scrapped in favor of food stamps, the low-income family found itself whipsawed between a program that had distributed food free and a new program that assumed that the family had paid for its food," (1, p. 59).

Legislative and administrative changes in the rules and the passage of time appear to have reduced this early resistance. About 18.4 million persons participated in the Food Stamp Program in the first quarter of 1979, according to preliminary Food and Nutrition Service (FNS) figures.

Table 3--Federal expenditures for USDA food and nutrition programs, fiscal years 1967-77

Program	1969	1970	1971	1972	1973	1974	1975	1976	1977
	Million dollars								
Food stamps issued:									
Total	603.4	1,090.0	2,713.3	3,308.6	3,884.0	4,724.3	7,265.6	8,700.2	8,339.8
Bonus stamps	228.8	549.7	1,522.7	1,797.3	2,131.4	2,714.1	4,385.5	5,326.5	5,057.7
Child nutrition:									
School Lunch	203.8	300.3	532.2	738.8	882.2	1,068.3	1,281.0	1,489.3	1,673.8
School Breakfast	5.4	10.8	19.4	24.9	34.6	55.5	86.0	114.0	146.1
Special Food 1/	1.5	7.7	20.8	37.1	44.9	62.1	96.5	148.9	232.9
Special Milk	101.3	101.2	91.1	90.3	90.8	52.4	122.9	144.1	153.3
Food distribution:									
Schools	272.1	265.8	279.2	314.8	331.0	319.4	423.4	417.8	498.5
Needy families	223.9	281.6	308.4	298.6	241.4	189.4	36.9	12.0	11.5
Supplemental food	1.0	7.8	12.8	12.9	13.3	15.1	17.3	17.2	14.1
Institutions	25.4	22.5	24.5	25.8	27.4	25.0	20.2	11.8	17.1
Food certificate	0	.1	1.0	1.1	.9	.8	.7	.7	0
Women, infants, and children 2/	0	0	0	0	0	11.1	89.2	142.6	259.1
Total 3/	1,063.2	1,547.5	2,812.1	3,341.6	3,797.9	4,513.2	6,559.6	7,824.9	8,064.1

1/ Includes child care and summer food programs.
2/ Special supplemental Food Program for Women, Infants, and Children (WIC) was started in Jan. 1974.
3/ Excludes food stamps paid for by participants.

Source: Food and Nutrition Service records.

Child Nutrition Programs

In terms of dollars spent, the child nutrition programs represent the second largest category of domestic food assistance. FY 1977 expenditures for these programs (National School Lunch, School Breakfast, Summer Food Service, Child Care Food, and Special Milk Programs) exceeded $2.2 billion. National School Lunch expenditures, including the value of commodities distributed, exceeded $2.0 billion--more than the total value of all food assistance in 1969 (table 3).

Several changes have increased Federal expenditures for these programs. Free and reduced-price meals for needy children have been greatly expanded. About 20 million children participated in the National School Lunch Program in 1968; less than 15 percent received either free or reduced-price meals. By 1977, 26 million children were participating in the program, and 45 percent were receiving meals either free or at reduced prices. The average rate of Federal reimbursement on all lunches served has increased from about 13 cents to more than 50 cents since 1969.

The School Breakfast and Child Care Food Programs have also grown significantly. Expenditures for these two programs were less than $7 million in 1969. By FY 1977, expenditures for both programs totaled $379 million.

Commodity Distribution Program

The total value of all commodities distributed by the Federal Government was relatively stable throughout the study period--about $500 million. Since FY 1974, distribution to needy persons has been reduced substantially as counties have transferred to the Food Stamp Program. As distributions to needy persons were reduced, they were increased to schools--keeping total value of distribution roughly constant. However, some overall reduction in direct commodity distribution occurred during 1975 and 1976, partially reflecting a reduction in the need to purchase commodities from the market to support farm income. A recent change in the National School Lunch Act requires the Secretary of Agriculture to provide a specified level of support for each lunch served. If commodities are not available, cash must be paid in lieu of commodities.

Women, Infants, and Children (WIC)

The most recent food assistance program, and one of substantial importance to the undernourished, is the Special Supplemental Food Program for Women, Infants, and Children (WIC). This program, created in 1972, provides supplemental food purchasing power to women and infants, considered in a category of high nutritional risk, through vouchers valid only for foods specified as highly nutritious.

No money was spent on WIC until FY 1974; however, during that year, $11.1 million was spent in food aid for that program. WIC expenditures totaled approximately $259 million in 1977 (table 3). The program's supplemental food benefits are crucial because low-income pregnant women, nursing mothers, infants, and young children are especially vulnerable to malnutrition.

Nutrition Education

Lack of knowledge regarding availability of food and lack of ability to select nutritious foods were identified as indicators of hunger. Although we are far from making significant progress in solving these problems for large numbers of the poor, some successes can be claimed. The major governmental nutrition education effort,

USDA's Expanded Food and Nutrition Education Program, represents a program which, like many others discussed here, was established in 1968. However, it was not implemented until 1969. The program operates on a one-to-one basis, concentrating on improving the food selection and preparation practices of low-income homemakers. It has been relatively successful. However, because of limited resources, the program has been able to reach only about 20 percent of its target population (17).

HAVE WE MADE PROGRESS?

The number of food assistance programs and the Federal dollars spent have increased dramatically since 1968 (table 3). Even so, the persistent question remains: Has progress been made in our effort to eliminate hunger in America?

Given the earlier definition, hunger can only be eliminated if the quantity of food consumed by chronically hungry people is increased on a regular basis. While the food assistance programs use indicators of hunger to determine eligibility, they operate on the premise that if food is available, hunger will be eliminated. Obviously, food assistance programs will not be effective unless public funds are channeled to those areas where hungry people are concentrated.

To determine whether or not these programs have helped to reduce hunger in America, one first needs to know where the hungry people are (figs. 2 and 3). Second, the flow of food assistance dollars must be traced to ascertain whether the dollars are going to those most in need. Third, if program dollars are going to those most in need, have they influenced per capita expenditures on food?

Hunger U.S.A. identified six groups of U.S. counties to determine the relationships among hunger, income, and postneonatal mortality (or death from the 2nd to the 12th month after birth), which is a major indicator of infant malnutrition. The county groups were defined as follows:

(1) Highest Postneonatal Mortality Counties (HMR): The county in each of the 47 States for which postneonatal data were available having the highest postneonatal mortality rate. (Data were not published in Hunger U.S.A. for Alaska, Hawaii, and New Hampshire.)

(2) Highest Poverty Counties (HP): The county in each of these States having the highest proportion of households below the poverty income line.

(3) Lowest Postneonatal Mortality Counties (LMR): The county in each of the 47 States for which data were available having the lowest postneonatal mortality rate.

(4) Lowest Poverty Counties (LP): The county in each of these same States having the lowest proportion of households below the poverty line.

(5) Highest Postneonatal Counties in the United States (NHMR): The 49 counties with the highest postneonatal mortality rates nationwide. 2/ More than one county per State could be included.

2/ At the outset of the study, 50 counties were chosen. However, food assistance data for two counties were not reported separately, thereby necessitating combining all data for the two counties.

