



NUTRITION PROGRAMS IN SRI LANKA USING U. S. FOOD AID  
(AN EVALUATION OF P. L. 480 TITLE II PROGRAMS)

William D. Drake, Ph. D., Team Leader  
John N. Gunning  
Abraham Horwitz, M. D.  
Roy I. Miller, Ph. D.  
Harold L. Rice, Ph. D.  
Gnani Thenabadu, M.B.B.S., M.P.H.

October, 1982

COMMUNITY SYSTEMS FOUNDATION  
IN COORDINATION WITH  
U. S. AGENCY FOR INTERNATIONAL DEVELOPMENT  
CONTRACT NUMBER AID/SOD/PDC/0262-I-05-1010-00

*BEST AVAILABLE COPY*

## PREFACE

This report has been prepared by a team made up of consultants and USAID staff. Preliminary design of the impact and cost-effectiveness studies was done by Dr. William D. Drake and Dr. Roy I. Miller of the Community Systems Foundation in Ann Arbor, Michigan. The design was implemented with the help of CARE/Sri Lanka and the quantitative analysis done by the Community Systems Foundation consultants.

The interpretation of the quantitative results and the preparation of the report were done with a larger team during a four week sojourn in Sri Lanka. Dr. Abraham Horwitz and three USAID staff members, Dr. Harold Rice of the Asia Bureau, Mr. John Gunning, the Sri Lanka Desk Officer in Washington and Dr. Gnani Thenabadu of USAID/Sri Lanka participated in this phase of the evaluation.

We would like to thank everyone who contributed time and energy to this project from the Government of Sri Lanka, CARE, and USAID/Sri Lanka. A complete list of these individuals is in Appendix B. Special thanks go to Mr. Francis W. Kulatunga and Mr. D. D. Jayatilleke for their monumental efforts in leading the teams which retrieved and collated the data used in our impact and cost analyses.

## EXECUTIVE SUMMARY

### THE PROBLEM: MALNUTRITION IN SRI LANKA

Among the poor in Sri Lanka, malnutrition has been and continues to be a serious problem. The 1976 country-wide survey done by the Ministry of Health with technical support from the Center for Disease Control revealed 42% of the preschool population was malnourished according to a weight-for-age classification (less than 70% of the N.C.H.S.-CDC standard). Recently, inflation has eroded the value of the Government issued food stamps. Because the Food Stamp Program is the primary government sponsored intervention for promoting better nutrition, reaching nearly half the Sri Lankan people, it can be assumed that malnourishment is at least as prevalent today as compared to 1976.

### U.S. ASSISTANCE

The P.L. 480 Title II Program began in 1957 with the initiation of a School Feeding Program through CARE. That program has evolved into the School Biscuit Program, an effort to provide 1,250,000 school age children with 44 grams of a nutritious biscuit on 180 school days every year. In 1972, CARE expanded its involvement under P.L. 480 Title II to include the distribution of a weaning food, Thriposha, to needy children through the health care system. The cost of U.S. commodity contributions in 1981 were \$2,881,036 for the Thriposha Program and \$1,684,254 for the School Feeding Program.

### EVALUATION PURPOSE AND METHODOLOGY

The evaluation of the P.L. 480 Title II supplementary feeding program was requested jointly by AID/Washington, USAID/Sri Lanka and the Government of Sri Lanka to improve impact and effectiveness. The evaluation was designed around:

- a) an assessment of nutritional impact resulting from the program, and
- b) a cost-effectiveness analysis of the components of the program.

The impact assessment was done for the Thriposha program only. Retrospective longitudinal data was gathered from existing records kept in health clinics. Using this data, it was possible to compare the nutritional status of long term participants in the program to newer entries of the same age. The cost-effectiveness analysis was done using costs determined by a detailed review of audit records for historic costs and by using the best source of estimation to predict costs out into the future. The

analytic work was subjected to the review of knowledgeable people in Sri Lanka prior to the preparation of the report through a series of interviews--in the field and in government circles.

## SUMMARY OF RESULTS

### A. MATERNAL CHILD HEALTH

Retrospective longitudinal data for 1,799 preschool children were gathered in 61 Maternal Child Health clinics participating in the Thripasha distribution program. Based on our sample, the program is reaching needy children. Four out of five children met one of the two criteria for participation; (1) they were suffering from second or third degree malnutrition or (2) they were younger than the age of maximum risk while showing clinical signs of nutritional deterioration.

A comparison of the nutritional status of children who had participated in the program for a substantial time to that of children who had participated for only a short time offered compelling evidence that the package of services provided through the MCH clinics improved nutritional status. (All comparisons were done for children in the same narrowly-defined age categories to eliminate the possibility that observed improvement resulted from the changing age distribution of the sample.) The amount of nutritional improvement surpasses that seen in any other food supplementation program that has been subjected to the rigorous statistical tests applied to this data. Indeed, we emphasize the package of services because we cannot isolate the contribution of the Thripasha alone. However, we firmly believe that without Thripasha the benefit observed would not be found.

The evidence suggests Thripasha is shared in the family, probably to the degree that the net Thripasha intake of the child would, of itself, not support the nutritional gains observed. This leads to the hypothesis that the combination of Thripasha distribution, use of health cards, immunizations, treatment of disease, nutrition education and family planning calls forth better child care behavior. Field observations and interviews convinced the team that Thripasha was a strong inducement to ongoing participation in this package of services.

### B. SCHOOL FEEDING

The design of the School Biscuit Program does not include any systematic collection of anthropometric (or any other) measures suitable for assessing the nutritional

status of program participants. Intuitively, one can argue that the biscuits help fill part of the nutritional gap for elementary school children and, therefore, help participating children maintain their level of nutritional well-being. However, due to the inherent weaknesses in using anthropometrics as a measure of nutritional status in school age children, one should not necessarily expect to find measurable nutritional impact in a study based on anthropometrics, even if nutritional benefits do occur. This is particularly true in a program such as that underway in Sri Lanka where the ration is relatively small.

In an effort to identify a non-nutrition impact for school feeding, retrospective attendance data in schools was examined to determine the relationship between school feeding programs and attendance. Very preliminary analysis of the data relating attendance and school feeding was inconclusive. Further study relating school feeding to data describing attendance, enrollment and drop-out rate is needed to assess the effects of school feeding on observed trends in those variables.

### C. COST-EFFECTIVENESS

A detailed cost analysis of both the Thriposha program and the School Biscuit Program was done using audited cost figures from invoices and other sources. With regard to Thriposha, the analysis showed that the cost of production was minor relative to the cost of commodities and that the major portion of costs borne by Sri Lanka were for production, transport and administration and not for commodities--even when the GSL contributes 40% of the raw materials. A comparison of Thriposha to alternative products available in the market place revealed that Thriposha delivers more nutrient per rupee than its nearest competitor--with regard to protein, in fact, Thriposha is twice as cost-effective.

One unanticipated consequence of the program was its role, along with government price supports, in stimulating soya production. While the absolute quantity of indigenous soya used in Thriposha doubled in a three year period, the percentage of total Sri Lankan soya purchased for Thriposha dropped from a market dominating high of 64.6% to a mere 17.6%. The dramatic increase in soya production in response to the demand generated by Thriposha is indicative of the perception, held by farmers, of a guaranteed market. Finally, the new availability of soya, when considered in light of the cost analysis, illustrates the feasibility of a move toward the use of totally indigenous raw materials in either a commercial Thriposha distribution scheme or continued distribution through the health system.

The cost analysis of the School Biscuit Program revealed a higher percentage of costs devoted to production than for Thripasha. Also, the wheat base of the biscuit precludes any possibility at this time of production using indigenous materials. As a result, Biscuits are more expensive per calorie and per gram of protein than Thripasha. However, unlike Thripasha which must be consumed with water (or some other food product), the Biscuits are ready to eat. Therefore, they are uniquely suited for school feeding in Sri Lanka where many schools lack adequate sources of water.

#### D. MANAGEMENT

In order to view the P. L. 480 Title II program within the broader context of Sri Lankan food and nutrition policy, interviews were conducted with representatives of the concerned Ministries, USAID and CARE. These interviews revealed a complex web of interrelationships between concerned individuals leading to a less than optimal management structure for food and nutrition programs. One possible means of simplifying the management structure is the development of a common, shared information system to serve as a focal point for debate and policy formulation regarding food and nutrition issues. Such a monitoring and evaluation system should be based on the routine collection and use of a minimum quantity of relevant data at the point of service delivery.

## BASIC PROGRAM IDENTIFICATION DATA

1. Country: Sri Lanka
2. Project Title: P.L. 480 Title II Program
  - (1) Thriposha Program
    - a) Maternal Child Health
    - b) Thriposha Commercialization
  - (2) School Feeding Program
3. Project Number: N/A
4. Project Date:
  - (1) Thriposha Program - 1973 to present
  - (2) School Feeding - 1956 to present
5. Program Funding:

AID Funding through 1981: \$85 million in commodities  
planned 1982: \$5.8 million
6. Mode of Implementation:

Voluntary Agency food grant program administered by CARE
7. Project Design: N/A
8. Responsible Mission Officials:

Mission Directors:  
1979-present, Sarah Jane Littlefield  
1977-1979, Thomas Arndt

Project Officers:  
1981-present, Robert Chamberlain  
1975-1981, Clark Billings
9. Previous Evaluation
  - a) AID Evaluation, An Evaluation Report Of The P.L. 480 Title II Program In Sri Lanka, Robert R. Nathan Associates, Inc., May 23, 1978
  - b) Other evaluations undertaken by CARE and the Government of Sri Lanka (see References)
10. Host Country Exchange Rates
  - a) Name of currency: Rupee
  - b) Exchange rate in January, 1982: 20 rupees=U.S. \$1.00

## CONCLUSIONS AND RECOMMENDATIONS

### A. THRIPOSHA PROGRAM

1. Overall Assessment - The Thripasha program has developed into one of the better maternal child health care programs sponsored under P. L. 480 Title II. Several features of the program set it apart from most others. The Thripasha, itself, is a weaning food formulation that is inexpensive to prepare, acceptable to the beneficiary and easily consumed. Moreover, in addition to its direct nutrition effect, Thripasha serves as an incentive for beneficiaries to come to the Government sponsored health clinics, not just once but on a regular basis, allowing the health staff the opportunity to treat cases and provide preventive services to their clientele. As with all programs of this kind, there are abuses (sharing of the food, selling of the food, etc.) but on balance, the combination of the preventive measures bolstered by Thripasha is having the desired effect.

#### 2. Specific Recommendations

a) Recipient Targeting - Thripasha is targeted, to preschool children who are classified as suffering from either second or third degree malnutrition or are identified, by qualified medical doctors, as likely to fall into those more serious states of malnutrition.

*In our sample, which was drawn from clinics with successful weighing (and, therefore, targeting programs), 4 out of 5 beneficiaries met these criteria. However, targeting can be strengthened, program-wide, by checking that proper procedures are followed in all clinics.*

b) Commodity Mix - Thripasha is a blend of ICSM, corn and soya beans fortified with vitamins and minerals. It is precooked by a low-cost extrusion cooking process at a plant near Colombo, where it is packaged for easy and convenient consumption by its recipients. One particularly attractive feature of Thripasha is the ease with which it can be consumed without additional cooking in the home.

*Thriposha is a carefully conceived product using appropriate commodities. The planned phase-out of gifted ICSM should be accompanied, if possible, by the addition of milk to (a) keep the consistency and solubility of the product the same and (b) keep the quality of the protein up.*

- c) Expansion - It has taken several years for the production process for Thriposha to mature to a point where the capability for reaching the targeted number of beneficiaries is nearly assured. If current plans to expand the plant are executed and if shipments of ICSM are not phased out faster than plant capacity is added, then the limiting factor on expansion would become the capacity of the Sri Lankan health system to service additional families through outreach or through the inclusion of new centers into the program.

*We are sufficiently impressed with the success of the Thriposha program to encourage its expansion. We urge the Government of Sri Lanka, CARE and USAID to work together to establish a reasonable expansion plan, considering production capacity, transport costs for additional commodities and the capacity of the health system for increasing coverage. To the degree possible, expanded coverage should be provided by increasing the percentage of locally grown commodities. Any phase out of donated ICSM should be coordinated with the expansion plan.*

- d) Funding Levels - U.S. commodity contributions of ICSM in fiscal year 1981 were valued at \$2,881,036.

*We urge AID to support expansion by maintaining or increasing its level of support through P.L. 480 as the shift toward indigenous materials progresses.*

- e) Delivery - Historically, delivery problems are traceable to production shortages. In the past, these shortfalls have been attributed to failures in the equipment and/or management of supplies in

the old production facility; however, as noted above, great strides have been made to eliminate most of the causes of production shortfalls by the construction of a newer, more efficient processing plant.

*One potential remaining problem can be alleviated if the operating reserve on raw materials coming from the U. S. be raised from the current 5% level. This would enable the storage of sufficient raw materials at the plant to avoid production stoppages due to late shipments from the U. S.*

- f) Future Directions and Phasing - Current plans call for the phasing down of donated commodity in the Thripasha blend by adding locally produced product made from indigenous corn and soya. One question of primary importance in the future is the role of commercial sales of Thripasha to (a) enable recipients to supplement their consumption through purchase of the product on the market, and (b) to enable people in areas not adequately covered by the health system to have access to Thripasha through commercial outlets.

*We recommend that the GSL and CARE continue to collaborate in an effort to add capacity and increase coverage through both the MCH system and the commercial market. The rate of commercialization and the geographic expansion plan should remain under GSL and CARE control. Sales, distribution and promotion should be contracted out to a single firm who, in exchange for their opportunity to make a profit in a low risk venture, return an agreed upon percentage of the profit to CARE and the GSL to defray the costs of the MCH program expansion.*

- g) Miscellaneous - In general, because the Thripasha is distributed through health clinics run by accredited physicians, the distribution is handled quite well as is the administration of related services.

*We recommend that serious consideration be given to enhancing the operation of the program by training mothers to assist in filling out and interpreting the road-to-health charts. This would relieve the staff of the burden of weighing and add to the educational component of the program.*

## B. SCHOOL FEEDING

1. Overall Assessment - The benefits of School Feeding are virtually impossible to quantify at this time. The mechanics and logistics of the program are currently adequate; in fact, the use of the pre-cooked biscuit as a supplement is an improvement over other programs around the world which distribute a commodity that needs on-site preparation. Again, we note that there are abuses and problems (sharing, spoilage, breakage) but, on balance, the operational aspects of the program are satisfactory.
2. Specific Recommendations
  - a) Recipient Targeting - School biscuits are given to those schools which exhibited a high degree of malnutrition in a 1973 survey, conducted by CARE, using the Quac-stick method (arm-circumference for height) of measuring malnutrition. As of 1981, schools formed since 1973 are not included nor are those schools which were excluded after the 1973 survey. (Minor changes in school selection were made on the basis of a 1981 survey of schools administered by CARE.) Currently, the Government of Sri Lanka wants to feed all elementary school children while, in the face of possible resource cutbacks, USAID is interested in finding a more exacting method of beneficiary selection.

Targeting at the level of the individual child would be both costly and ineffective, unless it was a component of a health care program. The equipment needed to assess individual nutritional status is not now available in schools, nor are the potentially feasible methods of assessing nutritional well-being, based on anthropometrics, adequate for that task. If scarce commodities force targeting, the current method of identifying the worst schools is as good as any. However, the current basis for targeting is obsolete and ought to be updated.

- b) Commodity Mix - Currently, school feeding is accomplished through the distribution of a ready-to-eat biscuit made from donated 12% soy fortified wheat flour and oil supplemented with locally provided sugar and chemicals. The biscuits come in two sizes; the smaller are used for more remote schools because they break less easily. Eight large sized biscuits or 44 grams of the small size are served on each school day.

