DOCUMENT RESUME

ED 054 258   UD 011 736

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TITLE   Analysis of the National School Lunch Program and
               Child Nutrition Needs.
INSTITUTION   Urban Inst., Washington, D.C.
SPONS AGENCY   Ford Foundation, New York, N.Y.
REPORT NO   UI-705-51
PUB DATE   Mar 71
NOTE   39p.
AVAILABLE FROM Publications Office, Urban Inst., 2100 M Street,
               N.W., Washington, D.C. 20037 ($2.00)

EDRS PRICE   EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS   Administrative Policy, *Childhood Needs, Cost
               Effectiveness, Disadvantaged Youth, Federal
               Programs, Financial Policy, Low Income, Lunch
               Programs, *Nutrition, *Program Evaluation, Program
               Improvement, *Resource Allocations, School
               Involvement, Systems Analysis
IDENTIFIERS   *National School Lunch Program

ABSTRACT

A number of criticisms of the National School Lunch
Program are substantiated by a structural analysis within the general
context of national child nutrition needs. The National School Lunch
Program has been criticized principally on the ground of inadequate
coverage of child nutrition needs, particularly for poor children.
For the year 1968, access to the school lunch program was available
in 71,983 out of approximately 119,000 schools. However, only
approximately 18.5 out of approximately 55.8 million children, aged
five to 18, participated in the program. Thus, the program actually
reached only about 33 percent of the nation's school age children.
Only 2,409,680 out of 8,579,392 poor school-age children were served.
The program does not favor the requirements of the needy. However,
for the 1968 level of government appropriations to the school meal
programs, more unmet child nutrition needs could be filled by, at the
least, guaranteeing a free meal to all poverty children and raising
prices for non-poverty children in schools that currently have a meal
program. (Author/JM)

Analysis of the National School Lunch Program and Child Nutrition Needs

Dennis Young

705-51   MARCH 1971

THE URBAN INSTITUTE
WASHINGTON, D.C.

UI   705-51

Available from

Publications Office
The Urban Institute
2100 M Street, N.W.
Washington, D.C.   20037

List price: $2.00

ABSTRACT

The National School Lunch Program is analyzed in the general context of
the national child nutrition needs. In terms of output per dollar it
appears that the most effective program would be one requiring 100 percent
participation of all schools and free meals for all poor children. This
is contrasted with the present program which reaches about 33 percent of
school-age children, of whom 13 percent receive free or reduced-price
meals, i.e., only 2.4 million of the nation's 8.6 million poor school-age
children are served. Recognizing the inadequacy of currently available
data, the author outlines a more comprehensive research and analysis plan
for verifying the findings.

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PROGRAM ANALYSIS: CASE STUDY

National School Lunch Program

Dennis Young

In the fall of 1969 panel members of the White House Conference
on Food, Nutrition, and Health expressed special interest in
the National School Lunch Program (NSLP), and how it might be
improved and expanded. This analysis is based in part on work
done by the research staff of the Urban Institute at the request
of Conference panel members.

Summary

Program:

This report develops a structural framework for analyzing the
National School Lunch Program in the general context of national
child nutrition needs. In addition, a simplified preliminary
analysis is developed using tentative numerical data to evaluate
proposed alternative courses of action for improving the program.

Need:

The National School Lunch Program has been criticized principally
on the ground of inadequate coverage of child nutrition needs,
particularly for poor children. For the year 1968:[1/]

1.   Access to the school lunch program was available in 71,983 out of approximately 119,000 schools. However, only 18.5 million out of approximately 55.8 million children aged 5 to 18 participated in the program. Thus, the program actually reached only about 33 percent of the nation's school-age children and, as we shall see, provided a considerably smaller percentage of their nutritional requirements.

2.   If we estimate the number of poor children that were served meals by the proportion of total meals served at free or reduced price (13%), then only 2,409,680 out of 8,579,392 poor school-age children were served by NSLP.[2/] From Figure 1, which shows the relative impact of the NSLP on poverty and non-poverty children, it is clear that the program does not favor the requirements of the needy.

3.   Figure 2 illustrates that the NSLP provided only 4 per-cent of the total annual U. S. child nutrition requirement when measured in terms of "child-RDA-days." (RDA is the "recommended dietary allowance" for one child in one day, as specified by the Food and Nutrition Board of the National Research Council, National Academy of Sciences.[3/]) Gaps in coverage result from three factors: (a) Broad categories of children do not partici-pate either voluntarily or because they are excluded; (b) School meals account for only 1 meal (1/3 RDA) per day; (c) Meals are served only on school days.

4. Substantial deficiencies appear to exist in the diets of Americans. According to preliminary results of the National Nutrition Survey,$\underline{4}$/ these deficiencies are greater for children and greater for poor people (and presumably greatest for poor children). Figures 3 and 4 illustrate some of these findings.

5. Although conclusive quantitative evidence is lacking in some areas, substantial nutrition-related deficiencies in health, educational achievement, and other areas of child development appear to exist in the United States. The hearings of the Senate Select Committee on Nutrition and Human Needs,[1] and "Hunger, U.S.A."[2] are illuminating on this subject.

Findings:

The preliminary analysis presented below yields the following tentative conclusions:

1. For the current (1968) level of government appropriations to the school meal programs, more unmet child nutrition needs could be filled by guaranteeing a free meal to all poverty children and raising prices for non-poverty children in schools that currently have a meal program.

2. An even greater quantity of unmet needs could be filled by increasing government funding, so that meals can be provided at lower prices for non-poverty children and free for all poverty

children, in schools with a meal program. However, the pro-
ductivity of government dollars (unmet needs filled per
government-appropriated dollar) decreases as government funding
increases (and meal prices are lowered).