Figure 2

U.S. Poverty County Sets

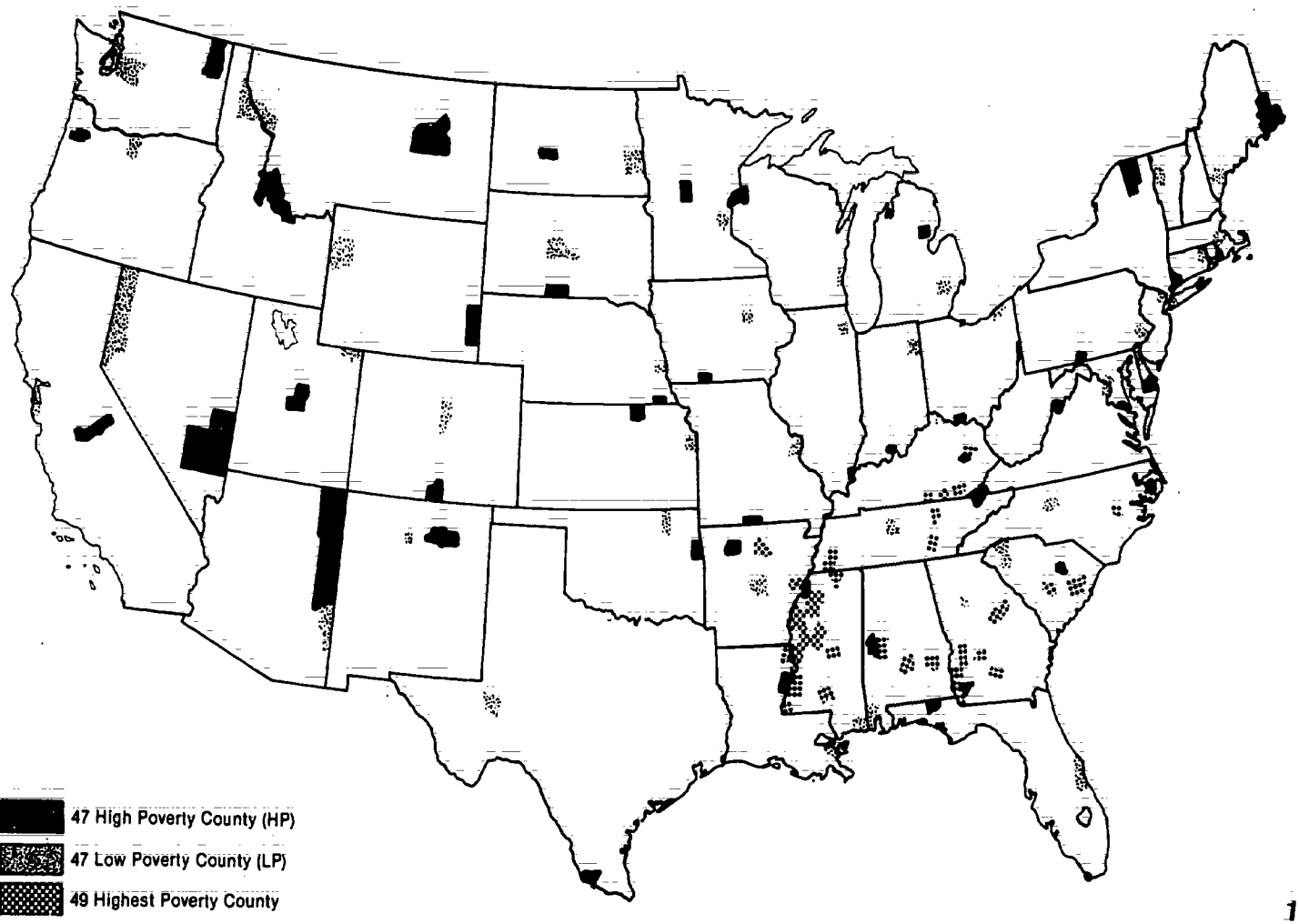
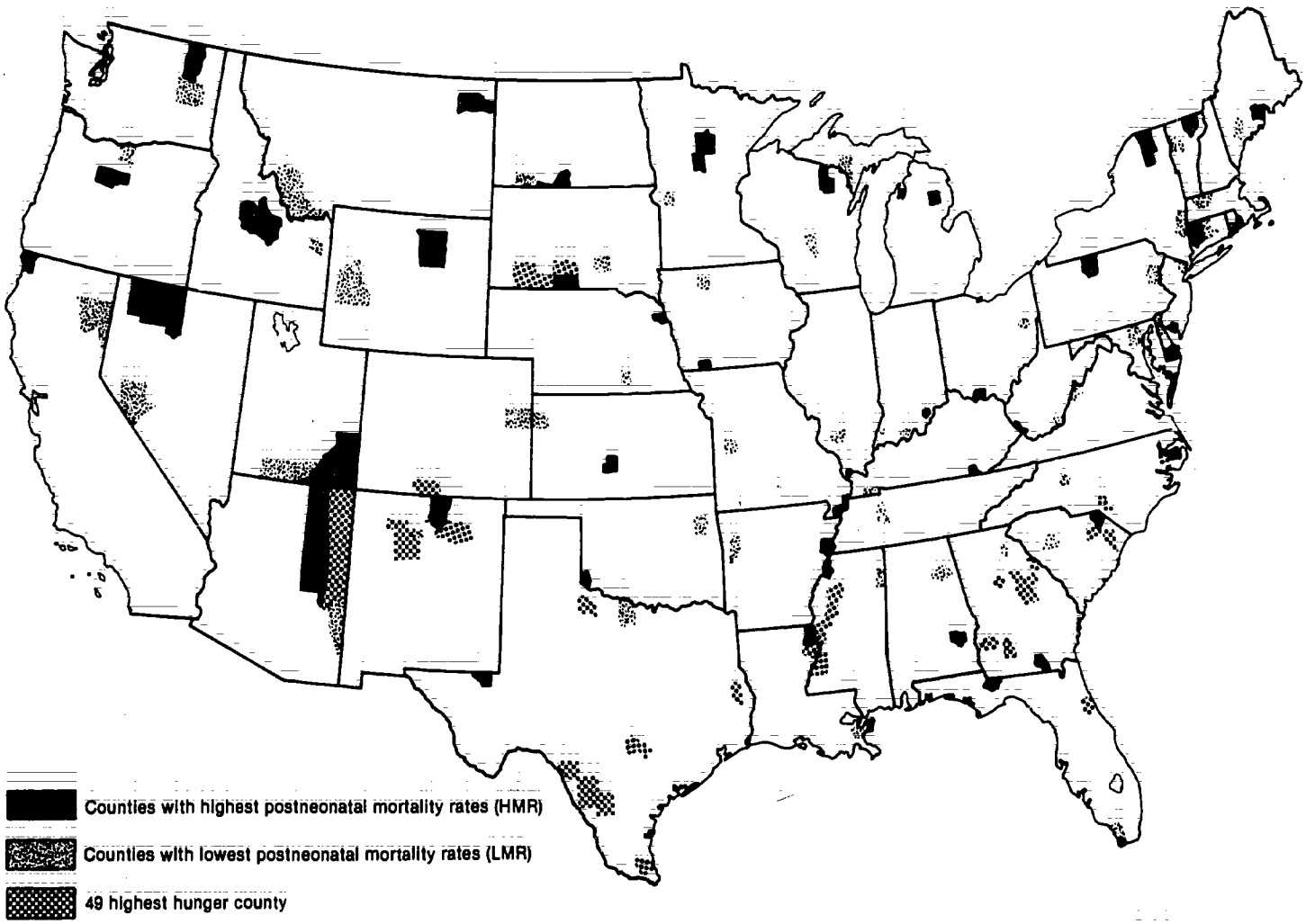


Figure 3

U.S. Postneonatal Mortality County Sets



(6) Highest Poverty Counties in the United States (NHP): The 49 counties with the highest proportion of households below the poverty income line nationwide. More than one county per State could be included (see appendix).

Admitting at the outset the very close association between income and malnutrition, CBHM made extensive use of postneonatal mortality rates (MR) to identify its hunger counties. Although the MR does not necessarily reflect the food buying potential of people in a county, it was argued that overall the MR was a good indicator of the existence of hunger. The authors of Hunger U.S.A. state:

> The correlation between malnutrition and poverty is reflected in postneonatal mortality rates. During the first month of life--the neonatal state--poverty infants die at only a slightly higher rate than infants from higher income groups. From the second to the 12th month, a startling disparity occurs between different income groups. The rate of death for the infant from an affluent family drops to approximately one-third the neonatal (first month) rate. The death rate for the poor infant may drop--but nowhere near as radically; and in the poorest counties, the postneonatal rate will actually rise appreciably above the neonatal rate (1, p. 33).