Unless the biscuits are replaced by something else entirely, which we feel would be a mistake, a wheat based commodity must be used for preparing them. It could be a wheat flour milled in Sri Lanka or an imported wheat flour such as that used now. Constraints on milling in Sri Lanka are not now known and must be determined in a special study.

The addition of milk, if potable water can be found in all schools, would enhance the biscuit both through the nutritional value of the milk and the effect a liquid would have on the acceptability of the biscuit, thereby enhancing in-school consumption as well.

- c) Funding Levels - In 1981, the United States commodity contribution (12% soya fortified bread flour and oil) was valued at \$1,684,254.

*The Government of Sri Lanka wants to expand school feeding island-wide. This should not be supported by P. L. 480 Title II. However, because of the adverse effects on the balance of payments from importing wheat, the current levels of support should be maintained so as not to place added burden on the GSL by forcing it to use wheat from the open market.*

- d) Delivery - We did not do an exhaustive study of the system for biscuits; however, our field observations did indicate adequate supply at most school sites, appropriate school level records showing receipts, disbursements and current inventory levels and a well designed distribution system.
- e) Future Directions and Phasing - School feeding, as it is currently implemented, is not linked directly with health concerns. To make it a more health-oriented program, through better targeting and the selective use of food to combat malnourishment, one should encourage the involvement of the health sector. Most likely, school teachers would make poor substitutes for physicians with regard to diagnosis and prescription of treatment. CARE is initiating an attempt to introduce health concerns into the school feeding program on a limited basis by providing selected schools with scales with which to weigh children and "nutritional" report cards to be sent home. This experiment should shed a great deal of light on the feasibility of introducing health matters directly into school feeding. In the interim, until this experiment is completed, AID/Washington's interest in curtailing school feeding is likely to dominate future programming concerns.

*Due to the especially strong commitment of the GSL to school feeding, the current program should be maintained unless a mutually agreed upon plan for phasing down is in effect.*

### C. ORGANIZATION AND MANAGEMENT

The organization and management of food and nutrition policy making functions and program implementation falls under the control of a series of Ministries and Committees.

The make-up of the structure is rather complicated and there is considerable overlap in their memberships.

*We recommend that a simplified structure for coordinating all food programs within Sri Lanka be sought. More importantly, we urge that an attitude disposed to coordination be adopted by all concerned parties.*

One of the problems which results from the fragmented control of food and nutrition matters is the lack of an appropriate focus for discussion. Furthermore, there is little commonly accepted data with which to hold constructive discussion about critical issues. Too often, debate centers around the validity of the information around which a premise is advanced rather than the premise itself.

*We further recommend that an information system be developed to achieve better systems operation and management. This system of monitoring and evaluation should be based on the routine collection and use of a minimum level of relevant data at the point of delivery of services. Such a system should be designed to facilitate better operation of the delivery system through the careful monitoring of impact as well as process variables.*

#### D. RESEARCH AND FIELD EXPERIMENTATION

Many of the pertinent questions in the food and nutrition arena are unanswerable, except by the subjective opinion of individuals involved in the system, because of a lack of valid data with which to test hypotheses concerning those questions. Much could be gained, in our opinion, if the energy devoted to arguing about these questions be channelled into the design and implementation of field experiments to generate an empirical basis for decision making.

We recommend that in addition to experimentation with a new system of monitoring and evaluation, experiments should be designed and carried forth which explore some of the basic issues of intervention design and implementation. A broad categorization of experiments is:

1. Research Questions -- special studies designed to elicit answers to fundamental research questions,
2. Operational Questions -- field experiments designed to shed light on the efficacy of alternative methods of running current programs, and
3. Cross-sectoral Experiments -- exploration of the linkages between food and nutrition and other related sectors such as water, transport and housing.

An enumeration of possible experiments appears in Chapter VI of the text.

## TABLE OF CONTENTS

PREFACE . . . . .	ii
EXECUTIVE SUMMARY . . . . .	iii
A. BASIC PROGRAM IDENTIFICATION DATA . . . . .	vii
CONCLUSIONS AND RECOMMENDATIONS . . . . .	viii
A. THRIPOSHA PROGRAM . . . . .	viii
B. SCHOOL FEEDING . . . . .	xi
C. ORGANIZATION AND MANAGEMENT . . . . .	xiii
D. RESEARCH AND FIELD EXPERIMENTATION . . . . .	xiv
LIST OF TABLES . . . . .	xviii
LIST OF FIGURES . . . . .	xix
SECTION I. BACKGROUND . . . . .	1
A. GENERAL STATUS OF FOOD PRODUCTION/CONSUMPTION . . . . .	1
B. THE HISTORY OF MALNUTRITION AS A SERIOUS PROBLEM . . . . .	3
C. GOVERNMENT EFFORTS TO COMBAT POVERTY/MALNUTRITION . . . . .	4
D. HISTORY OF CARE ACTIVITIES IN SRI LANKA . . . . .	6
E. OTHER DONOR NUTRITION PROGRAMS . . . . .	6
F. RECENT (POST 1977) CHANGES IN THE ECONOMY . . . . .	8
SECTION II. PURPOSE OF EVALUATION . . . . .	11
A. ORIGINAL OBJECTIVES VS. CHANGING NEEDS . . . . .	11
B. GOVERNMENT OF SRI LANKA INTERESTS . . . . .	12
C. UNITED STATES INTERESTS . . . . .	12
SECTION III. THE THRIPOSHA PROGRAM . . . . .	14
A. DESCRIPTION . . . . .	14
B. BENEFICIARY COUNT . . . . .	15
C. TARGETING . . . . .	17
D. NUTRITIONAL IMPACT . . . . .	20
E. FURTHER COMMENTS ON ANALYSIS . . . . .	30
F. SECONDARY BENEFITS AND/OR ADVERSE RESULTS . . . . .	40
G. COST EFFECTIVENESS OF THRIPOSHA . . . . .	41
H. FUTURE DIRECTIONS . . . . .	53
SECTION IV. SCHOOL FEEDING . . . . .	56
A. DESCRIPTION . . . . .	56
B. NUTRITIONAL IMPACT . . . . .	57
C. THE FEASIBILITY OF TARGETING . . . . .	62
D. COST EFFECTIVENESS ANALYSIS . . . . .	64

E. COMPARISONS BETWEEN THRIPOSHA AND SCHOOL FEEDING . . . . .	64
F. FUTURE OPTIONS FOR SCHOOL FEEDING . . . . .	66
SECTION V. ORGANIZATION AND MANAGEMENT . . . . .	70
A. COORDINATION WITHIN THE GSL AND BETWEEN THE GSL AND OTHER DONOR AGENCIES . . . . .	70
B. AN APPROACH TO INFORMATION SYSTEMS FOR FOOD AND NUTRITION PLANNING . . . . .	73
SECTION VI. NEXT STEPS: EXPERIMENTATION . . . . .	78
SECTION VII. CONCLUSIONS AND RECOMMENDATIONS . . . . .	83
B. SCHOOL FEEDING . . . . .	87
C. ORGANIZATION AND MANAGEMENT . . . . .	90
D. RESEARCH AND FIELD EXPERIMENTATION . . . . .	91
REFERENCES . . . . .	92
APPENDIX A: SCOPE OF WORK . . . . .	94
APPENDIX B: PERSONS INTERVIEWED BY EVALUATION TEAM . . . . .	97
APPENDIX C: ANNOTATED BIBLIOGRAPHY . . . . .	102
APPENDIX D: DESCRIPTION OF WORKING DOCUMENTS . . . . .	106

## LIST OF TABLES

1. WAGE RATE INDEX (REAL) . . . . .	10
2. NUTRITIVE VALUE OF SELECTED NUTRIENTS IN THRIPOSHA . . . . .	15
3. "HEAD" COUNT OF THRIPOSHA BENEFICIARIES IN 1981	17
4. CHARACTERISTICS OF THE SAMPLE . . . . .	23
5. ILLUSTRATION OF UNDER REPORTING: REALITY . . . . .	35
6. ILLUSTRATION OF UNDER REPORTING: OBSERVED . . . . .	36
7. ESTIMATE OF INDIGENOUS RAW MATERIALS COST FOR THRIPOSHA . . . . .	43
8. ESTIMATE OF ICSM COMMODITY & SHIPPING COST FOR THRIPOSHA . . . . .	44
9. COST OF THRIPOSHA . . . . .	45
10. INITIAL COSTS AND DEPRECIATION SCHEDULE FOR PHYSICAL FACILITIES AND INVENTORY . . . . .	45
11. ASSIGNABLE COSTS NOT REFLECTED IN ANNUAL BUDGET PROCESS . . . . .	48
12. ESTIMATE OF SELLING PRICE OF A ONE POUND PACKAGE REQUIRED TO COVER REASONABLE COSTS UNDER DIFFERENT CONDITIONS . . . . .	49
13. COMPARISON AMONG ALTERNATIVE PACKAGED PRODUCTS SOLD FOR INFANT CHILD FEEDING . . . . .	51
14. ESTIMATE OF PERCENTAGE OF NATIONAL MAIZE & SOYA CROP USED IN PRODUCTION OF THRIPOSHA . . . . .	52
15. PERCENTAGE OF DAILY REQUIREMENTS MET BY SCHOOL BISCUITS UNDER DIFFERENT ASSUMPTIONS . . . . .	58
16. PERCENTAGE OF SCHOOL AGED POPULATION ENROLLED IN SCHOOL . . . . .	60
17. ESTIMATED COST PER POUND OF SCHOOL BISCUIT AT SCHOOL SITE IN 1981 . . . . .	65
18. COMPARISON BETWEEN THRIPOSHA AND SCHOOL BISCUITS	67

## LIST OF FIGURES

1. THRIPOSHA RECIPIENTS: 1978-1981 (In Thousands) .	19
2. THRIPOSHA PRODUCTION: 1978-1981 (In Thousand Packages); . . . . .	19
3. MALNOURISHMENT VS. CHILD AGE BY DURATION OF TIME IN PROGRAM N.C.H.S. STANDARD . . . . .	26
4. MALNOURISHMENT VS. CHILD AGE FIRST AND LAST OBSERVATION N.C.H.S. STANDARD . . . . .	27
5. MALNOURISHMENT VS. CHILD AGE BY DURATION OF TIME IN PROGRAM PHILIPPINES STANDARD . . . . .	33
6. MALNOURISHMENT VS. CHILD AGE FIRST AND LAST OBSERVATION MCH CLINICS . . . . .	38
7. MALNOURISHMENT VS. CHILD AGE FIRST AND LAST OBSERVATION MOH CLINICS . . . . .	39

## I. BACKGROUND

Since the nineteen thirties, Sri Lanka has laid emphasis on the development of the social sector and has put into operation many welfare state measures. As a result it has attained relatively high standards of health and literacy rates. However, these measures have been a burden on the economy. Therefore, the policy since 1977 is to reduce this burden with suitable changes in the subsidy schemes, without endangering the satisfactory levels that have been achieved. Free health and education to all citizens continue to be a cardinal policy of the Government.'

Supported in part under P. L. 480 Title II, the Thripasha and School Biscuit programs are among the social welfare programs in Sri Lanka which contribute to the well-being of its people while contributing to the economic burden of the State. In view of the Sri Lankan government commitment to review all subsidy schemes, an evaluation of these programs is particularly timely. It is important to consider the impact of the program in light of its costs as the Governments of both Sri Lanka and the United States attempt to use their scarce resources in the best possible manner. Before considering these issues, we elaborate on the setting and background for these programs.

### A. GENERAL STATUS OF FOOD PRODUCTION/CONSUMPTION

According to an unpublished report prepared for use by USAID in 1980, the availability of major food staples in Sri Lanka declined on a per capita basis through 1974.<sup>2</sup> However, an open market policy instituted by the current

---

<sup>1</sup>Ministry of Health, Sri Lanka, Annual Health Bulletin, 1980, (Colombo, Sri Lanka: Ministry of Health, 1980) p. 9.

<sup>2</sup>Karen P. Lashman, Donald W. MacCorquodale, and James R. Brady, Health Population and Nutrition Sector Review For Sri Lanka-1980, Prepared for the USAID Mission to Sri Lanka--For use only by A.I.D. and H.E.W., Not for Public Quotation, p. 17.

government has stimulated local production and, according to a report in the Colombo Daily News dated October 13, 1981 has enabled Sri Lanka to make great strides toward self-sufficiency in rice. That article states that rice production increased from 1,154,000 in 1975 to 2,133,000 metric tons in 1980, an increase of 84.8%. Unfortunately, the gains in rice production have been accompanied by rising prices and, as stated in the Ministry of Plan Implementation "Final-Interim" report,

...the production of cheaper cereals and low cost staple foods should receive greater priority in view of the rising prices of rice and flour.<sup>3</sup>

That same report makes the all-important observation that the rise in prices of food relative to other items in the typical household budget has been high and, therefore, the ratio of food expenditure to total expenditure, particularly in poor families, has risen.<sup>4</sup> The net effect of price rises on consumption may be to induce families to purchase cheaper, less nutritious foods as a way to compensate for their budget imbalances.

Detailed studies of actual consumption patterns in Sri Lanka are quite dated; therefore, we can only speculate that the diet of the poor is getting worse. However, we do know that the wage rate index in real terms has decreased from 1980 to 1981. (See Section F of this chapter.) The logic that severe inflation, particularly as it effects food commodities, adversely affects consumption is born out by the continued high prevalence of island-wide malnutrition (see next section).

---

<sup>3</sup>Food and Nutrition Policy Planning Division, Ministry of Plan Implementation, Nutritional Status: Its Determinants and Intervention Programmes, (Colombo, Sri Lanka: Food and Nutrition Policy Planning Division, Ministry of Plan Implementation, 1981) p. 57.

<sup>4</sup>Ibid., p. 15.

## B. THE HISTORY OF MALNUTRITION AS A SERIOUS PROBLEM

Among the poor in Sri Lanka, malnutrition has been and continues to be a serious problem. Various special surveys throughout the years have been done to demonstrate the prevalence of malnutrition. The largest survey and, perhaps most often cited, was undertaken by the Ministry of Health with technical assistance from the Center for Disease Control in Atlanta, Georgia. Completed in 1975 and 1976, this survey claims that 34.7% of all preschoolers were stunted (deficient in height-for-age) while 6.6% were wasted (deficient in weight-for-height). Application of the Gomez classification to the same data revealed 42% of all preschoolers to be grade II or grade III malnourished.<sup>5</sup>

The more recent surveys administered by the Food and Nutrition Policy Planning Division (F&NPPD) in eight districts of Sri Lanka confirm the relatively high prevalence of stunting and wasting in Sri Lanka. The percent of chronically malnourished preschoolers varied from 15% in Puttalam to 34.6% in Nuwara Eliya while the percent of acutely malnourished ranged from 4.7% in Matale to 10.2% in Puttalam. (We question the wisdom of comparing the degree of malnutrition in several areas, or tracking malnutrition in one area over time, with the measure of acute malnourishment, weight-for-height. It is such a unstable measure that by weighing a group of children in the morning and then in the afternoon, one can alter the percent malnourished by several percentage points.)

Our own survey of participants in the Thripasha program reconfirms earlier findings that chronic malnutrition increases with age in preschool populations and that the

---

<sup>5</sup>Ministry of Health, Government of Sri Lanka (with CARE/Sri Lanka and the Center for Disease Control, Public Health Service, United States Department of Health Education and Welfare), Sri Lanka Nutrition Status Survey 1976, (Washington, D.C.: USAID/Office of Nutrition, 1976) pp. 27-30.

number of malnourished children in Sri Lanka is substantial. (Due to the screening done in the Thriposha program which preselected children at-risk, one cannot deduce directly comparable indications of the prevalence of malnutrition for the country.)