3. Greater productivity can be achieved by requiring that
all schools have a meal program, in which all poverty children
receive free meals. Again, more unmet needs can be filled (at
lower productivity) by lowering meal prices for non-poverty
children.

4. Sensitivity tests on several important parameter values
indicate that 10-percent variations in the values do not change
the general conclusions (1), (2), and (3).

Analysis

Background:

The U. S. government sponsors a set of child nutrition programs
authorized by the National School Lunch Act of 1946 and the Child
Nutrition Act of 1966. The purpose of these programs is "to
make the best possible nutrition available to every child, regard-
less of the economic condition of the child's family or the local
district."[5/] A secondary objective is to increase farm income by
expanding agricultural markets. The programs are administered by
the U. S. Department of Agriculture.

The set of child nutrition programs as listed in the U. S.
Budget for fiscal year 1970 under "(School Lunch Program) Child
Nutrition Programs," along with its financing in 1968, is shown
below:

		1968 Actual (in millions)
State and local contributions (total, including payments by children)		$1,428.4
Federal financing:		
1.	Cash payments to states:	
	(a) School Lunch Program	154.9
	(b) Special Assistance	4.8
	(c) School Breakfast Program	2.1
	(d) Nonfood Assistance Program	.7
	(e) State administrative expenses	----
	(f) Nonschool Food Program	----
2.	Commodity Procurement (sec. 6)	55.5
3.	Surplus commodity distribution	220.5
	Federal contributions	438.5
	Total, all contributions	$1,866.9

As shown, there are six categories of federal cash assistance
to states: (a) the "School Lunch Program" is the traditional
mid-day school meal program requiring a $3 matching of state and
local funds (including children's payments) to every $1 of federal
funds; (b) "Special Assistance" provides additional funds

for supporting free and reduced priced meals to needy students;
(c) "School Breakfast" provides meals before classes to students
in schools in poor areas. About 70 percent of these meals are
free or reduced price; (d) "Nonfood Assistance" helps schools to
purchase food service equipment; (e) "State Administrative
Expenses" supports technical assistance and supervision to local
school districts; and (f) "Nonschool Food" assists nonprofit food
services for children in other institutions.

"Commodity Procurement" provides federally purchased com-
modities to schools to supplement food purchased locally, and
"Surplus Commodity Distribution" provides U. S. surplus agri-
cultural products to schools. The bulk of resources for the child
nutrition programs goes into the traditional lunch program itself,
with much smaller portions devoted to breakfasts and support for
free and reduced priced lunches in poor areas.

Objectives:

The problem of nutrition can be discussed on various levels.
On a high level, one must consider the broad areas of social
needs (i.e., social goals) to which a nutrition program would
contribute. Some of these areas are Health, Education, Allevi-
ation of Poverty, Control of Crime and Delinquency, and Pleasure.
The contribution of nutrition to Health is clear. That nutrition
contributes to educational achievement is generally accepted,

although there has been little scientific documentation. However, it is reasonable to infer that hunger and ill health resulting from malnourishment impede the student and distract his attention from school work. Nutrition programs may also contribute to the alleviation of poverty since the provision of food to people at lower cost than they would otherwise purchase it constitutes a form of supplemental income. Nutrition programs may, in addition, help control crime by alleviating human conditions that encourage antisocial behavior. Finally, nutrition contributes to the pleasure of people who enjoy eating.

When considered in the broad context of health, education, and the other social needs, nutrition programs constitute just one set of possible alternatives for achieving goals in these areas. Table I suggests some of the other alternative programs that may compete with or complement nutrition in achieving social goals in various areas. The table also indicates possible output indexes to measure achievement of the goals. Such measures would be required to establish functional relationships between outputs in health, education, and so on, and (input) nutrition program products.

In addition to there being alternatives to nutritional programs in each area of social needs, there are alternative kinds of nutrition programs, each of which is intended to provide better diets for Americans. These include:

School Meal Programs

Nutrition Education

Other Forms of Institutional Feeding

Food Stamps

Direct Distribution of (Surplus) Unprepared Foods

Fortification of Foods Eaten by Low Income People

Each of these alternatives may be more or less well suited to meeting specific kinds of nutritional needs (defined in terms of needy groups, degree of malnourishment, etc.), and therefore may have different impacts toward the achievement of health and education goals, etc.

Consideration of nutrition programs in terms of high-level objectives, i.e., those in health, education, and so forth, is necessary at least for deciding the approximate level at which nutrition programs should be supported vis-a-vis alternative social programs. In addition, it is desirable to maintain this perspective in doing a detailed analysis of specific nutrition programs. However, the present state of knowledge does not permit establishing quantitative functional relationships between nutrition and the achievement of outputs in health, education, and other important areas. Thus, for purposes of a preliminary analysis at least, it is expedient to assume that nutritional deficiencies (failure of people to consume required quantities

of essential nutrients) are harmful per se, and that a sufficient
objective is to attempt to eliminate these deficiencies. The
thrust of the analysis, henceforth, will be directed along
these lines, with the recognition that research into nutritional
impacts on social goals is badly needed and that comprehensive
analyses of nutritional programs should make use of any new
knowledge in this area.

Analytic Structure:

The objective for analysis of the NSLP will be to develop a
program to fill the greatest possible proportion of <u>otherwise
unmet</u> nutritional needs for all U. S. children subject to
(alternative) prescribed levels of budget authorization.

   The following definitions are useful in interpreting this
objective:

   (a) The <u>output measure</u> is the amount of unmet child nutri-
tion needs filled by the program, i.e., the number of net child-
RDA-days (NCRD's) supplied.