These six county sets were adopted to determine whether or not food assistance payments have been flowing to localities where demonstrated need is greatest. The hypothesis is that the largest per capita payments will flow to the NHMR and NHP counties. Conversely, the smallest per capita payments will flow to the LMR and LP counties. Furthermore, it is hypothesized that food assistance payments per person will be higher for the Nation's 49 NHMR and NHP counties than for the HMR or HP counties. In turn, payments received by the HMR or HP county sets will be larger than those received by either the LMR or LP counties. Thus, it is anticipated the per capita payments received by persons residing in the HMR and HP counties will be larger than those received by people living in the LMR and LP counties.

One obtains per capita payments by dividing the total food assistance payments received annually within each county by the county's total population. 3/ Thus, the average per capita payments to the LMR and LP counties were lower than the amount that would have resulted if only the number of participants throughout the year (adjusted to avoid double counting of persons participating in more than one program) had been used as the divisor. For the HMR and HP categories, using this procedure did not lower the average per capita payments as much because a much higher proportion of the population in these counties received food assistance.

Although the differences among the HMR and HP and the LMR and LP county sets are greater when the total county population is used as the divisor, comparisons will indicate whether the direction of fund flow has been in favor of or at the expense of the neediest localities.

Average Per Capita Payments

Data in table 4 are consistent with these hypotheses. The payments received by persons in greatest need--those residing in county categories NHMR and NHP--were greater than those received by persons living in the other county groups. Payments

3/ The mean population of category HMR for the 1967-76 period was 23,741. For the HP counties, it was 33,836. In contrast, the corresponding average for LMR counties was 78,655; and for LP counties, 290,662. For the NHMR, the mean population was 14,461; and for the NHP counties, 13,633.

received by persons in the NHMR counties increased from $12.83 in 1967 to $123.33 in 1976. The corresponding payments received by persons in NHP counties grew from $21.98 in 1967 to $153.91 in 1976.

Persons living in the HMR and HP categories were believed to be the next in need. In 1967, per capita payments which flowed to the HMR counties amounted to $8.88. By 1976, these payments were $76.85. Corresponding figures for those residing in HP counties were $4.47 and $47.30.

In contrast, persons living in the least needy counties--that is, the LMR and LP counties--received $2.04 per person in 1967, and $30.09 and $26.35, respectively, in 1976. Consequently, in terms of current dollar payments, the neediest counties have been receiving the highest average payments per person (table 4). Among the Nation's neediest counties, those persons within the NHP category received more than those in the NHMR group. Those residing in the HMR and HP county groupings received less per person (see fig. 4).

Relative Receipts

The extent to which the absolute monetary assistance affected the shares received by the most and the least needy localities is shown in tables 5 and 6. Table 6 was derived by using absolute amounts reported for 1967 as the base. For each county category, the per capita payments received in subsequent years were divided by the 1967 base figure.

Figure 4

Per Capita Federal Domestic Food Assistance Payments, Fiscal Years 1967-76

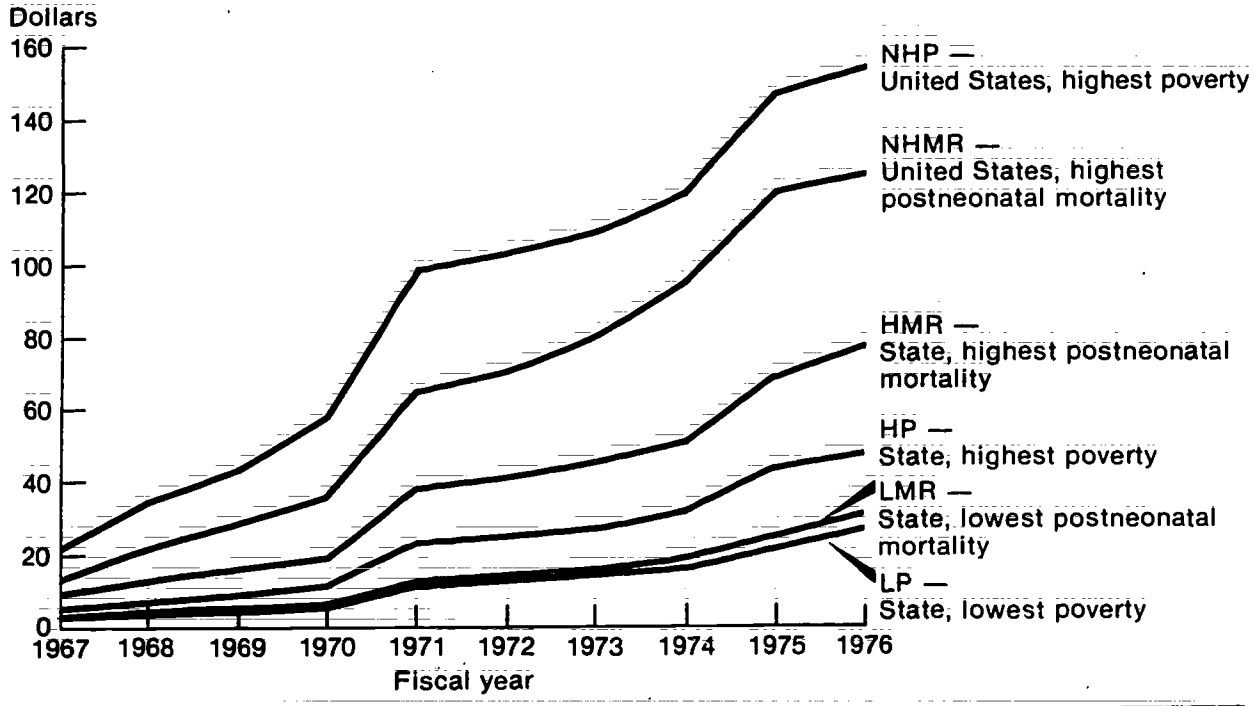


Table 4--Per capita Federal domestic food assistance payments, fiscal years 1967-76

County group	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
					Dollars					
Postneonatal mortality group:										
State-- 1/										
Highest (HMR)	8.88	12.01	15.59	19.32	38.45	40.28	44.51	50.73	68.99	76.85
Lowest (LMR)	2.04	3.30	4.29	4.74	11.66	12.22	13.50	17.46	23.81	30.09
United States, highest (NHMR) 2/	12.83	21.02	27.95	35.09	64.22	70.00	79.53	94.45	119.55	123.33
Poverty group:										
State-- 3/										
Highest (HP)	4.47	6.26	8.20	10.91	22.24	24.12	26.66	31.86	43.25	47.30
Lowest (LP)	2.04	2.71	3.32	4.47	10.81	12.02	13.23	15.12	21.42	26.35
United States, highest (NHP) 4/	21.98	34.94	42.47	57.14	97.88	101.22	107.47	119.48	146.64	153.91
United States, average 5/	4.28	5.67	7.09	10.23	19.38	23.30	26.44	30.93	44.26	52.06

1/ County in each of the 47 States for which postneonatal data were available.

2/ The 49 counties with the highest postneonatal mortality rates nationwide; more than one county per State could be included.

3/ The county in each of the 47 States for which poverty data were available showing proportion of households below the poverty income line.

4/ The 49 counties with the highest proportion of households below the poverty income line nationwide.

5/ The U.S. all-county average.

Source: Computed from unpublished Food and Nutrition Service data.

This procedure yielded the multiple by which each year's assistance was greater than the per capita food assistance payments received in 1967. Consequently, for the HMR counties, the 1976 per capita food assistance payment received was 8.65 times greater than the 1967 payment. The corresponding multiple for the LMR counties was 14.75.

These data seem to suggest that the amounts paid shifted in favor of the LMR and LP counties in relative terms, particularly after 1970. However, too literal an interpretation of these data could be misleading as the magnitude of the multiples is a direct function of the size of the base used in their computation. For example, the 1967 base for both LMR and LP categories is $2.04, whereas the corresponding amounts for the other categories ranged from $4.47 to $12.83 (table 5). The smaller the base, the easier it is to get a large multiple.