### C. GOVERNMENT EFFORTS TO COMBAT POVERTY/MALNUTRITION

The long term strategy of the current government of Sri Lanka is to combat poverty through development and through the stimulation of the agricultural sector. Hopefully, unemployment will be reduced and wages raised relative to food prices enabling the people to enjoy a higher standard of living while partaking of an adequate diet. Leading development efforts include the Mahaweli programme to generate hydroelectric power while irrigating large amounts of land not now suitable for intensive agricultural development. Also, there is a major urban development and housing program and an effort to stimulate industrial processing under the direction of the Greater Colombo Economic Commission.

Unfortunately, in the short run, the emphasis upon development activities has created a greater temporary reliance on external assistance for both the development effort and the maintenance of the health and education systems.' Some argue that government efforts to limit expenditures in the service area may lead to a temporary stress in the areas of health and nutrition.

Several government efforts remain in place to provide short term relief in the area of nutrition until the development program takes effect. Largest among these is the Food Stamp Scheme. This program was introduced in September, 1979 to replace the costly food subsidy scheme

---

'Ministry of Health, Sri Lanka, Annual Health Bulletin, 1980, p. 9.

which had grown to account for over 20% of total current payments of the government.' In brief, the Food Stamp Scheme seeks to provide stamps to eligible (poor) households to be applied toward the purchase of rice, paddy, wheat flour bread, sugar, milk foods and dried fish. Additional stamps were issued for kerosene that could be converted to purchase food but food stamps could not be used for kerosene. Half of the population of Sri Lanka benefits from food stamps (7.6 million people). Increases in the prices of food have not been met through increases in the purchasing power of food stamps until now. As of 25 January, 1982, a committee of Secretaries of the Ministries concerned with development has requested formally that food stamp holders be given 30% more than at present. Also, the Ministry of Plan Implementation recommends that the real value of the stamps be index-linked to compensate for inflation.' Other proposals include indexing the stamps to the price of rice or substituting cash allowances for stamps.' The other major programs are those supported by P. L. 480 Title II, the Thripasha Program and the School Biscuit Program. As these programs are the objects of this evaluation, they will be described in more detail later. In addition, there are other efforts to increase the widespread use of nutritious foods made from indigenous products. The most well known of these is "Kola Kenda," a mixture of leafy green vegetables juices with rice. Current supporters of

---

'Food and Nutrition Policy Planning Division, Ministry of Plan Implementation, Nutritional Status: Its Determinants and Intervention Programmes, p. 25.

\*Ibid., p. 35.

'Food and Nutrition Policy Planning Division, Ministry of Plan Implementation, Evaluation Report of The Food Stamp Scheme (Colombo, Sri Lanka: Food and Nutrition Policy Planning Division, Ministry of Plan Implementation, 1981) p. 43.

"Kola Kenda" include the Ministry of Indigenous Medicine and the voluntary organization, Sarvodaya.

#### D. HISTORY OF CARE ACTIVITIES IN SRI LANKA

Although active in Sri Lanka since 1950, CARE was not involved in nutrition activities until 1957. At that time, the Government of Sri Lanka restarted school feeding after a three year cessation. CARE has assisted in that program ever since. In 1968, CARE was instrumental in the introduction of a uniform biscuit to replace the unpalatable and inconsistent bun used previously.

In 1972, in collaboration with the Ministry of Health, CARE proposed to develop a high protein fortified cereal based foodstuff for distribution to at-risk infants and preschoolers as well as pregnant and lactating mothers. In 1973, distribution of Wheat Soya blend began in repackaged form under the name Thripasha. In 1974, indigenous commodities were introduced and blended with the gifted commodity. Ultimately, to facilitate the introduction of larger quantities of indigenous commodities, low cost extrusion cooking was introduced. Now, the new Thripasha Processing Complex is one of the largest extrusion cooking plants in the developing world. Current plans call for the inclusion of additional indigenous commodities into the Thripasha until, ultimately, it will be a Sri Lankan processed food product.

#### E. OTHER DONOR NUTRITION PROGRAMS

The largest donor nutrition program is that supported by the United States; however, other donors are active in Sri Lanka.

- 1) The World Food Programme - Operating in Sri Lanka since 1964, the World Food Programme has committed food aid worth US \$80.72 million for 18 development projects (resettlement schemes, road and canal construction

programs and self-help housing projects) and 8 emergency projects. About US \$60 million have already been spent. The balance is planned to be used in reforestation of water catchments and degraded lands and emergency operations. An additional program in drought relief began January 1, 1982.<sup>1°</sup>

- 2) UNICEF - UNICEF has been active in a Soya Foods Extension Project designed to develop acceptable soya foods for local production. Also, UNICEF has supported nutrition related programs such as immunization programs, drinking water and sanitation, family planning, training of paramedical personnel, and upgrading the quality of creches.
- 3) Other Voluntary Agencies - The Sarvodaya Organization of Sri Lanka manages a network of about 3,500 community kitchens providing on-site "Kola Kenda" and Thripasha to preschool children. By stressing self-help, Sarvodaya encourages involvement of the mothers and, through nutrition education, encourages mothers to make better use of traditional foods such as "Kola Kende" to increase family nutritional well-being.

The Save the Children Federation's Program in Sri Lanka follows their Community Based Integrated Rural Development plan. This involves a multi-sectoral approach based on a community plan for self-help. Thus far, SCF has concentrated on a pilot program in a single "shanty town" in Colombo but is planning to expand into rural areas.

- 4) Other private and religious organizations are also involved in the distribution of foods to needy groups.

---

<sup>1°</sup>World Food Programme, Activities of World Food Programme In Sri Lanka (Colombo, Sri Lanka: World Food Programme, 1981).

We were unable to enumerate fully all of these programs during the evaluation.

#### F. RECENT (POST 1977) CHANGES IN THE ECONOMY

As noted earlier, 1977 marked a shift in emphasis by the Government of Sri Lanka from social development to economic development. As a result, GNP, which grew at an annual rate of just over 3% in the 1970 - 1977 period, jumped to 8.2% in 1978, 6.2% in 1979 and about 5.4% in 1980. Agricultural production has been stimulated by creating an open market for paddy and establishing support prices for secondary crops.

However, the progress in these areas is not without its price. The high rates of economic growth and the employment creation achieved by Sri Lanka to date are not judged likely to continue over the medium term due to several adverse conditions, a low level of international reserves, high rates of domestic inflation and an unfavorable external economic environment. Given the general downturn in the economic activity in the industrialized countries, the potential for an expansion of Sri Lanka's exports tends to be limited. This comes at a time when an expansion of exports is needed to, inter alia, reduce the impact of petroleum imports which absorb over 43% of Sri Lanka's export earnings. Further, the capacity of the public sector, in particular, to absorb new investments is limited due to constraints on materials and manpower.''

These problems have prompted the Government to curtail its public investment program. Furthermore, these problems are making it especially difficult for the Government to maintain existing levels of social services at a time when the nation's poor, the hardest hit by inflation, are most in need.

---

'United States AID Mission to Sri Lanka, Country Development Strategy Statement Update FY 1983-1987 (Colombo, Sri Lanka: USAID/Sri Lanka, 1982) p. 13.

The damaging effects of inflation are best demonstrated by the Wage Rate Index for the private sector. In real terms, using 1975 as the base, this measure of the relative purchasing power of wages rose to a peak in 1979, levelled off in 1980 and dropped dramatically in 1981. Table 1 presents this index broken down by major economic sector.

In the short run, the economic prognosis for Sri Lanka is particularly distressing. Much of the development effort has been concentrated in the Mahaweli program, calling for the construction of major dams and all of the related activities such as the resettlement of families and the conversion of lands to agricultural use through irrigation. The major benefits of this effort will not be realized for some years but the costs are quite current. Thus, given the state of the economy, one can conclude only that programs directed to assist the poor until the benefits of the economic development activity extend to them remain critical in Sri Lanka.

TABLE 1  
WAGE RATE INDEX (REAL)

	Private Sector			Government Sector	
	Agriculture	Industry	Trade	Tech. + Clerical	Minor
1975 <sup>1</sup>	100.0	100.0	100.0	100.0	100.0
1976	100.9	101.4	107.8	105.5	110.6
1977	125.5	107.9	123.2	105.5	110.7
1978	162.8	117.5	157.0	105.5	114.4
1979	185.0	123.2	177.2	110.6	124.3
1980	184.9	119.6	178.1	96.4	109.9
1981	156.2	115.3	148.4	92.1	106.1

<sup>1</sup>Base Year is 1975

Source: Department of Census and Statistics and Central Bank of Ceylon

101

## II. PURPOSE OF EVALUATION

The evaluation of the P. L. 480 Title II supplementary feeding program in Sri Lanka was requested jointly by AID/Washington, USAID/Sri Lanka and the Government of Sri Lanka to improve program impact and effectiveness. One of a series of evaluations supported by the Asia Bureau of USAID, the Sri Lanka evaluation comes at a difficult time. Economic problems in the United States, when coupled with major cuts in federally funded U. S. programs, are leading to general cut-backs in P. L. 480 Title II programming world-wide. These cut-backs are not related to the current evaluation which was originally conceived as a means of improving the existing program.

Specifically, the evaluation was designed around:

- a) an assessment of nutritional impact resulting from the program, and
- b) a cost-effectiveness analysis of the components of the program.

From these analyses, it was hoped that recommendations for improving the program could be made as well as recommendations regarding the establishment of an ongoing monitoring and evaluation system.

### A. ORIGINAL OBJECTIVES VS. CHANGING NEEDS

The original objectives for the evaluation have been retained and, if anything, broadened. The final scope of work (Appendix A) calls for a more general review of P. L. 480 Title II in the context of all food and nutrition programs in Sri Lanka. The reasons for this are advanced in the following two sections.

## B. GOVERNMENT OF SRI LANKA INTERESTS

On July 27, 1980, His Excellency the President of Sri Lanka, Mr. J. R. Jayawardene presented a cabinet paper on nutrition in Sri Lanka calling for:

...formulation of a Food and Nutrition Policy Plan for Sri Lanka in relation to food production and consumption.'<sup>2</sup>

In this same document, the President notes the non-existence of a "real" evaluation of the effectiveness of existing supplementary feeding programs. He states that:

The effectiveness of this programme has also been in doubt due to logistic problems associated with transport and distribution together with overhead costs.'<sup>3</sup>

The current evaluation of P. L. 480 Title II is designed to help fill this critical void identified by the President.

## C. UNITED STATES INTERESTS

Different offices within AID have their own particular interests in the evaluation. All share the commitment to improving the operation of the feeding program; however, each has a somewhat different motivation.

USAID/Sri Lanka is going to be faced with defending its program in the face of budget cuts imposed by Washington and is interested, therefore, in learning for itself what parts of the program work best. In addition, the evaluation will provide "hard" data on which to base that defense.

---

<sup>2</sup>Food and Nutrition Policy Planning Division, Ministry of Plan Implementation, Nutritional Status In Sri Lanka: Its Determinants and Proposed Corrective Measures, Cabinet Paper presented by His Excellency the President at the Cabinet Meeting on July 27, 1980 (Colombo, Sri Lanka: Food and Nutrition Policy Planning Division, Ministry of Plan Implementation, Publication No. 4, 1980) p. 5.

<sup>3</sup>Ibid., p. 9.

The Asia Bureau initiated the series of evaluations because of observed problems with P. L. 480 Title II in Asia. The entire series of evaluations is designed to ascertain the magnitude and depth of those problems to facilitate better programming of U. S. aid in Asia. Of particular concern to the Asia Bureau is the integration of Food Aid into the development process. (Historically, P. L. 480 programs have often been run independent from, and sometimes in conflict with, other development activities.)

Finally, there was interest in Washington, as well as in this evaluation team, in testing out a methodology for evaluation based on an iterative approach to data analysis. Typically, nutrition intervention evaluations have been conducted under a procedure calling for a site visit by an evaluation team which then retires to its home base to write a report. In contrast, this evaluation follows a procedure calling for those persons with the most intimate knowledge of an intervention to review and interpret the analysis prior to completion of the report.<sup>14</sup> Because this commitment to on-site involvement guided the evaluation team in its deliberations, the evaluation exercise stands as an example of a methodology quite different from that most often applied.

---

<sup>14</sup>William D. Drake, Roy I. Miller, and Margaret Humphrey, Final Report: Analysis of Community-Level Nutrition Programs (Ann Arbor, Michigan: Community Systems Foundation, 1980).

### III. THE THRIPOSHA PROGRAM

The P. L. 480 Title II program in Sri Lanka has two components--the Thriposha Program and the School Biscuit Program. In this chapter, we consider the Thriposha Program in considerable depth.

#### A. DESCRIPTION

The primary thrust of the Thriposha Program is the integration of targeted supplementary feeding into the health care system of Sri Lanka. The program derives its name from the pre-cooked supplementary food employed, Thriposha, meaning "triple nutrient value" in Sri Lanka's two native languages. Thriposha is a blend of ICSM, corn and soya beans fortified with vitamins and minerals. It is precooked by a low cost extrusion cooking process at a plant near Colombo where it is packaged for easy and convenient consumption by its recipients.

Within the health care system, Thriposha is offered to medically selected antenatal and lactating mothers, infants, preschoolers and ward patients. Guidelines for the medical selection for pregnant and lactating women are that they be suffering from anemia (Talquist method indicating hemoglobin levels below 50), having difficulty producing milk while lactating, or showing other clinical signs of nutrition deficiency. Infants and preschoolers suffering from second or third degree malnutrition (less than 70% of the National Academy of Sciences'<sup>1</sup> standard weight-for-age), exhibiting weight loss or showing other clinical signs of malnutrition are also given Thriposha. Through the health care system, two 750 gram bags are distributed monthly providing a 50

---

<sup>1</sup>This standard is equivalent to the standard applied in the quantitative analysis in this paper. We shall call the standard the NCHS-CDC standard as it has been published by the National Center For Health Statistics and distributed by the Center For Disease Control in Atlanta, Georgia.

gram ration per day. Table 2 gives the nutritional content of 50 grams of Thriposha.

TABLE 2  
NUTRITIVE VALUE OF SELECTED NUTRIENTS IN THRIPOSHA

Nutrient	Thriposha with ICSM	Indigenous Thriposha without Vitamin and Mineral Fortification
Food Energy (calories)	190.0	185.0
Protein (gms) . . . .	10.0	9.9
Crude Fat (gms) . . . .	3.0	3.1
Crude Fiber . . . . .	0.6	0.9
Ash (gms) . . . . .	2.0	1.8
Carbohydrates (gms) .	30.0	31.5
Calcium (mgs) . . . . .	450.0	340.0
Iron (mgs) . . . . .	9.0	6.9
Folic Acid (mgs) . . . .	100.0	.....
Vitamin B <sup>12</sup> (mgs) . . . .	2.0	.....
Vitamin A (IU) . . . . .	850.0	698.0

Note: values are for a 50 gram ration

Source: Paper presented by Dr. S M. Gunasekera at an orientation seminar on food and nutrition policy

In addition, Thriposha is distributed through a limited commercial market experiment in four districts, into the primary schools which had the worst nutritional status during a survey of school children done in 1973, and through social service organizations (mainly Sarvodaya) for on-site feeding. At one time, distribution was also done through cooperatives (1974-1976).

#### B. BENEFICIARY COUNT

A source of confusion between government officials and CARE is the count of beneficiaries receiving Thriposha. The source of the confusion is natural and, hopefully, the set

of definitions presented here will help ameliorate the problem.

Beneficiaries can be counted in two ways. Consider the determination of an annual count of beneficiaries. First, one can count the average number of people visiting a clinic for all sessions of that clinic held in a single year. One might arrive at a figure of 300 preschool children per clinic and conclude that the number of preschool beneficiaries reached is 300. (Similar counts can be made for each other category of beneficiary.) This figure we call the average beneficiary count or "ABC" count. It is used most often by the government because it serves well in estimating the costs involved in getting Thripasha to the clinics.