   (b) An <u>unmet need</u> is that part of a child's RDA that would
not be consumed, in the absence of a school meal program

   (c) <u>Filled unmet needs</u>, i.e., <u>net child-RDA-days</u>, constitute
that portion of child-RDA-days (CRD's) provided by NSLP that cause
net reductions in children's daily nutrient deficiencies.

(d) The budget autnorization is that portion of funds allo-
cated by government (federal, state, and local) to the school
meal program, exclusive of revenues collected from children.

The notion of unmet needs requires, perhaps, some additional
clarification. If there were no school meal program, then a
certain proportion of total child nutrition requirements would
not be filled. These are the unmet needs. When a school meal
program is instituted, it provides a certain number of meals,
or equivalently, a certain number of CRD's. Some of the CRD's
are wasted (not eaten), some perform as substitutes for CRD's
that would be provided elsewhere (in the absence of a school meal
program), and others meet needs that would not otherwise be filled.
The latter constitutes the category of net child-RDA-days (NCRD's).

Measuring output simply in terms of aggregate unmet needs
supplied is clearly an expediency that does not account for differ-
ential effects on health, education, etc., that different dis-
tributions of this output (over child population groups, etc.)
might have. But in the absence of information on this subject,
the present approach will suffice.

The objective function may be written as:

$$NCRD = Tdr P_s P_e P_a P_p u \tag{1}$$

where

    d = proportion of days per year that meals are served

    r = proportion RDA supplied per day per participant

P_s = proportion of child population eligible (by age)

P_e = proportion of eligible children that are enrolled

P_a = proportion of enrolled children in schools with (access to) the NSLP

P_p = proportion of children in NSLP schools that participate in the program

u = proportion of child-RDA-days (CRD's) supplied by NSLP that fulfill othersise unmet needs

T = total annual child nutrition requirements

(365 days x 1 RDA x total child population)

The reader will recognize that the factors d, r, P_s, P_e, and P_p in formula (1) correspond to the sectors of the pie chart of Figure 2. T corresponds to the total value of the pie, and factor u would correspond to an additional slice equal to u percent of sector 1.

The strategy of this analysis will be to maximize the objective (NCRD) over a set of alternative program modifications, subject to financial constraints (revenues must cover costs and government budget appropriations are limited). The objective depends on many variables, some of which are identified in formula (1); the factors of formula (1) depend on additional variables, as identified below. Furthermore, the costs of providing NCRD output depends on a number of different program variables. To develop

the analysis it is important not only to identify these addi-
tional variables but to determine the nature of the dependencies,
and identify those variables that may be classified as "control"
variables which may be manipulated by policy makers to improve
program performance.

The following functional dependencies appear relevant with
respect to the factors of formula (1):

$$P_e = P_e(E, q_e) \text{ where } q_e = q_e(E, R)$$

$$P_a = P_a(R, q_a) \text{ where } q_a = q_a(SP, SO, O, A)$$

$$P_p = P_p(\mathcal{I}, I_a, F, Q)$$

$$u = u(d, r, I_p, w) \text{ where } w = w(I_p, Q)$$

where

> E = the set of children formally eligible for the program
> (by age, etc.)
>
> q_e = the propensity of eligible children to register or
> enroll in schools or institutions qualified for NSLP
>
> R = the set of eligible children that are registered in
> qualified institutions
>
> q_a = the propensity of schools or other institutions to
> join the NSLP, given the opportunity
>
> SP = set of participating schools
>
> SO = set of schools with the opportunity to join NSLP
>
> O = the set of children enrolled in schools in the set SO

A = the set of children enrolled in schools with the
     NSLP (SP), i.e. the set of children with "access"
     to the school meal program.

π = the price structure for NSLP meals

I_a = socio-economic characteristics (income distribution)
     of children with access to NSLP

F = alternative food services available to students with
     access to NSLP

Q = quality (desirability) of school meals, in terms of
     children's tastes

I_p = socio-economic characteristics (income distribution)
     of participating children

w = wasted food (served but not eaten)

The total cost of providing a given level of output (NCRD)
is given by,

$$TC = (NCRD/u) \times AUC = CRD \times AUC$$

where

AUC = average unit cost of a CRD,

That is, the total cost is equal to the total number of
child-RDA-days actually supplied (including the superfluous CRD's
that do not fill unmet needs) multiplied by the average unit cost
of a CRD.

The average unit cost depends on additional program
variables:

$$AUC = AUC(\underline{T}, \theta, I)$$

where

$\underline{T}$ = the technology of purchase, preparation, and delivery

θ = pattern of output: groups served (age, social class,

region) and extent of service (r,d) to each group

I = input factor costs (food, labor, capital)

"Control" variables whose adjustment is at the discretion
of a policy maker include: E,SO,Q,II,I, and θ.

Revenues to support the program at any given level of
output are derived from two principal sources -- child contrib-
utions (lunch money) and federal, state, and local government
appropriations. Child contributions depend on two factors --
the price structure (II) and the number of meals (or CRD's)
"demanded" at each price. Assuming that all of the independent
variables (except II) upon which the factors of formula (1)
depend are fixed at some set of values, the demand function may
be written as:

$$CRD(II) = NCRD(II)/u = Tdrp_s p_e p_a p_p(II) \tag{4}$$

If there were just a single price (πo) for all meals, then
the child contribution revenues would be the product of πo and
CRD(πo). The revenue function becomes more complicated for

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policies wherein different children pay different prices (e.g. on the basis of ability to pay). For example, suppose that there are N different prices, $\pi_1 < \pi_2 < \cdots < \pi_N$ and that everyone were somehow required to pay the highest price at which he would be willing to consume the meal. In this case, child contributions would be given by,

$$CC(\pi) = \sum_{j=1}^{N} \pi_j \left[CRD(\pi_j) - CRD(\pi_{j+1}) \right] \tag{5}$$

where $CRD(\pi_{N+1}) = 0.$ (6)

In any case, CC(II) must be computed in accordance with the specific pricing policy and corresponding demand levels at each price.