To minimize base-related distortions, we calculated the percentage change from one year to the next (table 6). Specifically, the absolute dollar difference from 1967 to 1968 was divided by the total payments received in 1967. For example, the average per capita payment in HMR counties was $8.88 in 1967. The payment received in 1968 was $12.01. Consequently, ($12.01-$8.88) / ($8.88) equals a 35.2 percent increase in the payment received between 1967 and 1968. Between 1968 and 1969, the corresponding computation is: ($15.59-$12.01) / ($12.01) or 29.8 percent.

An increase in the absolute payment received for all counties for each of the years reported is indicated by data in table 3. Table 5 shows that the multiples for each year likewise increased. In contrast, data in table 6 show that, in terms of relative percentage increases, the increase was greater for LMR and LP counties than for HMR and HP counties for some years. For example, the percentage increase for HMR counties was greater than the percentage increase for LMR and LP counties for 1 year; for 2 years, they were of equal size; and for 6 years, including 1974-76, they were lower.

Similarly, the annual percentage increase for the HP counties for 5 years was less than the corresponding increment for LMR counties; it was greater for 3 years, and the same size for 1 year. The increment for HMR counties was greater than the corresponding increment for LMR counties for 4 years, but was less for 5 years (table 6).

Furthermore, the annual increase in food assistance payments to HMR counties compared with LP counties showed the following results: for 6 years, the increase in HMR payments was less; for 3 years, it was more. HP counties received smaller increases in 5 years; in 4 years, their annual increments were greater. In comparison with NHMR counties, increments were less in 5 years and more in 4 years. If this pattern should persist, after a few years, the absolute distribution in favor of the HMR and HP (the neediest) counties would shift against them.

Before the Food Stamp Program replaced the Commodity Distribution Program in 1970, the total number of eligible persons and the proportion of eligible persons participating were typically greater in HMR and HP counties than in LMR and LP counties. 4/ With the establishment of the Food Stamp Program in all counties, the number of eligible persons and thereby the proportion of participants in LMR and LP counties increased. Thus, the size of per capita food assistance payments in the LMR and LP counties increased after 1971, reflecting the growth in the total number of participants. If the post-1972 percentage increases should continue, the least needy

4/ After 1970, a major switch in program emphasis occurred. The Direct Commodity Distribution Program was continued, but it was directed primarily toward persons participating in other programs, particularly the National School Lunch Program.

Table 5--Per capita food assistance, payments fund flow multiples, fiscal years 1967-76

County group	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
					Multiples					
Postneonatal mortality group:										
State-- 1/										
Highest (HMR)	1.00	1.35	1.76	2.18	4.33	4.54	5.01	5.71	7.77	8.65
Lowest (LMR)	1.00	1.62	2.10	2.32	5.72	5.99	6.62	8.56	11.67	14.75
United States, highest (NHMR) 2/	1.00	1.64	2.18	2.74	5.01	5.46	6.20	7.36	9.32	9.61
Poverty group:										
State-- 3/										
Highest (HP)	1.00	1.40	1.83	2.44	4.98	5.40	5.96	7.13	9.68	10.58
Lowest (LP)	1.00	1.33	1.63	2.19	5.30	5.89	6.49	7.41	10.50	12.92
United States, highest (NHP) 4/	1.00	1.59	1.93	2.60	4.45	4.61	4.89	5.44	6.67	7.00
United States, average 5/	1.00	1.32	1.66	2.39	4.53	5.44	6.18	7.23	10.34	12.16

1/ County in each of 47 States for which postneonatal data were available.
2/ The 49 counties with the highest postneonatal mortality rates nationwide; more than one country per State could be included.
3/ The county in each of the 47 States for which poverty data were available showing proportion of households below the poverty income line.
4/ The 49 counties with the highest proportion of households below the poverty income line nationwide.
5/ The U.S. all-county average.

Source: Computed from table 4.

Table 6--Year-to-year increments in per capita food assistance payments, 1967-76

County group	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76
					Percent				
Postneonatal mortality group:									
State -- 1/									
Highest (HMR)	35.2	29.8	23.9	99.0	4.8	10.5	14.0	36.0	11.4
Lowest (LMR)	61.8	30.0	10.5	146.0	4.8	10.5	29.3	36.4	26.4
United States, highest (NHMR) 2/	63.8	33.0	25.5	83.0	9.0	13.6	18.8	26.6	3.2
Poverty group:									
State-- 3/									
Highest	40.0	31.0	33.0	103.9	8.5	10.5	19.5	35.8	9.4
Lowest	32.8	22.5	34.6	141.8	11.2	10.1	14.3	41.7	23.0
United States, highest (NHP) 4/	59.0	21.6	34.5	71.3	3.4	6.2	11.2	22.7	5.0
United States, average 5/	32.5	25.0	44.3	89.4	20.2	13.5	17.0	43.1	17.6

1/ County in each of the 47 States for which postneonatal data were available.

2/ The 49 counties with the highest postneonatal mortality rates nationwide; more than one county per State could be included.

3/ The county in each of the 47 States for which poverty data were available showing proportion of households below the poverty income line.

4/ The 49 counties with the highest proportion of households below the poverty income line nationwide.

5/ The U.S. all-county average.

Source: Computed from table 4.

counties would gain proportionately more. However, this trend appears unlikely. Revised eligibility rules specified by the 1977 Food and Agriculture Act that lower the level of income below which persons are eligible will particularly affect LMR and LP counties. They will likely lose more participants than will HMR and HP counties.

IMPACT ON RETAIL FOOD SALES

The substantial relative increases in dollars received by HMR and HP counties are highlighted by the data in table 4. However, the question remains as to whether these dollars actually increased spending for food. Disbursements in the form of commodities or of contributions to the National School Lunch Program would not be expected to increase retail food sales. However, bonus food stamps would.

The total value of bonus stamps distributed in the HMR counties equalled 12 percent of total retail food sales (computed from FNS data and 12). This figure, however, cannot be interpreted as the gross contribution to retail food sales. Even though bonus food stamps are spent for food in retail food stores, some dollars formerly spent for food are likely substituted for nonfood items. In September 1976, the average participating household paid nearly 19 percent of its gross income to receive free bonus stamps (16). If prior to participating, households spent more than this amount for food, then the difference between 19 percent and the proportion actually spent for food was freed for other purchases.

Research evidence indicates that bonus stamps appear to be between 40 and 60 percent effective in increasing food expenditures (10). Even when an allowance is made for such substitution, the contribution of food assistance payments to retail food sales in a market area should be measurable.

We adopted a multiple regression model to help quantify the relationships between changes in per capita retail food sales and the amount of per capita food assistance. We applied this model independently for each of the six county data sets identified earlier. Results from the regression analysis provide a quantitative basis for evaluating the following four hypotheses:

(1) Bonus food stamp regression coefficients for HMR and HP counties will be substantially larger than corresponding ones for LMR and LP counties. All coefficient signs will be positive.

(2) Bonus food stamp regression coefficients for HMR and HP county sets will be larger than the corresponding ones for LMR and LP counties. All coefficient signs will be positive.

(3) Coefficients for the food programs buying food for direct distribution from farmers, wholesalers, and manufacturers will be smaller than the bonus food stamp coefficients. Indeed, the signs will be negative instead of positive.

(4) The coefficient for disposable personal income (Adjusted Buying Power) will be smaller than that for bonus food stamps. The sign will be positive.

Estimation Method

For purposes of parameter estimation, we tested the data set developed for this study as a dynamic cross-section and expressed variables for all computations in "real dollars" on a per capita basis. The model may be represented as follows:

$$Y_{it} = B + \sum_{j=1}^{K} B_j X_{jit} + U_{it}$$

Where:

$i = 1, 2, \ldots, N$ cross sections,

$t = 1, 2, \ldots, T$ time periods.