However, CARE points out, and rightly so, that due to the constant addition and subtraction of beneficiaries through screening, the actual number of individuals served is greater than the "ABC" count. Simply put, if one child receives Thripasha for 6 months and a second child receives Thripasha for 6 months, the "ABC" count is 1 but the number of individuals reached is 2. We call this latter number the "HEAD" count.

Given the record keeping system now in use, it is relatively easy to compute the "ABC" count but, without some assumptions with regard to turnover, impossible to arrive at a "HEAD" count. (Each clinic now reports the number of people seen, without differentiating between continuing participants, returning participants, and new participants.) In their own computations, CARE has made use of assumptions with regard to turnover based on logic and a detailed examination of the registries of selected clinics.

Because antenatal mothers receive Thripasha for only the last 4 or 5 months, a conversion factor of 2.2 is suggested by CARE for computing the "HEAD" count from the "ABC" count. Similarly, the aforementioned observation of

selected clinics offers conversion factors of 2 for lactating mothers, 2 for infants and 1.25 for preschoolers. Note, this no doubt over estimates the "HEAD" count by a slight amount because the same individual might be part of the "ABC" counts for two categories; that is, an antenatal mother gives birth and becomes a lactating mother or an infant ages beyond 12 months and becomes a preschooler.

Using the CARE conversion factors, the number of individuals reached in 1981 by category of beneficiary is given in Table 3 and amounts to 867,988 ("HEAD" count). Using the average beneficiary count, the comparable value is 553,304 ("ABC" count).

TABLE 3  
"HEAD" COUNT OF THRIPOSHA BENEFICIARIES IN 1981

	Estate	Health	Total
Antenatal Mothers	23,714	156,935	180,649
Lactating Mothers	35,512	62,634	98,146
Infants . . . . .	25,188	79,460	104,646
Preschoolers . .	91,511	297,555	389,066
Ward Patients . .	6,757	33,428	40,185
TOTAL . . . . .	182,682	630,012	812,649 <sup>1</sup>

<sup>1</sup>In addition, CARE served 15,000 beneficiaries through the Ministry of Social Services and 40,133 through their primary school feeding program for a grand total of 867,988. (These last two figures added are really "ABC" counts.)

### C. TARGETING

Disputes over the degree to which CARE is reaching pre-set targets have arisen as a result of confusion with regard to the interpretation of the targets as "ABC" or "HEAD"

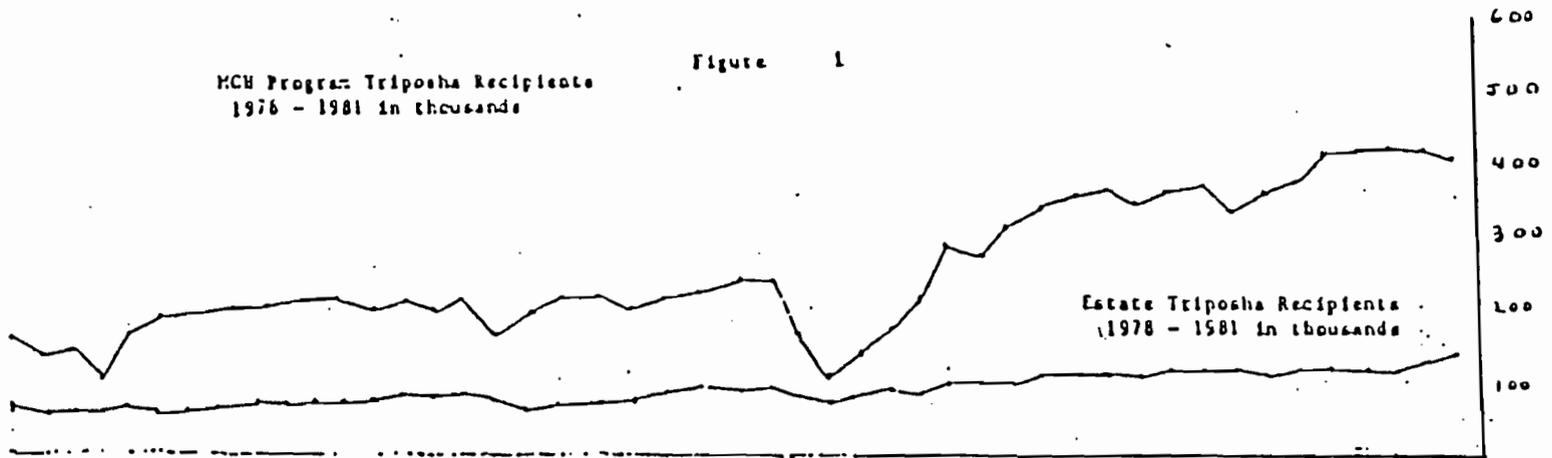
count targets. We believe that both counts are useful and, in the future, that all parties concerned should be specific with regard to the method used to set targets or count beneficiaries.

Using an "ABC" count, Figures 1 and 2 show that the number of beneficiaries, by category, has steadily risen over the past six years as has production. Short term disruptions in production or distribution lead to some periodic variations, but the trend is clearly upward. The Ministry of Health sets a target number of beneficiaries for each year. Up until this past year, the approved target for beneficiaries has been higher than the actual number capable of service through the existing production/distribution system. In fact, the MOH target represents the maximum number of beneficiaries that can be reached given the MOH budget and scheduled gifted commodities. It is a tribute to the MOH and an indication of their support for the Thripasha Program that they have continually approved levels of recipients above the practical limits of supply. During this past year, 90% of the MOH target, assuming an "ABC" count, has been reached each month as approximately 550,000 rations of Thripasha are distributed monthly.

Even though production/distribution capability now enables CARE to meet MOH targets (using the "ABC" count), the targets are such that one can conclude that only a portion of the needy, island-wide are included in the program. Let us illustrate the size of the shortfall for preschoolers. The current population estimate for Sri Lanka is about 15 million, with 2.25 million of that total being under 5. (When lactating and antenatal mothers are included, the total is close to 2.5 million.) Most nutrition surveys indicate a preschool malnutrition rate near 33%; therefore, close to 800,000 children should be served using the weight-for-age selection criterion alone.

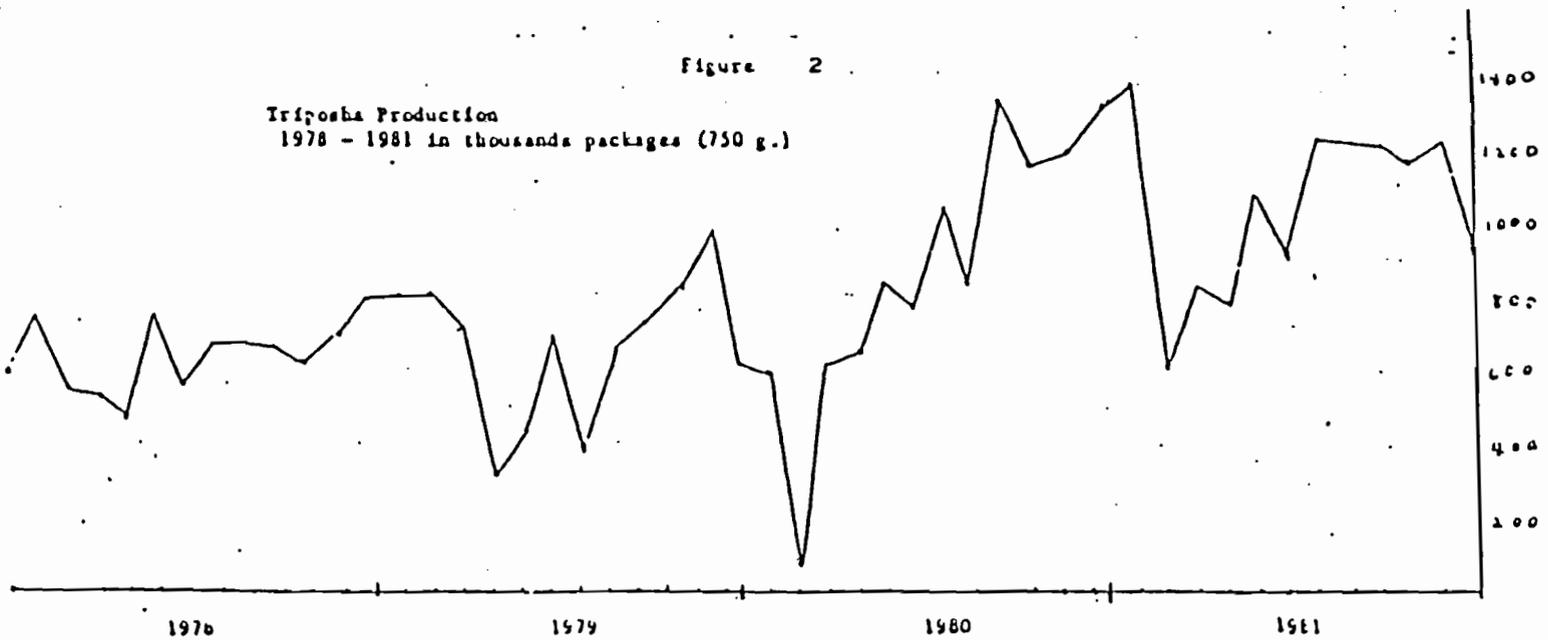
MCH Program Tripooha Recipients  
1976 - 1981 in thousands

Figure 1



Tripooha Production  
1978 - 1981 in thousands packages (750 g.)

Figure 2



197

FIGURE 3

MALNOURISHMENT VS. CHILD AGE  
BY DURATION OF TIME IN PROGRAM  
N.C.H.S. STANDARD

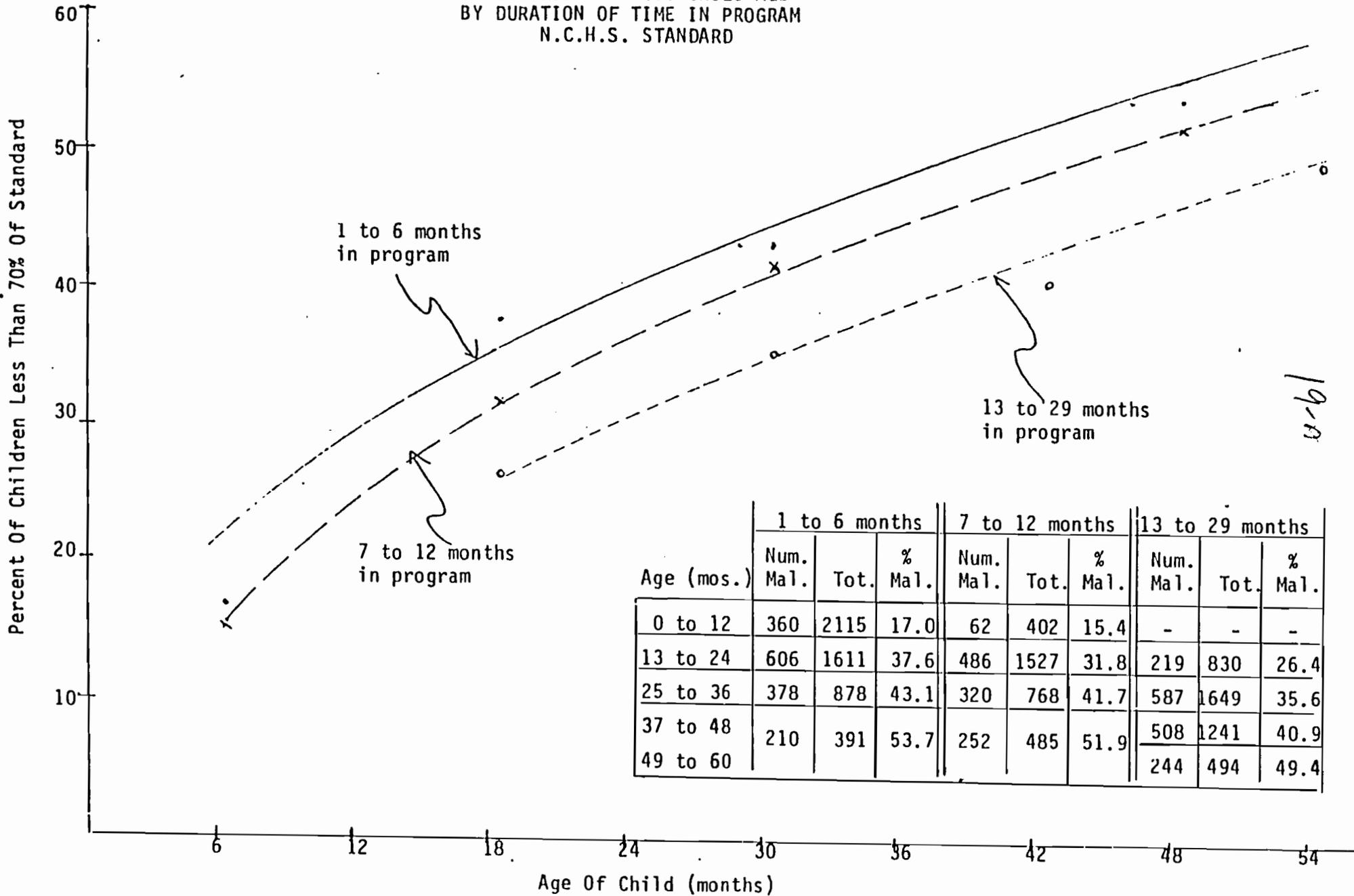
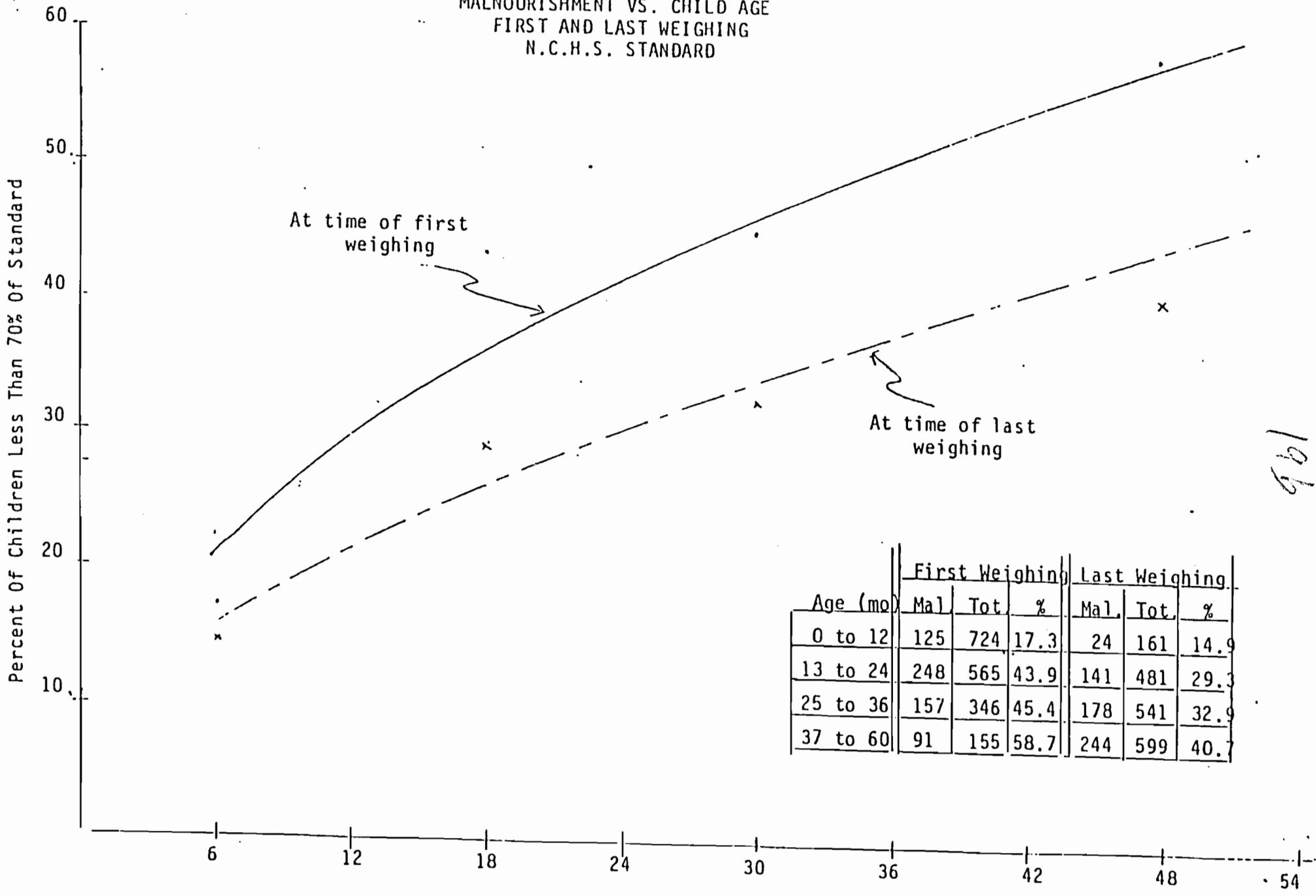


FIGURE 4

MALNOURISHMENT VS. CHILD AGE  
FIRST AND LAST WEIGHING  
N.C.H.S. STANDARD



196

According to the "HEAD" count provided by CARE, almost 500,000 infants and children are served per year. Due to the failure to screen properly and due to the propensity of the better Medical Officers to place very young children on Thripasha as a preventive measure prior to their falling into Grade II malnutrition, we can estimate that only 400,000 of those infants and preschoolers are truly in need. (This estimate is derived from our impact analysis which showed that of the 1,799 children observed, 20% were over 18 months of age and either Normal or Grade I malnourished at time of entry into the program. Thus, 4 out of 5 were already malnourished or likely to become malnourished.)