The total revenue is given by,

$$RE = CC + GBA \tag{7}$$

where GBA = government budget appropriation.

It is worth noting here that GBA may have dependencies of its own when broken down into its federal, state, and local components. For example, the level at which a state government chooses to fund the program may depend on the amount of federal support. Hence, policymakers at any given level of government (the federal level for example) may have to anticipate the policy of decisionmakers at other levels. In the interest of simplicity, however, GBA will be considered as a unit and the

analysis will merely specify the total required appropriation to support any given program structure.

Now that all the components are in place (objective, costs, revenues) the analytic problem may be stated as follows:

Maximize NCRD over a set of alternative programs specified

by different values of the discretionary variables

$E, SO, Q, \underline{T}, \theta$, and $\Uparrow$

such that

Total Cost $\leq$ Total Revenue $\qquad\qquad$ (8)

and

$GBA \leq GBA_o$. $\qquad\qquad$ (9)

Simplifications for a Preliminary Analysis.

The full analytic framework, as specified in the previous pages, requires a great deal of information that is not initially available. Such information pertains to the nature of the function dependencies and/or the data base from which to estimate these relationships. For example, little information is available on the variation of unit costs with different food purchase and delivery practices or output patterns. In addition, many of the variables such as Q (quality) require more careful specification in terms of quantifiable indices. In short, the previous section has outlined the basis for a comprehensive analysis requiring a significant investment in research.

For the limited purposes of this case study, a number of simplifications are made to permit a preliminary analysis of a few alternatives so that some tentative conclusions may be drawn. These simplifying assumptions are the following:

1. The average unit cost AUC will be assumed constant (i.e. independent of I and θ) and equal to the cost in 1968 ($1.73 per CRD).

2. Children will be divided into two groups, those in poverty (P) and those not in poverty (NP), to account for dependencies on socio-economic characteristics. Formula (1) will be used separately for P and NP to compute the program output for these groups individually and in sum.

3. P_s, P_e, P_a, P_p, and u will be considered separately for each group (poverty and non-poverty).

4. P_s, P_e, P_a, P_p, and u will assume values for (P and NP) based on 1968 data. P_s, P_e, and u will be assumed con-stants for each group. P_a will be considered as a control variable whose values may be changed directly. P_p is de-pendent on prices (Π).

5. For non-poverty children the dependency on price will be modeled in terms of its "elasticity"[6] in the range of 1968 prices (35¢ per meal or $1.05 per CRD). The elasticity figure used here is derived from preliminary data from a

1968 U.S. Department of Agriculture survey.

6. For poverty children it is assumed that 90% partic-
ipation would be achieved if enough fee meals were avail-
able.

7. The proposed alternative program changes involve
modifications in prices and access (P_a) for poverty and
non-poverty groups. $(P_e, P_s, r,$ and d will not be changed.)

Several of the assumed values are highly contestable.
Even at the level of simplification of this preliminary analysis,
the quality of data is a problem. Sensitivity analysis will
be performed to see if $\pm 10\%$ changes in AUC, price elasticity
and U for poverty and non-poverty, would change the ranking of
alternatives and therefore affect decisions that might be made
on the basis of these preliminary computations. Sensitivity to
changes in other variables or to changes in combinations of var-
iables should be investigated as well, for a more complete
analysis. The values listed in Table II are used in the com-
putations, below.

Alternatives.

Two variables, prices and access of children (schools) to the
meal program, are manipulated to synthesize the set of alterna-
toves described by Table III.

Alternative A0 is the present program whose eligibility,
enrollment, access, and participation (per cent) figures are
listed in Table II. Here, the number of free (and reduced price)
meals is limited by funding. Thus, the participation of pov-
erty children (P_p') is "supply limited."

Alternatives A1(a through e) remove the supply constraint
so that all poor children in school with a meal program are
entitled to a free meal. Ala through Ale specify different poss-
ible prices (per CRD) for non-free (non-poverty) meals.

Alternatives A2 (a through e) extend access to the NSLP to
all schools, while maintaining the policy of available free
meals to all poverty children. A2a through A2e specify alterna-
tives non-poverty price levels per CRD.

The output (NCRD), cost, revenues, and required government
appropriation may be computed for each alternative, using the
formulas developed previously in the text (equas. (1), (2), (4),
(5), plus (8) interpreted as an equality). Results are illus-
trated in Figures 5 and 6.

Figure 5 plots output NCRD against government appropriation
for each alternative. Alternative A2 dominate the rest. The
optimal decision is to chose that alternative corresponding to
the highest NCRD, given a specific level of GBA. Thus, for
levels of GBA in the illustrated range the best alternative is

the one corresponding to the intersection of the A2 locus with
a vertical line at the specified GBA value. For example, A2d
is the best choice for a GBA of approximately 1.3 billion dol-
lars. It is interesting to note that the present program is not
optimal, even for the current level of allocation. For example,
alternative Ale supplied more NCRD's with a smaller budget
allocation.

Figure 6 illustrates the behavior of two "productivity
indices" for each alternative; these are NCRD's per dollar of
government budget appropriation, and NCRD's per dollar of total
cost. Note the "diminishing returns" nature of governmental
dollars. However, the diminishing returns effect of government
dollars is not nearly so dramatic in terms of NCRD's per total
dollars input. This merely indicates that as the price of meals
decreases, the government assumes a greater proportion of the
financial burden. However, the overall efficiency of the pro-
gram in terms of input dollars does not seriously change.