That is, the sample data are represented by observations of K variables from N cross-sectional units over T time periods. Given such a data set, the usual ordinary least squares assumptions regarding normally distributed, homoscedastic, and nonautoregressive disturbances are highly suspect. In addition to the serial correlation problems often encountered in time series data, it is likely the disturbance structure will be substantially different from the disturbances of a single cross-section over time. If the disturbances are homoscedastic and/or autoregressive, the parameter estimates obtained from an ordinary least squares (OLS) estimation over the pooled data will be unbiased but inefficient. That is, if the sampling variances of the coefficients are obtained from least squares formulas, they will likely be underestimated. Therefore, the use of either the t or F tests associated with the OLS estimates is technically invalid for model evaluation. 5/

To cope with such problems, we adopted Park's error components model (5). More specifically, the regression equation was:

$$RFS_p = f(BS_p, F_p, ABP_p, e)$$

where:

RFS_p = retail food sales per person within a specified county,

BS_p = redeemed bonus stamps per person within the specified county,

F_p = commodity distribution per person within the specified county,

ABP_p = adjusted buying power per person within the specified county, and

e = error component.

The Data

A 10-year historical record for income, retail food sales, and assistance from domestic food programs was tabulated for each county. Net sales data for retail food establishments included sales of all products sold in foodstores, both food and nonfood. We derived retail food sales (RFS) by taking the total sales of county retail foodstores, as reported in the Survey of Buying Power (11), and applying an estimate of the percentage of sales allocated to food, published annually by Supermarketing (12). Foodstores were defined as establishments selling food primarily for home consumption. Included were sales from grocery stores; meat and fish markets; fruit and vegetable markets; candy, nut, and confectionery stores; dairy product stores; retail bakeries; and egg and poultry dealers.

5/ For additional detailed discussion of these problems, see (4, 5, 6, and 20).

Appendix tables 1 through 8 present county means and associated standard deviations for each of the regression variables. Retail food sales in LMR and LP counties increased from $22.8 million and $80.8 million, respectively, in 1967, to $44.1 and $162.6 million, respectively, in 1976 (app. tables 1 and 2). In contrast, sales in the NHP and NHMR counties amounted to $4.3 and $5.3 million, respectively, in 1976 (app. tables 5 and 6). These data were supplied by FNS.

Bonus food stamps represent the Federal assistance dollars available for buying food after payment of the purchase requirement. In 1967, the average bonus stamp payment ranged from $7,900 per county in LMR counties to $85,100 in NHP counties (app. tables 1 and 6). By 1976, however, the real value of bonus stamps adjusted for inflation in all but the LP counties varied only slightly. Average benefit payments for LP counties were more than three times those received in NHP counties. Undoubtedly, this is attributable to substantial differences in population among county sets. In 1976, for example, total population in LP counties was 14.3 million (app. table 2) versus 3.8 million in LMR counties (app. table 1). There were fewer than 1.7 million residents in each of the remaining four county sets (app. tables 3-6).

The sum of cash reimbursements made by the Federal Government to schools participating in the National School Lunch Program, plus all commodities distributed to persons and to institutions, was used as a variable (FOOD). Food program data were supplied by FNS.

The importance of population size in comparing the per county values can be seen when we examine the FOOD variable. The data in appendix tables 1 through 6 reveal that, with the exception of the LP counties, there is little variation in the average food program benefits received. However, data in appendix table 7 indicate that per capita payments to NHP and NHMR counties far exceed those to the remaining counties. In 1976, NHP and NHMR participants received Federal assistance via the National School Lunch and Commodity Distribution Programs valued at $26.02 and $27.08 per person, respectively. In contrast, benefits in HP and HMR counties were $10.47 and $14.96 versus $5.86 and $5.68 in LMR and LP counties (app. table 7).

The income variable was derived from the effective buying income (EBI) data contained in the Survey of Buying Power (11). EBI is disposable personal income less compensation paid to military and diplomatic personnel overseas. The EBI includes transfer payments. Consequently, we adjusted this amount by subtracting bonus food stamps from EBI for each county. Adjusted buying power (ABP) thus represents income available for food and other purchases, without double counting Federal assistance provided by food stamps.

ABP in the LP counties was substantially greater than in the remaining counties, ranging from $927 million in 1967 to $2,013 million in 1976 (app. table 2). Predictably, NHP counties had the lowest purchasing power, $34.2 million in 1976 (app. table 4).

Analytical Context

The data used for these regressions were not collected within the context of a tightly controlled experimental design. For example, population changed annually both in size and age distribution. While the Consumer Price Index for food was used to deflate all dollar figures, changes in the price level due to noninflationary sources were not controlled.

Table 7 shows the change in total population for each of the six county sets between 1967-76, the range in population size among counties constituting each set,

Table 7--Population by county categories

County set	1967-76 change	1972 density per square mile	Range	Change in average size between 1967-76
		Number		
Postneonatal mortality group:				
State-- 1/			14,115-	
Highest (HMR)	14,461	25	14,927	1.06
Lowest (LMR)	78,655	201	75,588-	
United States, highest			80,470	1.06
(NHMR) 2/	23,741	39	22,896-	
			24,857	1.09
Poverty group:				
State-- 3/			13,506-	
Highest (HP)	13,633	26	14,046	1.04
Lowest (LP)	290,622	661	270,148-	
United States, highest			303,977	1.13
(NHP) 4/	33,836	72	32,486-	1.09
			35,277	

1/ County in each of the 47 States for which postneonatal data were available.
2/ The 49 counties with the highest postneonatal mortality rates nationwide; more than one county per State could be included.
3/ The county in each of the 47 States for which poverty data were available showing proportion of households below the poverty income line.
4/ The 49 counties with the highest proportion of households below the poverty income line nationwide.

Source: Compu'ed from unpublished Food and Nutrition Service data.

and the average population per square mile for 1972. These data indicate that NHMR and NHP counties were the least populous and had the lowest population density per square mile. Furthermore, the change in average population ranged from 4 to 13 percent, the largest LP counties gaining the most and the smallest NHP counties increasing the least (table 7).

From these data, we infer that the proportion of the total population in NHMR and NHP counties participating in food programs was substantially greater than in LMR and LP counties. Consequently, the effect of food assistance programs on per capita retail food sales in NHMR and NHP counties should be more evident than in LMR and LP counties. The same relationships should hold for HMR and HP counties.

Convential viewpoints on retail food sales, supported by undeflated time series data, portray continued escalation of retail food sales during the past decade. Deflated data (1967 dollars) suggest a somewhat different picture (table 8). In each of the six data sets, figures in constant 1967 dollars show that, for at least 40 percent of the years in the decade, county retail food sales in real dollars were less than in 1967. Table 8 indicates that in terms of year-to-year comparisons, for each of the six data sets, the following year's total retail food sales were greater than those for the preceding year only 53.7 to 59.1 percent of the time. In fact, only for the NHMR set did as many as seven counties have even 5 consecutive years (1971-76) with such a sequence. During this period, 10 counties had real total food sales lower

Table 8--Total retail food sales: Specified comparisons of county sets, 1967-76

County set	Proportion of years in which retail food sales were--	
	Less than 1967's	Greater than preceding year's
	Percent	
Highest nationwide postneonatal mortality rate (NHMR)	51.1	59.1
Highest nationwide poverty (NHP)	40.1	59.0
Highest in State postneonatal mortality rate (HMR)	46.0	57.7
Highest in State poverty (HP)	46.8	51.1
Lowest in State postneonatal mortality rate (LMR)	47.0	57.0
Lowest in State poverty (LP)	50.1	53.7

Source: Computed from (11).

than the preceding year's in at least 3 of the last 5 years. Also, in terms of real per capita retail food sales, four of the six county sets in 1976 had either an increase over corresponding 1967 sales of less than 10 real dollars or an actual decrease. Two county sets had real per capita increases of between 18 and 19 dollars (app. table 8). Such data do not yield high coefficients of determination.

Empirical Results

The regression model was constructed to explain observed changes in per capita retail food sales (in 1967 dollars). Results (in constant dollars) show for each dollar's change in average per capita retail food sales how much may be attributed to bonus food stamps, other food assistance transfers, and adjusted buying power. We use results from the NHP counties to interpret data for each of the other county groups.