To derive the total pool of eligible beneficiaries, we must add to the 800,000 malnourished preschoolers the approximately 200,000 very young children who should be given the Thripasha as a preventive measure. (We select 200,000 because this is the approximate number of children in the age range between 6 months and 18 months in the entire population who are still normal but likely to become malnourished as they age.) Thus, we can estimate that the Thripasha program is currently serving about 400,000 of Sri Lanka's one million needy preschoolers, about forty percent. Note, it was not anticipated that the program, in its present form, would reach all needy children in Sri Lanka. In fact, the commercialization experiment was launched to test the feasibility of reaching needy people through the market because the health care system and the budget allowances of the GSL may not have proved adequate to reach everyone.

#### D. NUTRITIONAL IMPACT

We now turn to the analytic issue of whether Thripasha, as one component of a "package" of services, contributes to a reduction in child malnutrition. In order to address that issue, we must resolve two sets of questions: first, what is

the change in nutritional status and, second, if there is a change, can it be attributed to the package of services rather than some other competing explanation?

In the case of the Thriposha program, there are several potential competing explanations:

- 1) there were participation or selection biases which overwhelmed or distorted the program effects,
- 2) the children showed improvement because a large percentage passed the highly vulnerable weaning period,
- 3) the environment in which the children lived changed due to events outside the program,
- 4) there was improvement due to natural phenomenon unrelated to age, or
- 5) the outcome reflected a random or stochastic effect rather than an actual change.

Since the observed outcome is heavily dependent upon the sample selection and field data gathering protocol, we begin with a description of the field methodology employed.

Teams of data gatherers visited selected clinics to retrieve longitudinal anthropometric records on program participants. Under the direction of the CARE field staff, some of whom had participated in the Ministry of Health-CDC survey in 1976, teams of university students visited clinics in 42 cities where they recorded weight histories, Thriposha usage and several family and child descriptors. The research design and data gathering protocol for this effort was developed during the first phase of this evaluation and is described in the phase I report (working document number 1).

CARE followed the procedure suggested by the evaluation team and forwarded completed data forms to the United States in batches. The analysis of nutritional impact was based on data for 1,799 children from 42 health clinics. Due to the paucity of data received on pregnant women, this data was not included in the analysis.

The data for the 1,799 children came from a variety of clinic types in rural, urban, suburban and estate areas. An unusually large proportion of the interviews came from the Kandy District. Table 4 displays some of the pertinent data describing the sample.

It should be noted that the selection of clinics was not done in a way to insure that the sample was truly representative of all clinics administering Thriposha in Sri Lanka. In fact, there is good reason to believe that the sample is skewed toward the better run and/or better staffed clinics, although we have no evidence of this. Data could be gathered from only those clinics which had been weighing children regularly and keeping records of those weighings in a form suitable to retrieval. The ability and willingness to maintain such records is an indication of commitment by clinic staff which, no doubt, translates into effective overall administration of services. Therefore, one must not generalize blindly from this analysis to the entire Thriposha program. If impact in these selected clinics is observable, we can say only that the program worked when administered as well as in those selected clinics. The importance of such a result, however, should not be denied. Due to a variety of factors, demonstration that a nutrition intervention has positive impact is a remarkable finding. If we can show that the Thriposha Program works under current conditions existing in the sample, the problem becomes not one of redesign but one of more effective application island wide.

Another bias, this one likely to result in an underestimate of program impact, must also be considered. This bias arises as a consequence of the way children from any given clinic were included in the sample. A well run clinic stops administering Thriposha to children who have attained a nutritional level of Grade I (70% or more of the standard) after those children remain in that category for

TABLE 4  
CHARACTERISTICS OF THE SAMPLE

	Count	Pct.
BY DISTRICT		
Kandy . . . .	791	44.0
Colombo . . . .	384	21.4
Kurunegala . . . .	208	11.5
Amparai . . . .	141	7.8
Kalutara . . . .	74	4.1
Puttalam . . . .	120	6.7
Badulla . . . .	21	1.3
Kegalle . . . .	57	3.2
TOTAL . . . .	1,799	100.0
BY CLINIC TYPE		
Polyclinic . . . .	361	20.1
Child Welfare . . . .	752	41.8
Preschool . . . .	465	25.8
Infant . . . .	39	2.2
Thripasha Distr. . . .	182	10.1
TOTAL . . . .	1,799	100.0
BY ADMINISTERING AGENCY		
Municipal . . . .	867	48.2
Min. of Health . . . .	684	38.0
University . . . .	92	5.1
Estate . . . .	156	8.7
TOTAL . . . .	1,799	100.0
BY LOCATION		
Urban . . . .	821	45.6
Suburban . . . .	329	18.3
Rural . . . .	493	27.4
Estate . . . .	156	8.7
TOTAL . . . .	1,799	100.0

some designated period of time (for example, three months). These "recovered" children are then asked to return to the clinic for a "check-up" after another designated time period (say six months). Because children included in the sample attended the clinics on the day the sample was chosen (so that either the weights or the Thripasha distribution records could be retrieved from the mother), children who had responded to the treatment were under-represented.

Stated simply, the research design called for the comparison of the nutritional status of children of a given age who had been receiving services for a sustained period of time to the nutritional status of children of the same age who had less exposure to the program services. The need to compare children of similar age results from the universal phenomenon that the degree of risk experienced by a preschooler varies according to his/her age. Typically, some months after the children in a given culture are weaned, they go through a period of extraordinary risk. Increased exposure to disease-causing agents accompanies the increased mobility of children which coincides with weaning. Also, the unavailability of palatable, nutritious weaning foods contributes greatly to this risk. As children develop their own immunities and become more able to digest adult food, they are able to exhibit some recovery--independent of intervention. To avoid confusing such recovery with the impact of an intervention, it is mandatory to compare children of the same age.

The device used to make such comparisons, a graph of malnourishment against age for different age groups within a preschool population, has been called a "characteristic curve" in earlier work done by the authors.' To facilitate comparisons of sub-groups of the population, separate curves can be drawn for each sub-group. Figure 3 presents such a

---

'Drake et. al., Final Report: Analysis of Community-Level Nutrition Programs, p. 97.

set of curves for sub-groups of children defined by length of time in the Thriposha Program.

In Figure 3 children are considered to be malnourished if their weight is less than 70% of the NCHS-CDC (also called the WHO or N.A.S) standard weight-for-age. Uniformly, the rate of malnutrition is lowest for all age groups in the segment of the population with the longest participation in the program. This simple figure is convincing graphic evidence that the program is having a positive nutritional impact on its participants.

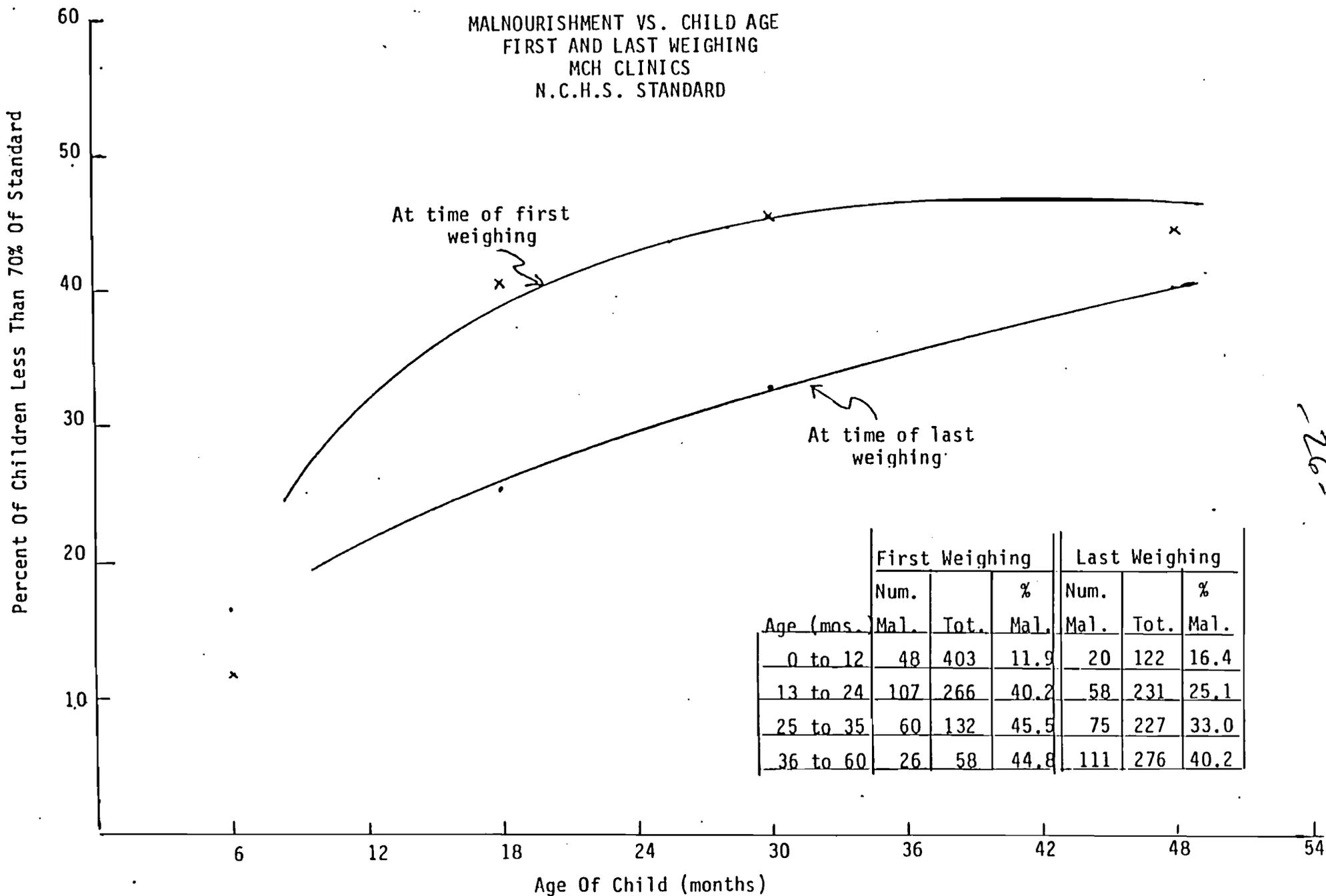
It must be understood that this impact is due to the entire program--immunizations, primary health care including deworming and vitamin and mineral supplementation, health education and Thriposha. In the absence of more carefully conceived research studies, it is impossible to sort out the role of Thriposha alone in causing nutritional improvement. Such a study might consist of partitioning similar villages into groups receiving different mixes and/or intensities of service and comparing impact in those groups. (Frankly, such experimentats are difficult to administer because villages tend to undergo unique changes during the time of experimentation--changes which make it risky to attribute differential rates of improvement across villages to the intervention alone.)

Another way to demonstrate program impact is a comparison of the nutritional status of all preschoolers at the time of entry into the program to the status as of their most recent observation. Once again, such a comparison must consider children of similar age; that is, one must compare children in a given age group just entering the program to children in the same age group who have a history of participation in the program. Figure 4 presents such a comparison, again using the characteristic curve.

From this figure, we can deduce that children in each age group who have participated in the program are better

FIGURE 6

MALNOURISHMENT VS. CHILD AGE  
 FIRST AND LAST WEIGHING  
 MCH CLINICS  
 N.C.H.S. STANDARD

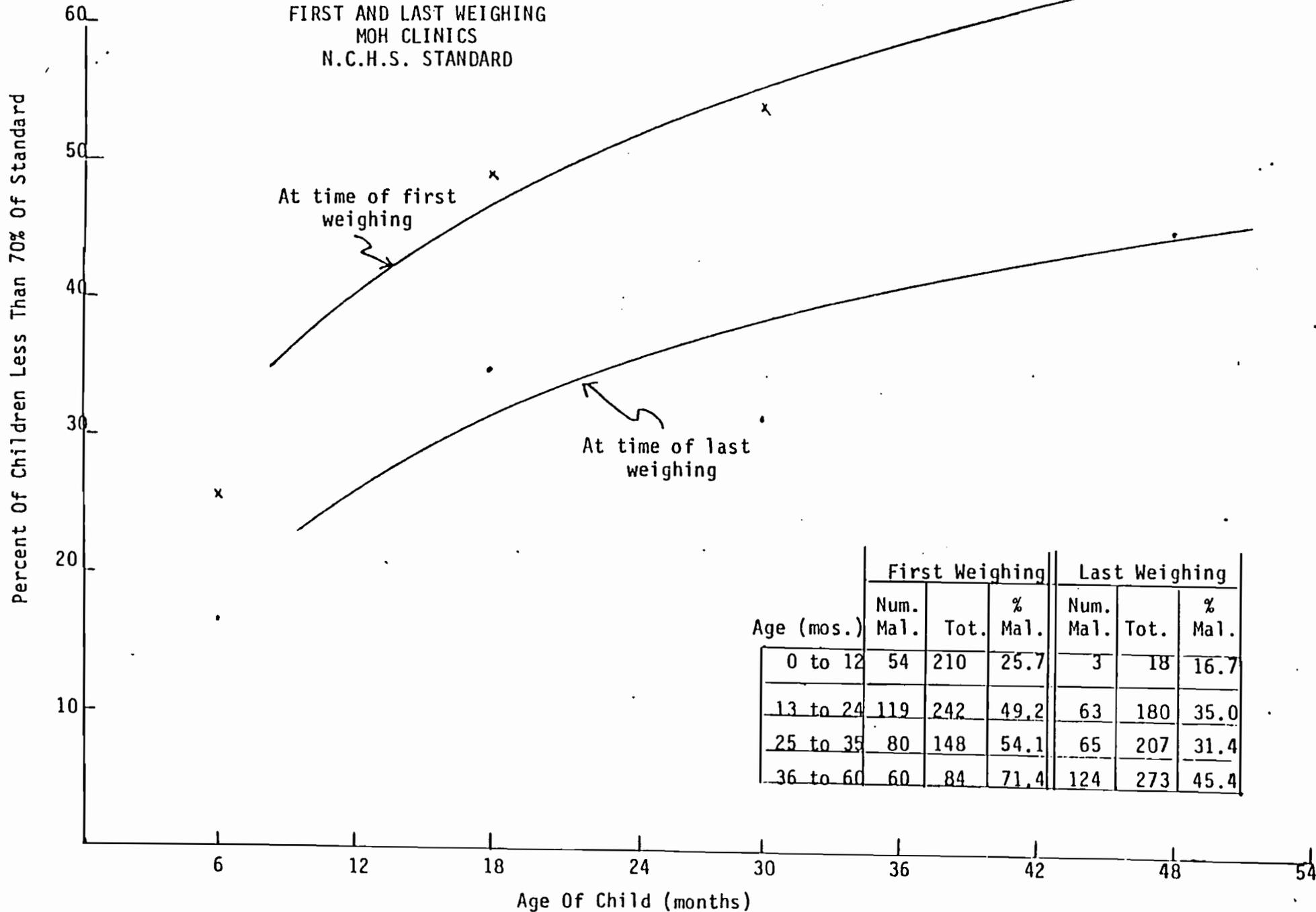


Age (mos.)	First Weighing			Last Weighing		
	Num.	Tot.	%	Num.	Tot.	%
0 to 12	48	403	11.9	20	122	16.4
13 to 24	107	266	40.2	58	231	25.1
25 to 35	60	132	45.5	75	227	33.0
36 to 60	26	58	44.8	111	276	40.2

-26-

FIGURE 7

MALNOURISHMENT VS. CHILD AGE  
 FIRST AND LAST WEIGHING  
 MOH CLINICS  
 N.C.H.S. STANDARD



Age (mos.)	First Weighing			Last Weighing		
	Num. Mal.	Tot.	% Mal.	Num. Mal.	Tot.	% Mal.
0 to 12	54	210	25.7	3	18	16.7
13 to 24	119	242	49.2	63	180	35.0
25 to 35	80	148	54.1	65	207	31.4
36 to 60	60	84	71.4	124	273	45.4

27

off than those who had not. (In this analysis, intensity of participation is not considered.)