Sensitivity Analysis.

In order to judge how sensitive the choice of alternatives, and
the values of output and cost are to the accuracy of estimated
parameter values, sensitivity analysis are required. Here, comp-
utations were executed based on $\pm 10\%$ variations in the values of

average unit cost (AUC), price elasticity of participation (λ), and the unmet needs factor (w) for poverty and non-poverty children. The nine variations (including the original) are exhibited in Table IV.

The variations resulted in no change in the relative rankings of the basic alternatives. That is, alternatives A2 continued to dominate A1, and A1 (at $\pi = 1.35$) remained dominant over AO. However, considerable variation occurs in the level of output and the required level of government support. Table IV shows the changes in NCRD and GBA as the parameter values are varied for alternative A2b ($\pi = 0.90$, zero price for non-poverty children, 100% access to the program). It is clear that the uncertainty in unit cost and the percent of supplied CRD's that fill unmet needs has a significant impact on the final output and cost values.

Another way to view the impact of changes in important parameters, is to assume a fixed level of government appropriation and see how the optimal decision (best alternative) changes with these values. Table V shows how the best choice alternative changes as the parameter values vary, for a GBA level on the order of 1.8 billion dollars. Note that A26 remains the best choice except where variation in unit cost allows a decrease or requires an increase in the price charged for (non-poverty) meals. In these cases A2a and A2c are the best choices, respectively.

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Conclusion.

The preliminary analysis has indicated that a program of required (100%) participation of schools plus free meals from poverty children is most effective in terms of output per dollar than the present program or a modified program with free poverty meals but current access levels. Furthermore, this conclusion appears to be fairly insensitive to variations in parameter values.

A more comprehensive analysis, that would involve a signif- icant research effort, is needed to verify the preliminary re- sults and to investigate additional alternatives including changes in age eligibility policy, meal quality, food prepara- tion and delivery technology, and patterns of output. The re- search inherent in a more complete analysis would involve in- vestigation of the functional relationship between the vari- ables relevant to costs and factors in the production of out- put. In addtion, the research should attempt to develop more careful estimates of child population group sizes, and the needs, and behavioral parameter values of these groups. Finally, a comprehensive analysis and research program should attempt to relate nutrition to outputs in health, education and other social areas on which the general welfare is dependent.

FOOTNOTES

1. See Apendix A for documentation of the population estimates upon which these statements are based.

2. This estimate is clearly a crude one, but is the best available estimate at present.

3. The adequacy of this measure will be discussed later.

4. See Reference 1.

5. U.S. Budget, FY'70.

6. Price elacticity of demand $= \zeta = \left. \dfrac{\% \text{ change in } P_p}{\% \text{ change in price}} \right)$ at $\pi = \pi_o$

REFERENCES

1. Select Committee on Nutrition and Human Needs of the U.S. Senate, Hearings on "Nutrition and Human Needs," 1968-1969.

2. Citizens' Board of Inquiry into Hunger and Malnutrition in the United States, "Hunger, U.S.A.," Beacon Press, Boston, 1968.

APPENDIX A

TABLE I

1968 POPULATION DATA

Group	Number	Source
All Children (age 0-18)	74,325,000	Census*
All Poor Children (age 0-18)	11,427,000	Census**
Non-School Age Children (age 0-4)	18,521,000	Census*
Non-School Age Poor Children (age 0-4)	2,847,608	Computed[#]
School Age Children (age 5-18)	55,804,000	Census*
School Age Poor Children (age 5-18)	8,579,392	Computed[#]
School Enrollment	50,700,000	HEW***
School Age - Not Enrolled	5,104,000	Computed+
Enrolled Without Access	11,154,000	USDA++
Enrolled With Access	39,546,000	"
Participating With Access	18,536,000	"
Non-Participating With Access	21,010,000	"

* Current Population Reports, U.S. Bureau of Census, Series P-25, No. 416, February 17, 1969
** Current Population Reports, U.S. Bureau of Census, Series P-23, No. 28, August 12, 1969
*** Projections of Educational Statistics to 1977-78, U.S. Office of Education
+ School Age Children minus School Enrollment
++ Preliminary data from the National Survey of School Food Services, March 1968, U.S. Department of Agriculture
# Ratio of school age or non-school age to total child population assumed equal for poverty and non-poverty children.

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TABLE I

Area	Alternative Programs	Output Measures
Health	Medicine, Sanitation, Housing	Incidence of disease and nutrient deficiency symptoms, height, weight, hemotocrit scores.
Education	Classroom Education, Pre-School, Adult Supervision of Extra-Curricula Activities, Tutoring	Test scores, college entrance rates, dropout rates, attendance rates.
Poverty Alleviation	Family Assistance (Welfare), Food Stamps, Public Services	Families in poverty, income statistics (mean, median, mode).
Pleasure	Recreation, Alcohol and Drugs, Entertainment	Incidence of mental problems, conflict statistics (divorces, riots), psychological survey results.
Crime and Delinquency Control	Police, Security Systems, Counseling and Rehabilitation Services, Income Supplements	Incident rates for different types of crime and delinquency.

TABLE II

	Total Annual Nutrition Requirement (CRD's) T*	Ps**	Pe**	Pa	Pp	U++	Elasticity η
Poverty	11,427,000	0.75	0.91	0.76+	0.40+	0.36	Assume Pp=0.9 at π = 0
Non-Poverty	62,898,000	0.75	0.91	0.78	0.48	0.19	0.93#

* Based on Population estimates in Appendix A.

** Assumed the same for poverty and non-poverty.

+ Based on a USDA Urban School Lunch Study.