Bonus Food Stamps

In NHMR counties, of each dollar's change in per capita retail food sales, 15.8 cents may be attributed to food bonus stamp transfers, 1.8 cents to transfers from the National School Lunch and Commodity Distribution programs, and 2.1 cents to adjusted buying power. Thus, almost 18 percent of each dollar's change in per capita retail food sales was linked to food assistance payments, 2 percent to adjusted buying power, and 80 percent to unidentified variables.

The association between bonus food stamps and retail food sales was less strong in other county groups. However, the coefficient for real bonus food stamps was positive for NHMR, NHP, HMR, and HP county sets; it was negative for the LMR and LP sets. All coefficients, except those for the HMR set, were statistically significant at the 5-percent level, or below. The food stamp coefficients for the NHP and NHMR

county categories (10.0 cents and 15.8 cents) 6/ were larger than those for the HMR and HP county sets (1.9 cents and 4.0 cents) and the LMR and LP categories (-0.1 cent and -8.2 cents); see table 9. With respect to coefficient size these data support our hypotheses concerning the relationships between changes in per capita retail food sales and the amount of per capita food assistance (see p.18). However, two unanticipated results require explanation. The signs for the LMR and LP sets were negative, and the HMR coefficient was not statistically significant for bonus food stamps.

Each of the following county conditions would contribute to the statistical estimation of a negative sign for the bonus food stamp coefficients for the LMR and LP sets:

(1) A very small proportion of the county's total population receiving food assistance during the observed period.

(2) A substantial number of years during which the following year's average real retail food sales per person were less than those of the preceding year.

(3) Relatively few years during which the county had participated in the Food Stamp Program.

(4) A substantial proportion of the population residing on an Indian reservation. 7/

The LMR and LP county sets had a larger total population and a higher population density than did any other county set (table 7). For these counties, a smaller proportion of the total population used bonus food stamps. Of those using the bonus food stamps, it is very likely that a high proportion of these participants received the smaller, rather than the larger, amounts of bonus stamps. This situation occurs because these households are likely to fall within income groups that approach the cut-off level for income eligibility.

For the LMR county set, the following year's total food sales were less than the preceding year's in 43 percent of cases. The corresponding figure for the LP county set was 46 percent. In only five counties did total retail food sales exceed those during the preceding year for as many as 5 consecutive years. Total retail food sales were less than those during the preceding year for 9 LMR counties and for 11 LP counties. For both groups, in at least 47 percent of the observed years, real total retail food sales were less than those reported for 1967. In addition, 12 LP counties (25.5 percent) and 15 LMR counties (32.0 percent) participated in the Food Stamp Program for 5 years or less in the 1967-76 period.

The explanation for the lack of statistical significance for the HMR county set is similar to that for the LMR and LP sets. Fifteen of the 47 counties in the HMR set participated in the Food Stamp Program for 5 years or less. Of these 15 counties, 6 had a large Indian population. For example, Roosevelt County, Montana, had a total population of 10,635 in 1970. According to the U.S. Department of Interior, over 20

6/ The coefficient for the 49 NHMR set illustrates how each of these bonus food stamp coefficients may be interpreted. For each additional dollar of bonus food stamps spent, the average retail food sales per person increased by 10.0 cents (±1.9 cents). This concept includes all persons residing in the county, not just those receiving bonus food stamps.

7/ Persons residing on Indian reservations frequently preferred the Commodity Distribution Program. When food stamps replaced distributed commodities, the rate of participation in the Food Stamp Program rose slowly.

Table 9—Results of regression analysis using Park's error component model, 1967-76

County set	Intercept	Bonus food stamps	Food	Adjusted buying power
		Dollars		
Postneonatal mortality group:				
State— 1/				
Highest (HMR)	89.025	0.019*	-1.548	0.076
	1/(5.95)	(.078)	(.166)	(.004)
Lowest (LMR)	160.605	-.082	-.118	.036
United States, highest	(.949)	(.010)	(.026)	(.000)
(NHMR) 2/	126.876	.158	.018	.021
	(.071)	(.000)	(.000)	(.000)
Poverty group:				
State— 3/				
Highest (HP)	106.173	.040	-.252	.046
	(2.920)	(.019)	(.044)	(.000)
Lowest (LP)	199.293	-.001	-.265	.018
	(.000)	(.000	(.000)	(.001)
United States, highest				
(NHP) 4/	116.013	.100	-.280	.035
	(3.475)	(.019)	(.036)	(.003)

*This is the only coefficient that was NOT statistically significant at the 5-percent level or below.

1/ Figures in parentheses are standard errors. If reported with the value of (0.000), it means they were too low in the fourth decimal place to round upward.

2/ The 49 counties with the highest postneonatal mortality rates nationwide; more than one county per State could be included.

3/ The county in each of the 47 States for which poverty data were available showing proportion of households below the poverty income line.

4/ The 49 counties with the highest proportion of households below the poverty income line nationwide.

Source: Computed from unpublished Food and Nutrition Service data.

percent of this county's population is of Indian origin (18). Todd County, South Dakota, is part of the Rose Bud Indian Reservation.

The Indians favored the Commodity Distribution Programs and were slow to participate in the Food Stamp Program. Of the 47 counties in this set, 32.0 percent participated less than 3 years during the decade. The weight of these 15 counties was apparently sufficient to result in a low coefficient estimate and a high standard error. Nevertheless, the weight of the last 4 years was sufficient to result in a positive sign.

The results reported here are not directly comparable to those reported previously by Nelson (9) and Reese (10) for the following three reasons:

(1) The earlier studies used actual, not real, dollars.

(2) The earlier studies refer only to bonus stamp dollars, whereas the equation here includes additional food assistance, some of which enters food markets at wholesale and manufacturing levels.

(3) These real retail sales dollars were computed by dividing total retail food sales dollars by the county's total population, not just by the number of its food stamp participants.

The Food Variable

Commodity purchases made by USDA and by schools participating in the National School Lunch Program typically are made at the farm, wholesale, and manufacturing levels. Such purchases, therefore, usually do not show up in retail food sales for home preparation.

To the extent that school lunches substitute for food prepared at home from food purchased from retail foodstores, they reduce per capita retail food sales. Consequently, we expected the sign for the food coefficient to be negative. Statistical findings confirmed our expectations for all but the NHP county set. 8/

Previous surveys have shown that when school lunch programs are small and are located in small communities, food for lunches is often purchased from local retailers. The NHP county set had an average population density of 26 persons per square mile.

Direct purchases from local retailers could result in a positive coefficient. However, the data obtained in this study are not sufficient to confirm this hypothesis.

For every dollar distributed through the combined National School Lunch (Federal cash reimbursements) and Commodity Distribution Programs in NHMR counties, total per capita real retail food sales declined by 28.2 cents (± 3.6 cents). The corresponding statistics for the HMR and HP county sets were -$1.55 (± 16.6 cents) and -25.2 cents (± 4.4 cents), respectively. For the LMR and LP county sets, they were -11.8 cents (± 2.6 cents) and -26.5 cents (± zero cents), respectively.

8/ For the NHP county set, the coefficient for the food variable was 1.8 cents and was statistically significant.

Adjusted Buying Power

As expected, the sign for the adjusted buying power coefficient was positive for each of the county sets. For the NHMR and NHP sets, the bonus food stamp coefficient was larger than for the adjusted buying power coefficient. Although this result had also been hypothesized, the coefficient was found to be smaller for the HMR and HP sets.

Both the bonus food stamp and the adjusted buying power variables have a statistically significant coefficient in the HP county set. They differ substantially in the size of their standard error, but by much less in the value of the coefficient. This difference is related to the small variations year to year in the value of the per capita adjusted buying power in constant dollars. In contrast, the per capita average value of the bonus food stamp grant rose sharply during 1971-76, particularly during the last 3 years. The rapid escalation of the bonus food stamp value resulted in this variable's coefficient having a wide range of values and, consequently, a much larger standard error.