According to the guidelines of the CARE program, there should be no "normal" children added to the rolls of Thriposha recipients. Therefore, the high number of "normal" children at time of entry may be viewed as a violation of policy. However, during our field visits, we learned that the better Medical Officers use considerable judgement in selecting beneficiaries. Based on clinical signs, family histories or other observed changes, decisions to add "normal" beneficiaries are often made. This explains the high number of "normal" children at time of entry into the program, especially among younger children approaching the period of highest nutritional risk.

The positive effect of the program indicated in the graphic representation of nutritional impact can be shown to be statistically significant. Many statistical procedures can be used to test for significance; however, we will apply only one of the more commonly used--regression. A regression analysis tests for the significance of an "explanatory" variable in explaining the variance of a dependent variable. We form the hypothesis that change in nutritional status of a child (the dependent variable) is a function of the age of the child at time of entry to the program, the child's nutritional status at time of entry and the length of time the child participated. This particular formulation was selected because it is parallel to one used in the evaluation of the P. L. 480 Title II program in the Philippines.''

Let Y = Change in nutritional status  
(Philippines standard)

X' = Age of child at time of entry

---

''Stewart Blumenfeld, et. al., The Impact of PL 480 Title II in the Philippines, Draft of a Report of a Program Evaluation for USAID/Philippines (July, 1981).

$X^2$  = Percent of standard at time of entry  
 $X^3$  = Length of time in program

Then, the regression results are shown in the following equation:

$$Y = 0.12X^1 + 0.49X^2 + 0.08X^3 + 33.8$$

(6.8)    (-25.7)    (3.4)    (21.2)

The numbers in parentheses are the t-statistics for the tests of the significances of the individual explanatory variables--all are significant at the .01 level or better. Also, the analysis of variance (not shown here) shows the significance of the entire equation. The  $R^2$  coefficient derived in the analysis of variance is 0.345, implying that 34.5% of the variance in the dependent variable is explained. This figure is relatively high for nutrition studies.

Figures 3 and 4 give a straight forward indication that the Thripasha program has had positive nutritional impact in selected clinics. Let us consider the other possible competing explanations.

1) Participation Or Selection Biases - We have already alluded to the possibility that the clinics included in our sample are the "better" run clinics. During our field visits, we saw several clinics that were part of our sample and several that were not. There were few differences to be seen, except in Jaffna where the clinics were not in our sample and were run better than all other clinics visited. In support of the contention that clinics were generally the same across the country, many of the officials with whom we had contact corroborated the similarity of most clinics.

2) Children Passed the Age of Maximum Vulnerability - The characteristic curve compares children of similar age and all children, regardless of age, were better off for having been in the program.

3) Environmental Changes - Our discussion of the economy suggested that, if anything, the effects of inflation represented an adverse environmental change; therefore, it is unlikely that improvement between first and last observation is due to an improvement in the environment. In fact, it is really remarkable that participants improved in the face of a harsh environment.

4) Natural Improvement - Some percentage of children who are worst off in a population will improve independent of any intervention. By comparing the rate of improvement in groups differentiated only by their length of participation in the program, we avoid the possibility that the observed improvement would have occurred anyway.

5) The Outcome Is Random - The statistical analysis tests for the possibility that the observed outcome was due to chance. The statistical significance of the duration of time in program variable indicates that the observed data are probably not a chance configuration.

#### E. FURTHER COMMENTS ON ANALYSIS

Demonstration of impact in selected centers is, in itself, remarkable. This is due to a variety of issues concerning the measurement of nutritional impact which, taken together, cause estimates of nutritional change to be systematically low. These issues include:

- a) the choice of growth standard for determining nutritional status,
- b) the choice of the cut-off point for defining malnutrition,
- c) the responsiveness (or lack of responsiveness) of weight-for-age as an indicator of malnutrition, particularly among clinically normal but stunted children, and
- d) the unavoidable understatement of the magnitude of change due to the misclassification of children as

to nutritional status, a phenomenon that has been called "under reporting."<sup>4</sup>

A detailed explanation of these issues follows.

a) The Choice Of Standard - Derived from healthy American children, the NCHS-CDC standard defines normal growth in an American environment where the abundance of meat provides a diet rich in the amino acids (lysine) that lead to longboned growth. Thus, the standard calls for a rather high rate of weight increase in individuals to enable them to "hold their own." Other standards, based on the observation of healthy Asian children are less demanding.

For example, a male child should gain 2.1 kilograms between the ages of 36 and 48 months to retain the 50th percentile according to the NCHS-CDC standard. According to the officially sanctioned standard of the Philippines, such a child should gain 1.5 kilograms to remain normal. Clearly, any child who gains between 1.5 kilograms and 2.1 kilograms will improve according to the Philippines standard but will deteriorate according to the NCHS-CDC standard. (Note, for younger preschoolers, the Philippines standard is more demanding than the NCHS-CDC standard. Between 6 and 12 months, the Philippines standard calls for a 2.5 kilogram weight gain; the NCHS-CDC standard, a 2.4 kilogram weight gain for boys or a 2.3 kilogram increase for girls.) Therefore, quantification of the degree of improvement in a population depends as much on the choice of standard as the actual gain in weight.

Figure 5 is identical to Figure 3 except that the Philippines standard is used to define malnutrition. Notice how the older children seem to improve (exhibit less malnutrition) according to the Philippines standard while they continue to deteriorate according to the NCHS-CDC

---

<sup>4</sup>Drake et. al., Final Report: Analysis of Community-Level Nutrition Interventions, p. 89.

standard. Given this apparent contradiction one must ask the question, "which standard accurately portrays the nutritional status of the population?" Nutrition experts are unable to agree on the answer to this question.

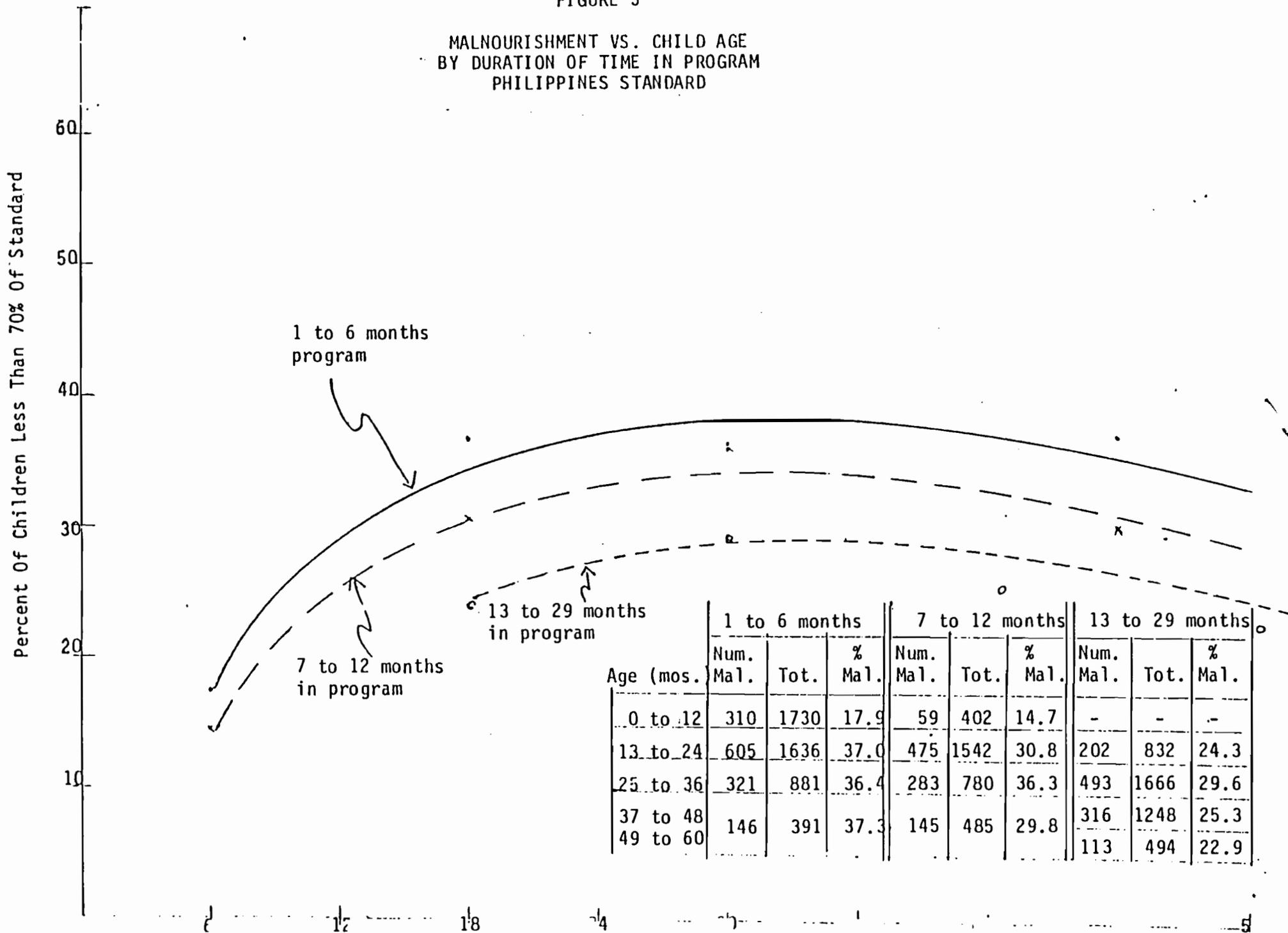
b) The Choice of "Cut-point" - The confusion with regard to rate of improvement related to the choice of a standard is further exacerbated by the arbitrary selection of 70% as the dividing line between normal and malnourished children. The 70% figure, which is used the world over, is taken from the Gomez classification. This classification derives its name from the Mexican doctor who first used the notion of a classification based on weight-for-age. Gomez determined degrees of risk associated with weight deficiency by observing clinical signs of malnutrition as compared to the observed weights of children with those signs. He discovered that children attaining weights only 70% of normal were in a state of relatively high risk. The 70% figure is still used; however, the normal weights used by Gomez are not the weights most often used today. They are, for example, considerably less than those prescribed by the NCHS-CDC standard.

It should be obvious to the reader that a small shift in this "cut-point" for defining malnourishment can cause many children to cross the line from normal to malnourished or vice versa. This is particularly true in communities with a fair amount of malnutrition because, in those communities, the weight distribution for preschoolers often clusters near the cut point.

Again, the experts in the nutrition field offer no concrete justification that any particular "cut-point" is correct. Experience suggests that the 70% figure does describe nutritional risk fairly well; however, it is important to recognize that it is an arbitrary figure which may cause artificial results in any quantitative analysis.

FIGURE 5

MALNOURISHMENT VS. CHILD AGE  
BY DURATION OF TIME IN PROGRAM  
PHILIPPINES STANDARD



c) Responsiveness of Weight-for-age - In the evaluation of P. L. 480 Title II programming in Sri Lanka, the anthropometric measurement of weight was selected as the indicator of nutritional status because it was readily available in the MCH clinics. Again, the experts argue over the relative merits of using weight-for-age as the indicator of nutritional status rather than weight-for-height, height-for-age or a combination of the two. Because of the lack of choice, this argument was irrelevant for the Thripasha evaluation.

But, it is important to recognize the drawbacks in using weight-for-age as the indicator of malnourishment. It is well known that weight-for-age is a composite indicator of nutritional status. Individuals suffering from either chronic undernutrition (stunting) or acute malnutrition (wasting) can be deficient on a weight-for-age measure. While wasted children very often have the skeletal structure to support complete recovery of weight deficiency, stunted children may not. The potential for weight recovery in stunted children is not well understood, but at least some stunted children will not respond to an intervention by gaining weight. Of course, those children will not appear to improve in analyses of the type presented earlier in the text.

d) The Understatement of Change - A curious phenomenon occurs when comparisons such as those in Figure 3 and 4 are made. Misclassification of children (calling normal children, malnourished or malnourished children, normal) leads, in most cases, to a low estimate of the difference in malnutrition between groups. The curious aspect of this phenomenon is that the difference appears less than the actual difference regardless of the direction of the misclassification. Although we will not demonstrate the near universality of this phenomenon here, we will present a single example by way of illustration. (The careful reader

will notice that the "numbers" are taken directly from Figure 3.)

Suppose we are comparing the malnourishment in two groups of children between 25 and 36 months of age. The first group participated in a program for less than six months; the second, for more than twelve months. In "reality," the numbers of malnourished children in each group are given in Table 5.

TABLE 5  
ILLUSTRATION OF UNDER REPORTING  
REALITY

	Participation	
	Less than six months	More than twelve months
Malnourished	317	349
Normal . . .	561	1300
TOTAL . .	878	1649

The actual difference in prevalence of malnutrition in the two groups is 36.1 - 21.2 or 14.9%.

But, we misclassify some children, say 25%. (This is not an unreasonable estimate due to the tendency of young malnourished children to appear normal for some time until weight loss is sufficient to cause a drop in nutritional grade and the inability of older stunted children to respond sufficiently to enable them to regain normalcy.) Because of this misclassification, we will not observe "reality." Rather, we will observe that the number of malnourished children in the group participating for less than 6 months is  $(317 \times .75) + (561 \times .25)$  or 378. This equation multiplies the number of malnourished children in "reality"

by the percentage classified properly and adds the result to the number of normal children classified incorrectly. Using similar equations, we derive all of the "observations" as shown in Table 6. The observed difference in Table 6 is less (almost half) than the difference in reality presented in Table 5.

TABLE 6  
ILLUSTRATION OF UNDER REPORTING  
OBSERVED

	Participation	
	Less than six months	More than twelve months
Malnourished.	378	587
Normal . . .	500	1062
TOTAL . .	878	1649

The observed difference in prevalence of malnutrition in the two groups is 43.1 - 35.6 or 7.5%.