++ Based on Figure 4 in text. It is assumed that the per cent of supplied food meeting unmet needs is the same as the per cent of people in a given income group with inadequate diets.

Based on preliminary data of USDA School Lunch Survey of 1968.

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TABLE III

Alternative	Description	Prices (per CRD)	Access
AO	Present Program	$1.05 Non-Poverty Free for Poverty as far as funds will allow.	Current Values See Table II
A1a	Ensure that all poverty children with access have free meals available.	$0.75	"
A1b	"	0.90	"
A1c	"	1.05	"
A1d	"	1.20	"
A1e	"	1.35	"
A2a	Require that all schools have the meal program. Free meals available to all poverty children.	0.75	$P_a = 1.0$ for Poverty and Non-Poverty Children
A2b	"	0.90	"
A2c	"	1.05	"
A2d	"	1.20	"
A2e	"	1.35	"

TABLE IV

Sensitivity Test, Alternative A2b

Run No.	Change in Parameter Values	NCRD (millions)	GBA (millions of dollars)
1.	no changes	406.5	1,840.4
2.	increase price elasticity (η) by 10%	409.5	1,853.3
3.	decrease λ by 10%	403.5	1,827.2
4.	decrease AUC by 10%	406.5	1,539.0
5.	increase AUC by 10%	406.5	2,141.8
6.	increase u by 10% for poverty and non-poverty groups	447.2	1,840.4
7.	decrease u by 10% for poverty and non-poverty groups	365.9	1,840.4
8.	increase u by 10% for poverty decrease u by 10% for non-poverty	395.4	1,840.4
9.	decrease u by 10% for poverty increase u by 10% for non-poverty.	417.7	1,840.4

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TABLE V

Run No.	Change in Parameter Value	Best Alternative	NCRD (millions)	GBA (millions of dollars)
1	none	A2b	406.5	1,840.4
2	increase λ by 10%	A2b	409.5	1,853.3
3	decrease λ by 10%	A2b	403.5	1,827.2
4	decrease AUC by 10%	A2a	436.9	1,873.0
5	increase AUC by 10%	A2c	376.2	1,801.5
6	change u { +10% poverty / +10% non-poverty	A2b	447.2	1,840.4
7	" { -10% / -10%	A2b	365.9	1,840.4
8	" { +10% / -10%	A2b	395.4	1,840.4
9	" { -10% / +10%	A2b	417.7	1,840.4

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Figure 1

<table>
</table>

49.5%

School age non-
participating

24.9%

Non-school age

25.6%

Participating

54.0%

School age non-
participating

24.9%

Non-school age

21.1%

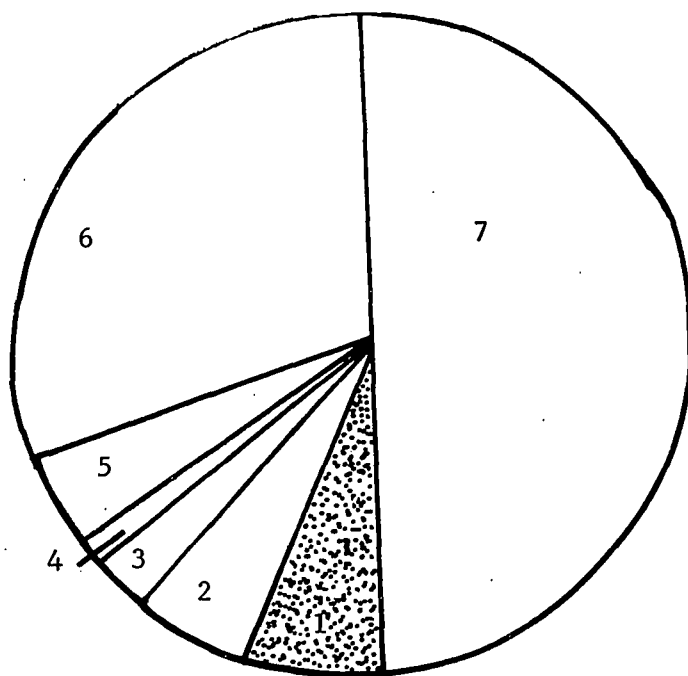Participating
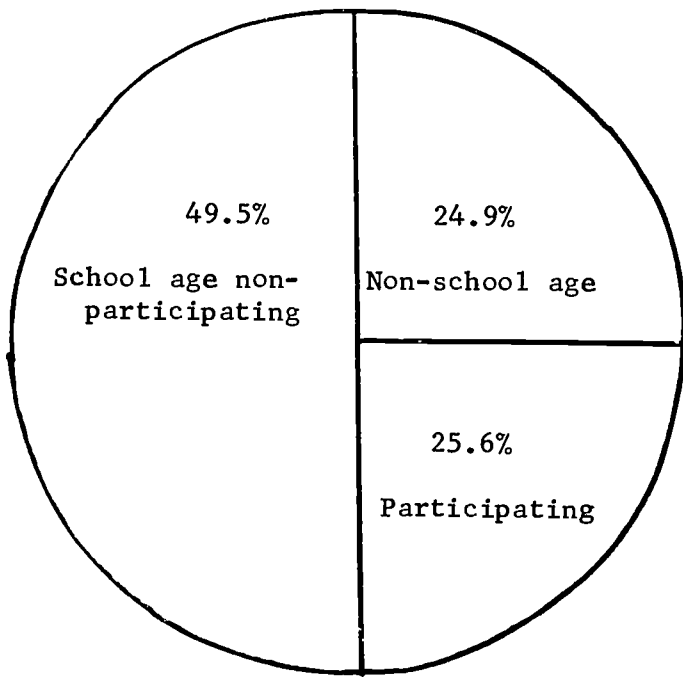
Non-Poverty Child Population
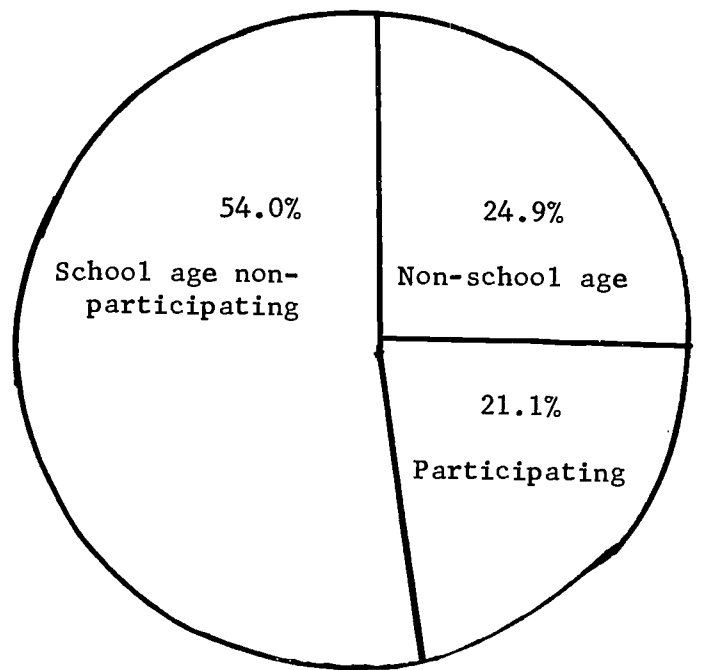
Poverty Child Population