During the second decade of the Food Stamp Program, the average per capita bonus food stamp grant should stabilize. At that point, the probability is great that the value of the coefficient of the bonus food stamp grant will be greater than the corresponding coefficient for adjusted buying power in constant dollars.

CONCLUSIONS

Progress has been made in providing food for poor people in the United States. On average, households in localities with the greatest need received substantially more food assistance funds than households in areas with higher incomes. Over the past decade, the increase in retail food sales per person was substantial in counties with high postneonatal mortality rates and with the greatest poverty. In all other counties, the increase was much lower.

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APPENDIX

List of 49 Highest Hunger Counties in the United States (NHP)

State and county	State and county
Alabama:	New Mexico:
Bullock	Mora
	Sandoval
Arizona:	Taos
Apache	
	North Carolina:
Colorado:	Hoke
Conejos	Tyrrell
	Washington
Florida:	
Flagler	South Carolina:
Gadsden	Darlington
	Marion
Georgia:	Marlboro
Clinch	
Greene	South Dakota:
Hancock	Bennett
Jasper	Mellette
Lincoln	Shannon
Randolph	Todd
Terrell	
Warren	Tennessee:
Washington	Lake
Worth	
	Texas:
Illinois:	Caldwell
Pulaski	Dimmitt
	Foard
Louisiana:	Hays
East Carroll	Kinney
Madison	LaSalle
	San Augustine
Mississippi:	Willacy
Claiborne	Zavala
Humphrey	
Issaquena 1/	Virginia:
Jefferson	Accomack
Leflore	
Sharkey 1/	
Tallahatchie	
Tunica	

1/ Data were reported as single totals for these two counties which could not be disaggregated.

Appendix table 1--County means and standard deviations for regression model variables, low postneonatal counties, fiscal years 1967-76 1/

Variable	1967	1968	1969	1970	1971
			1,000 dollars		
Bonus food stamps	7.94 (22.85)	15.64 (40.80	47.28 (107.54)	113.30 (266.95)	308.70 (714.94)
Adjusted buying power	198,084.66 (589,366.38)	217,073.68 (638,991.80)	234,884.53 (686,505.04)	297,577.57 (811,604.24)	311,401.40 (840,751.97)
Retail food sales	22,830.31 (56,038.33)	23,495.19 (57,606.22)	24,970.12 (62,367.72	26,517.94 (67,680.99)	28,577.03 (73,036.27)
Food	130.19 (206.32)	173.32 (283.76)	195.43 (326.85)	136.89 (237.93)	342.89 (1,013.69)
Total population (thousands)	3,552.6	3,594.7	3,637.0	3,679.4	3,713.7
	1972	1973	1974	1975	1976
			1,000 dollars		
Bonus food stamps	353.21 (774.99)	399.34 (801.54)	518.68 (1,033.51)	888.98 (1,665.85)	907.96 (1,548.59)
Adjusted buying power	336,395.68 (904,756.29)	368,744.57 (985,702.75)	412,566.91 (1,104,494.41)	464,553.87 (1,248,446.19	518,628.72 (1,396,782.40)
Retail food sales	31,453.70 (80,910.93)	36,432.59 (92,638,44)	38,905.65 (94,909.26)	40,806.52 (96,675.24)	44,071.78 (104,044.60)
Food	279.87 (544.05)	301.66 (559.52)	453.85 (1,022.22)	380.43 (719.28)	471.74 (873.71)
Total population (thousands)	3,747.9	3,746.1	3,739.6	3,744.5	3,782.1

1/ Standard deviations are reported in parentheses.

Source: Computed from Food and Nutrition Service (FNS) records and (13).

Appendix table 2--County means and standard deviations for regression model variables, low poverty counties, fiscal years 1967-76 1/

Variable	1967	1968	1969	1970	1971
			1,000 dollars		
Bonus food stamps	23.38 (71.08)	45.57 (95.84)	124.09 (246.98)	437.02 (1,030.47)	1,290.13 (2,427.94)
Adjusted buying power	926,966.23 (1,222,694.63)	1,010,090.72 (1,335,475.78)	1,092,482.02 (1,447,413.71)	1,173,875.85 (1,550,279.82)	1,259,797.81 (1,642,041.73)
Retail food sales	80,811.35 (113,192.17)	86,478.73 (127,799.58)	92,043.99 (126,425.41)	97,042.43 (125,756.27)	103,853.81 (131,852.01)
Food	479.06 (514.69)	623.23 (673.48)	634.96 (653.74)	527.11 (647.52)	1,004.87 (1,288.47)
Total population (thousands)	12,697.0	12,986.1	13,275.8	13,565.3	13,713.3
	1972	1973	1974	1975	1976
			1,000 dollars		
Bonus food stamps	1,400.60 (2,304.02)	1,549.74 (2,433.13)	1,961.66 (2,966.57)	3,087.51 (3,638.79)	3,846.36 (4,312.54)
Adjusted buying power	1,358,878.02 (1,732,613.09)	1,500,653.28 (1,879,139.59)	1,661,819.49 (2,064,862.45)	1,849,893.26 (2,281,656.59)	2,013,225.26 (2,467,534.10)
Retail food sales	112,071.45 (138,024.78)	129,701.42 (155,294.80)	142,353.03 (164,510.67)	150,700.48 (170,582.96)	162,557.66 (179,047.86)
Food	1,113.45 (1,206.71)	1,240.32 (1,333.35)	1,334.40 (1,341.26)	1,410.55 (1,410.18)	1,726.81 (1,709.40)
Total population (thousands)	13,861.3	13,977.1	14,059.5	14,188.8	14,286.9

1/ Standard deviations are reported in parentheses.

Source: Computed from Food and Nutrition Service records and (13).

Appendix table 3—County means and standard deviations for regression model variables, high postneonatal counties, fiscal years 1967-76 1/

Variable	1967	1968	1969	1970	1971
			1,000 dollars		
Bonus food stamps	37.32 (115.19)	69.64 (167.01)	91.04 (177.43)	177.66 (299.46)	397.62 (599.20)
Adjusted buying power	45,269.70 (72,713.12)	48,594.83 (78,532.59)	51,925.32 (84,667.41)	55,102.81 (89,724.57)	59,099.15 (96,830.62)
Retail food sales	5,477.04 (7,759.55)	5,623.88 (8,084.32)	6,062.09 (8,979.13)	6,391.05 (9,609.62)	6,819.70 (10,044.18)
Food	118.77 (147.15)	133.34 (168.42)	166.38 (216.64)	145.87 (190.43)	271.60 (361.10)
Total population (thousands)	1,076.1	1,080.9	1,086.0	1,090.6	1,109.0
	1972	1973	1974	1975	1976
			1,000 dollars		
Bonus food stamps	420.64 (595.86)	483.23 (653.22)	563.68 (734.71)	833.02 (1,069.63)	961.53 (1,274.59)
Adjusted buying power	65,319.74 (109,952.71)	73,303.04 (125,285.80)	81,800.85 (138,849.28)	90,415.19 (151,148.24)	99,936.40 (164,829.28)
Retail food sales	7,404.28 (10,895.82)	8,566.88 (12,677.33)	9,563.02 (13,906.09)	10,270.26 (14,802.37)	11,023.00 (15,721.83)
Food	270.81 (279.28)	275.28 (253.89)	303.81 (298.44)	305.98 (270.02)	371.79 (335.10)
Total population (thousands)	1,127.3	1,142.0	1,142.5	1,135.5	1,168.3

1/ Standard deviations are reported in parentheaes.

Source: Computed from Food and Nutrition Service records and (13).