This mystical bit of arithmetic carries over to almost all situations involving misclassification. The observed difference between groups is almost always less than the actual difference. In the nutrition field, this is particularly troublesome because we always misclassify some children. One obvious source of misclassification is poor field protocol--misread weights, incorrect ages, recording mistakes, etc. However, even if field protocol is perfect, we will misclassify some children. At the very least, we will misclassify those normal children who make up the tails of the distributions derived to define the standards. But, given the imperfections of anthropometry for measuring

nutritional status, we will, no doubt, misclassify more children than those in the tails.''

To probe into the data in more depth, additional analysis was performed. Intuitively, the evaluation team felt that the program might be more effective in some sub-groups of clinics than in others. For example, we felt that Municipal clinics and Ministry of Health clinics might operate differently or that the program might be more successful in one region of the country than another. Our attempt to isolate sub-groups of clinics with different performance levels revealed that this was not the case.

Although small quantitative differences in performance were observable, comparisons of improvement between districts of Sri Lanka and between clinics controlled by different agencies (Ministry of Health, Municipalities, Estates and Universities) showed a surprising uniformity with regard to impact. Figures 6 and 7 present the curves comparing performance in the Municipal clinics to performance in Ministry of Health clinics. The improvement seen in both types of clinic is indicative of their similar nature. Comparisons of performance by district are equally similar. Note, these curves show greater fluctuation in the points than the earlier curves. This is due to the smaller number of cases used to make up each curve. The number of cases is less, of course, because of the partitioning of the data set to achieve the categorization.

As an extension of the impact analysis, several statistical procedures were employed. Chi-square tests were run to test for the existence of relationships between the few socio-economic descriptors of the family recorded on the

---

'A more complete discussion of these issues can be found in the USAID funded research project, Drake, et. al., Final Report: Analysis of Community-Level Nutrition Interventions, pp. 89-93.

FIGURE 6

MALNOURISHMENT VS. CHILD AGE  
 FIRST AND LAST WEIGHING  
 MCH CLINICS  
 N.C.H.S. STANDARD

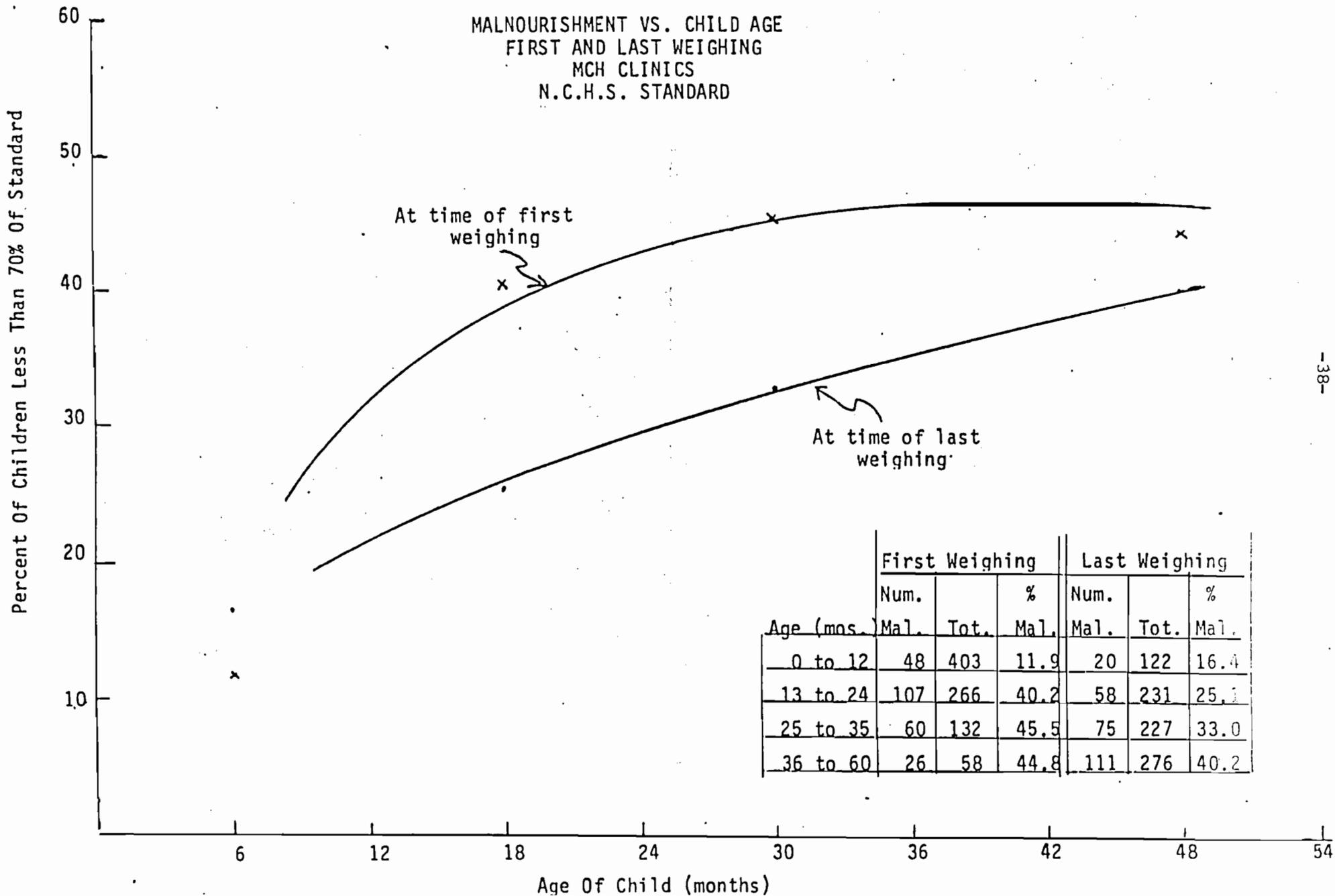
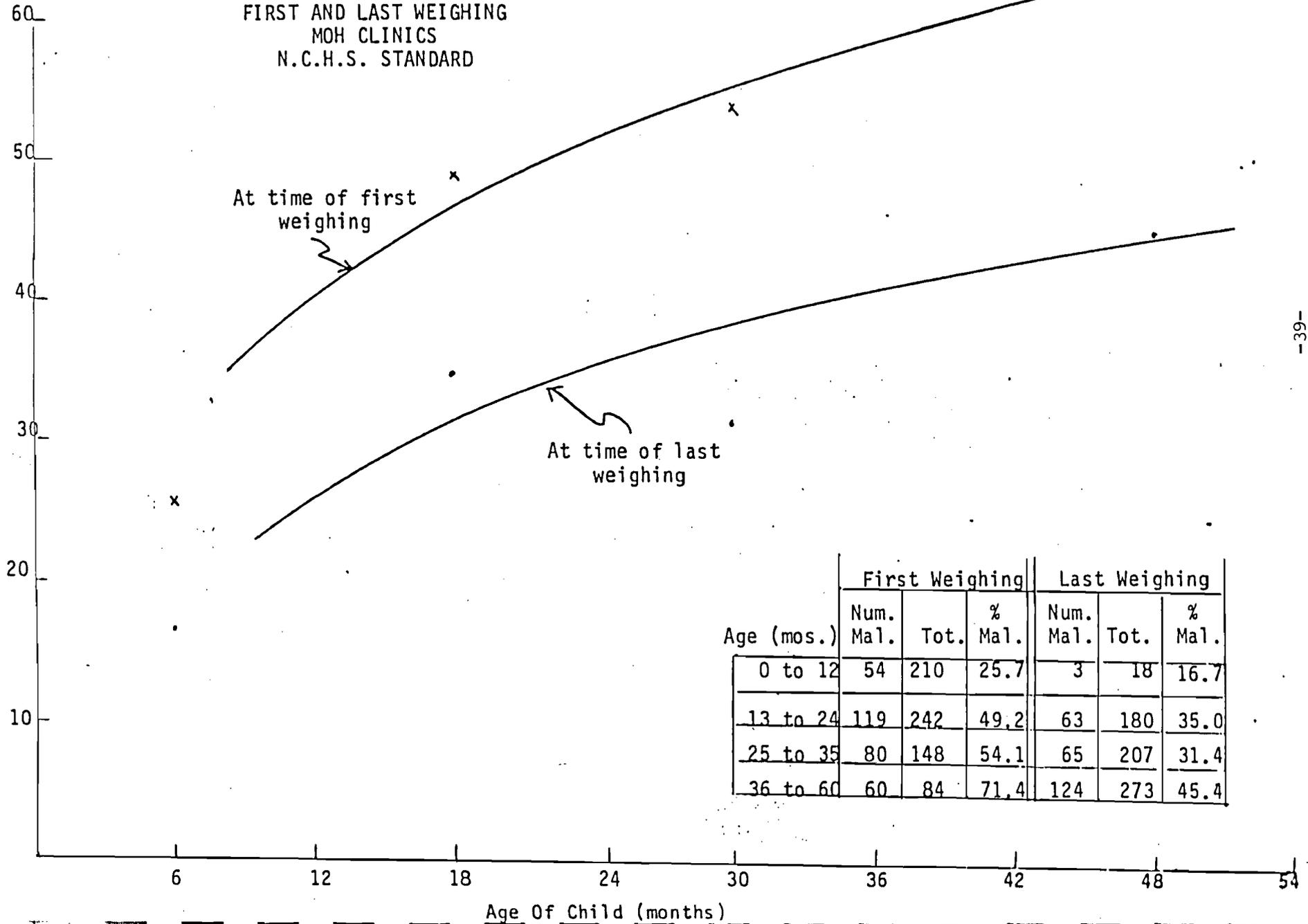


FIGURE 7

MALNOURISHMENT VS. CHILD AGE  
 FIRST AND LAST WEIGHING  
 MOH CLINICS  
 N.C.H.S. STANDARD

Percent Of Children Less Than 70% Of Standard



Age (mos.)	First Weighing			Last Weighing		
	Num. Mal.	Tot.	% Mal.	Num. Mal.	Tot.	% Mal.
0 to 12	54	210	25.7	3	18	16.7
13 to 24	119	242	49.2	63	180	35.0
25 to 35	80	148	54.1	65	207	31.4
36 to 60	60	84	71.4	124	273	45.4

data forms and nutritional status. The age of the mother, the total number of children and the birth order of the child were found to be statistically related to the nutritional status of the child where the last observation for each child was used to measure nutritional status. The relationships were all as expected; the older the mother, the greater the number of children in the family and the greater the number of living older siblings, the poorer the nutritional status of the child. Father's occupation, mother's occupation and food stamp use were not related to nutritional status. The sex of the child was not related to nutritional status when the NCHS-CDC sex-differentiated standard was applied; however, the non-sex differentiated standard used in the Philippines revealed a statistically significant relationship. This latter finding is because boys and girls grow at different rates in reality but they grow at the same rate according to the Philippines standard.

#### F. SECONDARY BENEFITS AND/OR ADVERSE RESULTS

The most outstanding secondary benefit of distributing Thriposha through the health care system is the incentive effect of the supplement on participation in that system. At all levels of the system, from the Doctors in the clinics to the highest levels of the implementing Ministry, the role of Thriposha in bringing families into the clinics was praised. In fact, some advocates pleaded that, if the program had to be stopped, the termination be delayed for, at least, five years so that the immunization effort now underway could be completed.

Another secondary benefit has been the stimulation of corn and soya production on the island. A rice producing country, Sri Lanka had only a small corn growing industry and a small level of soya bean production. However, the "guaranteed" market for these products for Thriposha production has stimulated growth in both sectors. This

finding is more fully discussed in the cost-effectiveness section.

The most striking adverse effect of the program is the dependence on the product on the part of the nation's poor. For many years now, Thriposha has been available through the health clinics. Recipients come to "expect" the supplement. Its removal would, no doubt, cause a hardship on a great many of these recipients as well as an adverse effect on the operation of the health care system.

#### G. COST EFFECTIVENESS OF THRIPOSHA

We approach our cost effectiveness study with some hesitation. Effectiveness or benefit is hard to measure and so are costs. Even more difficult are the assumptions and judgements which have to be made throughout the analysis. From whose perspective should the analysis be conducted: the governments of Sri Lanka and/or the United States or from the perspective of the recipient? How does one determine valuation: on the basis of actual costs incurred or the local market equivalent? Should costs which are not reflected in current budgets such as depreciation of plant and equipment be included? What of the opportunity costs associated with the program?

Our resolution of these questions is two-fold. First, where it is most critical we will attempt to present alternative formulations so that different perspectives can be reviewed. Second, we will provide sufficient detail so that the reader can reformulate the different components into additional formulations depending upon the particular interest at hand.

The method followed in determining costs was to obtain audit records for historic costs and to use the best source of estimation to predict costs out into the future. In the accompanying tables, great care was taken to document all sources used in their preparation.

We begin the analysis by considering the actual costs in 1981 for delivery of a pound of Thriposha into the hands of a beneficiary and compare those to the estimated costs for 1982.

Tables 7 and 8 derive the costs for commodities, and lead to Table 9. Table 9 provides a detailed breakdown of the costs, separating out those costs borne by the GSL and the USAID. The actual cost per pound in 1981 was 4.62 rupees of which 1.24 rupees (26.9%) was borne by the GSL. Only half of that amount (.60 rupees) was for raw materials; the other half went for production, storage, transportation and administration. Note, given that 20,596,644 pounds are produced, the total GSL outlay is a substantial sum, 25,622,225 rupees.

The 1982 estimates assume a change in the magnitude of raw materials provided by the GSL from the actual contribution of 24.6% in 1981 (30% had been targeted) to the target of 40% in 1982 as well as reasonable increases in the non-commodity costs borne locally. The projected cost per pound in 1982 is 4.80 rupees, an increase of only 3.9%, but costs borne by the GSL increased to 1.76 rupees per pound or 36.6% of the total. Factoring in a slight increase in production, the total outlay for the GSL is even greater--41,812,663 rupees, an increase of 63% over 1981.

One more piece of analysis provides added insight into Thriposha. Tables 10 and 11 show the analysis leading to assignable cost not reflected in the budget process. These costs consist of depreciation of physical facilities and the carrying charges associated with monies which would have been borrowed for the investment in the enterprise. Table 12 illustrates that given reasonable profit margins to producers, wholesalers and retailers, a plant producing Thriposha in quantities akin to the existing plant but using only locally grown maize and soya would be a viable undertaking. The final column of Table 12 illustrates that

TABLE 7

## ESTIMATE OF INDIGENOUS RAW MATERIALS COST FOR THRIPOSHA

Comm.	Purchase cost per lb. of commodity (rupees)	Percentage of commodity in mixture	Cost per lb. of mixture before production	Cost per lb. of mixture after production	Cost of corn soya component in 1 lb. of Thripasha
1981					
Maize	1.5256 <sup>1</sup>	70.26 <sup>2</sup>	1.07189	1.1078	.....
Soya	4.0308 <sup>4</sup>	29.74 <sup>2</sup>	1.19878	1.3453	.....
TOTAL	.....	100.00	2.27067	2.4521 <sup>3</sup>	0.6034 <sup>4</sup>
1982					
Maize	1.4969 <sup>5</sup>	70.00	1.04783	1.0828	.....
Soya	3.6289 <sup>5</sup>	30.00	1.08867	1.2217	.....
TOTAL	.....	100.00	2.13650	2.3045 <sup>3</sup>	0.9218 <sup>4</sup>

<sup>1</sup>Costs are based on the weighted average of purchases during CARE FY 1981 yielding 8,886 rs./metric ton for Soya and 3,364 rs./metric ton for Maize.

<sup>2</sup>Actual percentage mixtures during FY 1981.

<sup>3</sup>During 1981, there were preprocessing and production losses equalling 3.26% for Maize and 10.89% for Soya. These values are derived from batch yield values reported in the Yield Material Balance report of 1981.

<sup>4</sup>Based upon the CARE FY 1981 actual mixture of 75.4% ICSM.