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Figure 2

THE NSLP CONTRIBUTION TO TOTAL ANNUAL CHILD NUTRITION REQUIREMENTS

|	Child Nutrition Category	No. Child-RDA-Days	% of Total
1	The NSLP Contribution	1,081,205,000	4%
2	Non-Participating Children in Schools with the NSLP	1,255,583,000	5
3	Children in Schools without the NSLP	650,613,000	2
4	School Age Children Not in School	297,716,000	1
5	Non-School Age Children	1,080,330,000	4
6	2/3 RDA Not Supplied by NSLP	8,670,755,000	32
7	Non-School Days	14,121,750,000	52
	TOTAL (74,325,000 Children x 1 RDA x 365)	27,128,625,000	100%

Figure 3

3a

HEMOGLOBIN LEVELS

Percent of Population with less than Acceptable Levels

Age

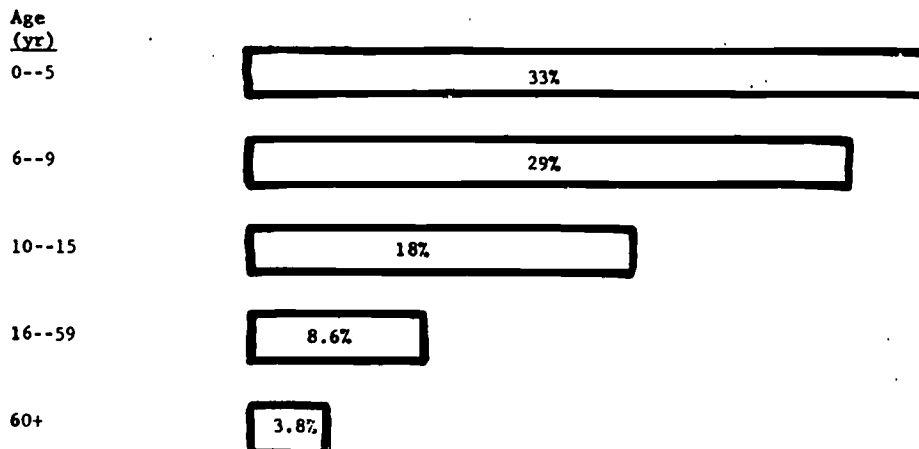| Age	
0--5	34%
6--9	15%
10--15	12%
16--59	8.8%
60+	8.1%
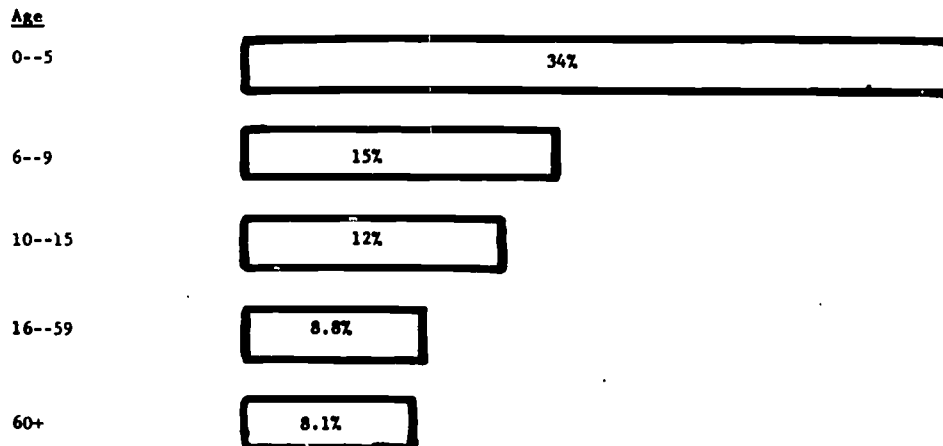
NOTE.—A low hemoglobin level indicates a person is a candidate for medical treatment for anemia.

Source: Preliminary results, National Nutrition Survey.