Appendix table 4--County means and standard deviations for regression model variables, 49 highest poverty counties, fiscal years 1967-76 1/

Variable	1967	1968	1969	1970	1971
			1,000 dollars		
Bonus food stamps	85.10 (155.51)	211.55 (299.79)	221.63 (277.69)	409.81 (456.26)	764.02 (844.36)
Adjusted buying power	16,432.45 (11,910.31)	18,237.33 (13,029.68)	19,045.31 (13,868.18)	20,439.20 (14,556.23)	21,575.00 (15,313.09)
Retail food sales	2,185.73 (1,787.60)	2,268.86 (1,896.67)	2,384.04 (1,946.80)	2,452.14 (1,967.49)	2,676.19 (2,159.02)
Food	150.76 (158.60)	124.81 (112.01)	188.52 (183.40)	168.02 (194.90)	287.84 (234.44)
Total population (thousands)	688.3	679.6	670.8	662.1	662.2
	1972	1973	1974	1975	1976
			1,000 dollars		
Bonus food stamps	735.65 (773.21)	772.49 (794.29)	848.08 (831.35)	1,119.86 (947.31)	1,149.96 (920.54)
Adjusted buying power	23,329.08 (16,558.33)	25,953.65 (18,960.75)	29,193.37 (21,732.58)	32,506.41 (24,101.28)	34,197.55 (24,442.35)
Retail food sales	2,962.78 (2,408.04)	3,545.37 (2,957.90)	3,899.95 (3,404.50)	3,986.57 (3,620.08)	4,278.55 (3,895.30)
Food	320.02 (251.81)	321.00 (246.64)	354.70 (287.15)	311.29 (221.99)	353.20 (247.47)
Total population (thousands)	662.2	664.5	661.8	664.0	665.0

1/ Standard deviations are reported in parentheses.

Source: Computed from Food and Nutrition Service records and (13).

Appendix table 5--County means and standard deviations for regression model variables, (49 highest post-neonatal counties, fiscal years 1967-76 1/

Variable	1967	1968	1969	1970	1971
			1,000 dollars		
Bonus food stamps	30.18 (69.98)	89.57 (196.54)	111.06 (184.92)	220.41 (308.11)	444.98 (580.49)
Adjusted buying power	19,768.18 (18,056.01)	21,731.96 (20,259.43)	23,389.90 (21,882.46)	25,031.35 (23,544.58)	26,586.51 (25,033.93)
Retail food sales	2,549.68 (2,460.31)	2,600.29 (2,516.16)	2,693.50 (2,666.81)	2,801.07 (2,827.08)	3,035.56 (3,048.38)
Food	123.25 (133.34)	143.50 (141.29)	190.94 (200.04)	161.73 (168.28)	295.12 (297.50)
Total population (thousands)	702.9	699.2	695.5	691.7	697.5
	1972	1973	1974	1975	1976
			1,000 dollars		
Bonus food stamps	471.24 (575.36)	535.24 (645.07)	662.22 (695.65)	897.76 (858.82)	947.82 (858.42)
Adjusted buying power	27,954.63 (25,315.59)	30,440.12 (27,002.69)	34,091.88 (30,288.12)	37,932.29 (33,656.81)	42,759.57 (37,710.61)
Retail food sales	3,308.60 (3,348.76)	3,968.14 (4,052.80)	4,540.44 (4,642.55)	4,873.47 (5,012.16)	5,282.39 (5,422.33)
Food	321.68 (263.19)	362.77 (431.43)	387.87 (549.23)	422.80 (741.14)	404.24 (317.78)
Total population (thousands)	703.3	716.0	719.3	728.9	731.4

1/ Standard deviations are reported in parentheses.

Source: Computed from Food and Nutrition Service records and (13).

Appendix table 6—County means and standard deviations for regression model variables, high poverty counties, fiscal years 1967-76 1/

Variable	1967	1968	1969	1970	1971
			1,000 dollars		
Bonus food stamps	25.23 (61.96)	50.26 (121.19)	56.38 (117.59)	139.72 (293.63)	352.21 (704.03)
Adjusted buying power	93,082.62 (432,753.69)	100,671.11 (469,575.75)	109,112.94 (512,488.15)	116,373.68 (547.856.84)	125,651.40 (594,570.34)
Retail food sales	8,761.47 (35,636.62)	9,079.97 (37,209.57)	9,702.55 (39,638.87)	10,161.41 (40,946.63)	10,781.19 (42,995.86)
Food	94.46 (130.95)	110.92 (180.57)	158.94 (203.24)	155.92 (198.85)	243.20 (339.35)
Total population (thousands)	1,526.8	1,541.7	1,556.6	1,571.5	1,585.9
	1972	1973	1974	1975	1976
			1,000 dollars		
Bonus food stamps	369.28 (723.46)	386.68 (746.44)	505.00 (966.08)	760.49 (1,398.78)	884.55 (1,841.85)
Adjusted buying power	134,950.87 (630,075.37)	146,712.13 (669,970.89)	165,375.19 (757,926.45)	183,189.11 (840,059.01)	200,619.70 (911,681.45)
Retail food sales	11,447.31 (44,602.35)	12,609.41 (48,666.21)	14,236.65 (52,896.22)	15,127.06 (55,009.19)	16,087.94 (58,076.76)
Food	260.94 (340.93)	322.87 (541.71)	355.45 (658.38)	400.19 (892.30)	369.39 (642.90)
Total population (thousands)	1,600.4	1,614.8	1,613.2	1,634.1	1,658.0

1/ Standard deviations are reported in parentheses.

Source: Computed from Food and Nutrition Service records and (13).

Appendix table 7--Per capita payments for food variable, fiscal years 1967-76 1/

County	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
	Dollars									
Postneonatal mortality group:										
State-- 2/										
Highest (HMR)	5.19	5.80	7.20	6.29	11.51	11.29	11.33	12.50	12.66	14.96
Lowest (LMR)	1.72	2.27	2.53	1.75	4.34	3.51	3.78	5.70	4.74	5.86
United States, highest (NHMR) 3/	8.59	10.06	13.45	11.46	20.73	22.41	24.83	26.42	28.42	27.08
Poverty group:										
State-- 4/										
Highest (HP)	2.91	3.38	4.80	4.66	7.21	7.66	9.40	10.36	11.51	10.47
Lowest (LP)	1.77	2.26	2.25	1.82	3.44	3.77	4.17	4.46	4.67	5.68
United States, highest (NHP) 5/	10.73	9.00	13.77	12.43	21.30	23.68	23.67	26.26	22.97	26.02
United States, average 6/										

1/ Food variable is computed by combining per capita payments for the National School Lunch and Commodity Distribution Programs.
2/ County in each of the 47 States for which postneonatal data were available.
3/ The 49 counties with the highest postneonatal mortality rates nationwide; more than one county per State could be included.
4/ The county in each of the 47 States for which poverty data were available showing proportion of households below the poverty income line.
5/ The 49 counties with the highest proportion of households below the poverty income line nationwide.
6/ The U.S. all-county average.

Source: Computed from unpublished Food and Nutrition Service data and (14).

Appendix table 8--Per capita retail food sales, by county group, fiscal years 1967-76

County	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
	1967 constant dollars									
Postneonatal mortality group:										
State--										
Highest (HMR)	239.21	236.05	240.92	239.70	244.11	249.96	249.35	243.29	242.36	245.27
Lowest (LMR)	302.04	296.52	296.31	294.81	305.46	319.38	232.27	302.39	289.69	302.92
United States, highest (NHMR) 1/	177.73	175.90	174.26	172.71	180.11	186.66	192.05	191.28	186.78	195.74
Poverty group:										
State-- 2/										
Highest (HP)	269.70	267.19	269.02	264.50	269.86	272.21	259.55	256.51	248.05	252.24
Lowest (LP)	299.14	302.11	299.23	292.62	300.63	307.69	308.44	294.30	284.60	295.78
United States, highest (NHP) 3/	155.61	157.92	159.91	157.94	167.26	177.51	184.89	178.57	167.72	174.37

1/ The 49 counties with the highest postneonatal mortality rates nationwide; more than one county per State could be included.

2/ The county in each of the 47 States for which poverty data were available showing proportion of households below the poverty income line.

3/ The 49 counties with the highest proportion of households below the poverty income line nationwide.

Source: Computed from unpublished Food and Nutrition Service data.