SERUM VITAMIN A LEVELS

3b

Percent of Population with Less than Acceptable Levels

Age
(yr)

Age (yr)	
0--5	33%
6--9	29%
10--15	18%
16--59	8.6%
60+	3.8%

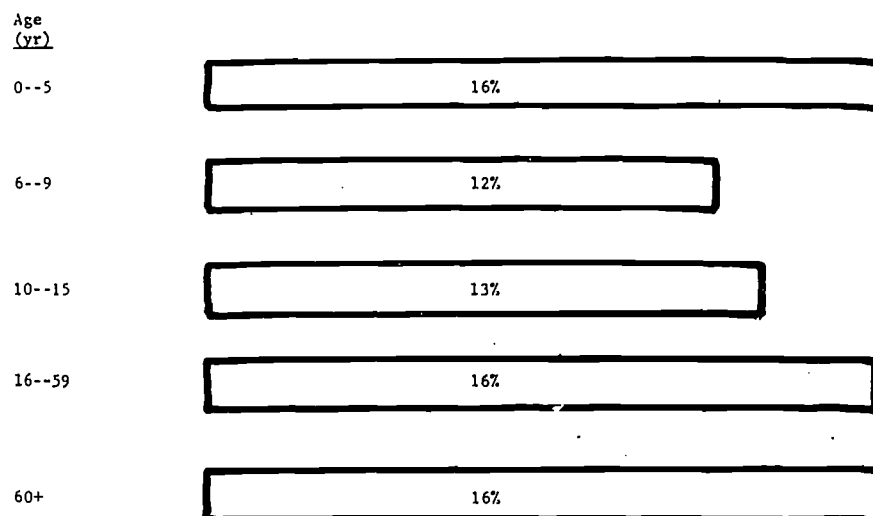NOTE.—Vitamin A affects vision.

Source: Preliminary results, National Nutrition Survey.

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Figure 3
(Continued)

3c

SERUM VITAMIN C LEVELS

Percent of Population with less than Acceptable Levels

Age
(yr)

0--5   16%

6--9   12%

10--15   13%

16--59   16%

60+   16%

NOTE.—Vitamin C is important for normal tooth and bone formation, wound healing, and resistance to infection.
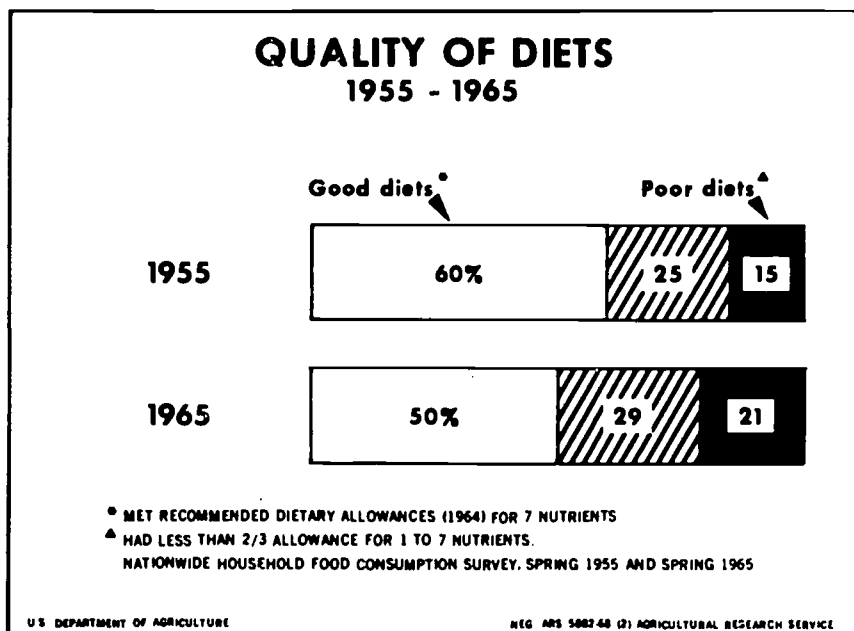Source: Preliminary results, National Nutrition Survey.

B. Dietary data

Data in table 5–7 are from a U.S. Department of Agriculture survey of diets in 7,500 nationally representative households. Table 5 is a comparison of the nutritional adequancy of diets for families with various incomes. Table 6 compares the dietary status of the Nation as a whole in 1955 and 1965. Table 7 shows the number and percentage of households with poor diets by State. Table 8 is a dietary survey taken as part of the national nutrition survey cited above. Additional information is available in parts 2 and 3 of the printed hearings of the Select Committee on Nutrition and Human Needs, and in the several volumes of USDA's "Food Consumption of Households in the United States, Spring 1965."

Figure 4

INCOME AND QUALITY OF DIETS

Good diets•   Poor diets▲

Under $3,000	37%	27	36
$3,000-4,999	43%	33	24
$5,000-6,999	53%	29	17
$7,000-9,999	56%	32	12
$10,000 and over	63%	28	9

•MET RECOMMENDED DIETARY ALLOWANCES FOR 7 NUTRIENTS.
▲ HAD LESS THAN 2/3 ALLOWANCE FOR 1 TO 7 NUTRIENTS.
NATIONWIDE HOUSEHOLD FOOD CONSUMPTION SURVEY, SPRING 1965

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QUALITY OF DIETS
1955 - 1965

Good diets•   Poor diets▲

1955	60%	25	15
1965	50%	29	21

• MET RECOMMENDED DIETARY ALLOWANCES (1964) FOR 7 NUTRIENTS
▲ HAD LESS THAN 2/3 ALLOWANCE FOR 1 TO 7 NUTRIENTS.
NATIONWIDE HOUSEHOLD FOOD CONSUMPTION SURVEY, SPRING 1955 AND SPRING 1965

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Figure 5

NCRD

hundred million NCRD's

Hundred million dollars

GBA