<sup>5</sup>Based upon purchases during January 1982; Maize = 3,300 rs./metric ton and Soya = 8,000 rs./metric ton.

<sup>6</sup>Derived from a 60% ICSM mixture implemented January 1, 1982

TABLE 8

## ESTIMATE OF ICSM COMMODITY &amp; SHIPPING COST FOR THRIPOSHA

Year	Commodity	Invoice commodity cost (US\$/lb.)	Invoice shipping cost (US\$/lb.)	Total cost at Colombo Port (US\$/lb.)	Total cost at Colombo Port (rs./lb.)
Per pound of commodity (50 pound bag)					
1981	ICSM <sup>1</sup>	.19237	.06126	.2536	4.4825 <sup>2</sup>
1982	ICSM <sup>3</sup>	.18031	.06603	.2463	5.0648 <sup>4</sup>
Per pound of Thripasha					
1981	ICSM <sup>3</sup> (based on 75.4% mix)	.14505	.04619	.1912	3.3798 <sup>2</sup>
1982	ICSM (based on 60% mix)	.10819	.03961	.1478	3.0388 <sup>4</sup>

<sup>1</sup>1981 ICSM cost estimates were obtained from audit reports submitted by CARE to Sri Lanka Ministry of Health for the 16,896,100 lbs. of ICSM utilized in production during FY 1981.

<sup>2</sup>The exchange rate of 17.6728 rupees per U.S. dollar utilized for this conversion was determined by the weighted average of quarterly audit reports submitted by CARE to GSL.

<sup>3</sup>Estimate of 1982 costs were determined by a query of the USDA commodity list computer in Washington D.C. on December 23, 1981 for the most recent shipment to Colombo. In this instance, ICSM shipments were to the World Food Program.

<sup>4</sup>The exchange rate utilized for this conversion was 20.56 rupees per U.S. dollar on January 22, 1982.

<sup>5</sup>While the programmed mixture between ICSM and indigenous raw materials was 70% - 30% respectively, the actual mixture for FY 1981 was 75.4% and 24.6%. This change was caused by a variety of reasons including stoppages at the plant due to power failures and temporary shortages of raw materials.

<sup>6</sup>The planned mixture of 60% ICSM and 40% indigenous materials for FY 1982 was implemented January 1, 1982. Costs are based on the 60-40 mixture and an exchange rate of 20.56 rupees per U.S. dollar.

244

TABLE 9  
COST OF THRIPOSHA

Cost category	1981 (Actual)		1982 (Estimate)	
	Expense Covered By		Expense Covered By	
	USAID (rupees)	GSL (rupees)	USAID (rupees)	GSL (rupees)
1. Commodity costs at U. S. point of embarkation (See Table 8) . . . . .	2.5634	.....	2.2244	.....
2. Ocean shipping costs of ICSM (See Table 8) . . . . .	0.8164	.....	0.8144	.....
3. Commodity costs of indigenous raw materials (See Table 7) . . . . .	.....	0.6034	.....	0.9218
4. Transportation to storage facilities and storage prior to production <sup>1</sup> . . . . .	.....	0.0153	.....	0.0232
5. Minerals--vitamins premix <sup>2</sup> . . . . .	.....	.....	.....	0.1672
6. Packaging materials (4,386,749 rs) <sup>3</sup> . . . . .	.....	0.2130	.....	0.1874
7. Production labor (1,622,957 rs) <sup>4</sup> . . . . .	.....	0.0788	.....	0.0906
8. Factory overhead (1,250,838 rs) <sup>4</sup> . . . . .	.....	0.0607	.....	0.0698
9. SUB-TOTAL--Production cost at factory	3.3798	0.9712	3.0388	1.4600
10. General and administrative expenses including insurance (1,852,641 rs) <sup>4</sup> . . . . .	.....	0.0899	.....	0.1034
11. Warehouse expenses CARE (471,635 rs) <sup>5</sup> . . . . .	.....	0.0299	.....	.....
12. Distribution Expenses a. CARE (FY81=546,586 rs) <sup>6</sup> . . . . .	.....	0.0265	.....	0.0318
b. MOH rail (FY81=303,750 rs) (FY82=360,139 rs) Lorry (FY81=140,654 rs) (FY82=133,392 rs) . . . . .	.....	0.0243	.....	0.0184
13. Record keeping, audit and other direct management costs including freight forwarding . . . . .	.....	0.1092	.....	0.1426
14. Cost per pound package (rs) . . . . .	3.3798	1.2440	3.0388	1.7562
15. Cost per .750 kg package (rs) . . . . .	5.5881	2.0568	5.0242	2.9037

<sup>1</sup>Line 4: The Food Department of the Ministry of Food & Cooperatives paid 41 rs./metric ton and 85 rs./Mt. in 1981 and 1982 respectively. The 1982 price reflects a longer transport distance as well as the effects of inflation.

<sup>2</sup>Line 5: No mineral-vitamin premix was used during FY 1981 but during 1982 the premix was incorporated due to a higher ratio of indigenous materials. The batch mixture is 2 lbs. vitamins and 38 lbs. minerals per 2000 lb. batch. Current costs are 6.56 US\$ per lb. and .6723 US\$ per lb. respectively.

<sup>3</sup>Line 6: Packaging material costs decreased approximately 12% between 1981 and 1982.

<sup>4</sup>Lines 7, 8 & 10: 1981 audited disbursements are shown in brackets. Production and overhead is expected to increase 15% in FY 1982.

<sup>5</sup>Line 11: CARE's warehouse cash expense will be eliminated during 1982 due to the completion of a new structure.

<sup>6</sup>Lines 12a & b: Distribution expenses incurred by CARE are actual audit values for FY 1981 and have been adjusted upward by 20% for 1982. MOH rail expense was estimated as shipments for 1982 times the appropriate freight rate to each railhead. 1981 estimates were increased to reflect greater shipments to remote regions. Lorry expenses from railhead to clinic were estimates based on delivery rates for an average load travelling 10 miles (29.17 rs./Mt.).

<sup>7</sup>Line 13: Freight forwarding, CARE/New York and other direct management expenses are based on the signed annual implementation plan agreements of \$127,302 for 1981 and \$165,162 for 1982. (CARE letters dated March 3, 1980 and March 18, 1981 respectively.)

45

a commercial venture to produce Thriposha from indigenous products, including the costs of capital necessary to build the plant, could net acceptable profit to all concerned for a market price of only 5.83 rupees per pound.

We now consider the value of Thriposha as a nutritional supplement by comparing its nutritive value to other competing goods on the market. Table 13 computes the costs per equivalent quantities of the primary nutrients of proteins and calories. For a market price of Thriposha, we use the price used in the commercialization experiment, 5.5 rupees. This price is higher than the cost of delivery to each beneficiary in 1982, but it is appropriate for a product produced with completely indigenous materials. Thriposha clearly delivers more protein per rupee spent than any available alternative--it is twice as cost effective as its nearest competitor. It is even more cost effective in its delivery of calories than all other competitors; with only one exception, Infant Milk Powder formula, it is twice as good a value.

It is now fair to ask, what does all this mean? Given the low cost of producing Thriposha due to the extrusion cooking process, Thriposha is the best weaning food available in Sri Lanka today. The commercial marketing experiment shows that it will sell in the market place for a price roughly capable of covering its costs and, although we have no "hard" data to offer as proof, it is generally accepted as part of the local diet.

Furthermore, the existence of a guaranteed market for soya provided by Thriposha has stimulated production of soya (along with government price supports) so much that there is now enough soya available on the market to support such a plant. Table 14 shows that the percentage of Sri Lanka grown soya going into Thriposha has dropped markedly as acreage devoted to soya has increased. It is hard to refute the impact that Thriposha has had in generating indigenous

TABLE 10  
INITIAL COSTS AND DEPRECIATION SCHEDULE FOR  
PHYSICAL FACILITIES AND INVENTORY

	Initial Costs (\$)	DEPREC. SCHED. (years)
<b>1. Equipment (including spare parts)</b>		
Raw Grain Cleaning Equipment . . .	\$57,109	10
Dehulling Equipment . . . . .	37,566	15
Processing Equipment (cookers) . .	130,613	7
Other . . . . .	78,856	10
Installation Expenses & Materials	31,119	10
<b>TOTAL EQUIPMENT . . . . .</b>	<b>\$335,263</b>	
<b>2. Manufacturing Facility</b>		
Initial Structures . . . . .	283,778	20
Addition (estimated based on 90% completion) . . . . .	270,000	20
<b>TOTAL FOR FACILITY . . . . .</b>	<b>\$558,778</b>	
<b>3. Railroad Siding . . . . .</b>	<b>78,753</b>	<b>20</b>
<b>TOTAL CAPITAL INVESTMENT . . . . .</b>	<b>\$972,794</b>	
<b>4. Valuation of Average Inventory</b>		
a. ICSM <sup>1</sup> (1.5 mo. average inventory) . . .	535,691	n/a
b. Other Plant Inventory <sup>2</sup>		
Soya and Maize . . . . .		n/a
Other raw materials . . . . .		n/a
Thripasha Finished Goods Stored at Plant . . . . .	452,745	n/a
c. Thripasha in Distribution Network and Stored in Clinics <sup>3</sup> . . . . .	514,200	n/a
<b>TOTAL INVENTORY . . . . .</b>	<b>\$1,502,636</b>	
<b>TOTAL CAPITAL INVESTMENT . . . . .</b>	<b>\$2,475,430</b>	

<sup>1</sup>ICSM is valued at (.25364 US\$ x 16,890,100 lbs. x 1.5 mo.)/12 mo.

<sup>2</sup>Other plant inventory was determined from the insurance valuation analysis in CARE letter of January 12, 1982 of 8 million rupees.

<sup>3</sup>Thripasha in distribution network is based on 1.5 months average supply x 600,000 beneficiaries x .4285 US\$ per packet x 2.

199

TABLE 11

## ASSIGNABLE COSTS NOT REFLECTED IN ANNUAL BUDGET PROCESS

Expense Category	Estimated Annual Cost	Cost per lb. of Thripsha	
		FY 1981 (9,343 MT)	FY 1982 (10,800 MT)
1. Equipment depreciation <sup>1</sup> . . . .	37,879	.001839	.001591
2. Buildings <sup>2</sup> . . . .	27,689	.001344	.001163
3. Railroad siding <sup>3</sup> . . . .	3,938	.000191	.000165
4. CARE administrative facilities <sup>4</sup> . . . .	.....	.....	.....
SUBTOTAL . . . . .	69,506	.003374	.002919
5. Physical Facilities carrying costs @17% interest . . . .	82,687	.004015	.003473
6. Inventory carrying at @17% interest . . . .	166,321	.008080	.006986
TOTAL . . . . .	318,514	.015460	.013380

<sup>1</sup>Estimated annual cost of equipment depreciation is based upon the original cost depreciated over the schedule of years shown in Table 10 assuming no salvage value. The effective life, in years, was derived from the studies on comparable equipment conducted by the Colorado State University, May 1, 1978.

<sup>2</sup>Buildings, including the recently completed addition was depreciated over 20 years.

<sup>3</sup>Railroad siding depreciated over 20 years.

<sup>4</sup> CARE Administrative facilities are leased and are, therefore, reflected in the other annual cost values.

<sup>5</sup>Physical facilities opportunity costs are based upon a 17% cost of capital on an average of one half the facilities value. 17% is the interest rate charged by the Bank of Ceylon for development loans.

TABLE 12

ESTIMATE OF SELLING PRICE OF A ONE POUND PACKAGE REQUIRED  
TO COVER REASONABLE COSTS UNDER DIFFERENT CONDITIONS

Cost elements per 1 lb. package	1981 (CARE FY) actual	1982 (CARE FY) estimate	1982 prices (all indigenous materials no profit)	1982 prices (all indigenous materials profit)
1. Commodity (ICSM incl. transp.) <sup>1</sup> . . . . .	3.3798	3.0388	.....	.....
2. Indigenous raw materials (Soya & Maize) <sup>1</sup> . . . . .	.6034	.9218	2.3045	2.3045
3. Vitamins-minerals premix <sup>1</sup> . . . . .	.....	.1672	.4180	.4180
4. Transportation to storage facility . . . . .	.0153	.0232	.....	.....
5. Packaging materials <sup>2</sup> . . . . .	.2130	.1874	.1874	.1874
6. Production labor <sup>2</sup> . . . . .	.0788	.0906	.1359	.1359
7. Factory overhead <sup>2</sup> . . . . .	.0607	.0698	.1047	.1047
8. Total production cost at factory exclusive of depreciation and opportunity costs . . . . .	4.3510	4.4988	3.1505	3.1505
9. General & administrative expenses <sup>3</sup> . . . . .	.0899	.1034	.1034	.1034
10. Out-of-pocket warehouse expenses <sup>3</sup> . . . . .	.0229	.....	.....	.....
11. Record keeping, audit and other direct expenses <sup>3</sup> . . . . .	.1092	.1426	.1426	.1426
12. Commercial box expenses <sup>3</sup> . . . . .	.7068	.8224	.8224	.8224
13. Depreciation expenses on equipment and facilities <sup>4</sup> . . . . .	.....	.....	.0600	.0600
14. Interest expense on 60% of investment borrowed at a 17% rate (200,000 US\$) <sup>5</sup> . . . . .	.....	.....	.1727	.1727
15. Total cost exclusive of marketing and distribution . . . . .	5.2798	5.5672	4.4516	4.4516
16. Marketing expenses @ 6% <sup>4</sup> . . . . .	.3168	.3340	.2671	.2671
17. Profit @ 40% on equity investment <sup>7</sup> . . . . .	.....	.....	.....	.2710
18. Total cost exclusive of wholesale and retail . . . . .	5.5966	5.9012	4.7187	4.9817
19. Wholesaler distribution costs @ 5.5% . . . . .	.3078	.3246	.2595	.2744
20. Mark-up at retail level @ 11.5% . . . . .	.6436	.6786	.5426	.5738
Estimated selling price (Rs.) . . . . .	6.5480	6.9044	5.5208	5.8299
Estimated selling price (₹) . . . . .	.3700	.3400	.2700	.2800

<sup>1</sup>See Table 9 for cost elements related to columns 1 & 2. Cols 3 & 4 are derived from Table 7.

<sup>2</sup>See Table 9 for cost elements in cols 1 & 2. Cols 3 & 4 have been raised 50% to account for increased production costs of totally indigenous materials.

<sup>3</sup>See Table 9.

19

TABLE 13

## COMPARISON AMONG ALTERNATIVE PACKAGED PRODUCTS SOLD FOR INFANT CHILD FEEDING

Product Name & Description	Manufacturers	Package Size (gms)	Package Cost (rupees)	Cost per 100 gms of prod. <sup>1</sup> (rupees)	Protein per 100 gms (gms)	Cost per 100 gms protein (rupees)	Calories per 100 gms of product	Cost per 1,000 calories (rupees)
THRIPOSHA (Vegetable protein mix)	Ministry of Health CARE/Sri Lanka	454	5.5	1.210	20.0	6.05	375	3.23
LAKSPRAY Full Cream Milk Powder (24% milk fat)	National Milk Board Spray Dried Milk Factory, Ambewela	400	13.30	3.325	26.0 <sup>2</sup>	12.79	492 <sup>2</sup>	6.76
INFANT Milk Powder Formula (26% M/F)	Darley Butler & Co. Ltd., Sri Lanka	454	8.25	1.817	14.5	12.53	494	3.68
NESPRAY Formula III (Full cream powder 28% milk fat)	Nestle's Products Ltd. Nassau, Bahamas	400	23.90	5.975	25.7	23.25	501	11.93
NESTLE LACTOGEN Formula I Infant Milk Food (24% M/F)	Nestle's Products Ltd. Nassau, Bahamas	454	29.0	6.388	16.1	39.68	492	12.98
BEAR BRAND Formula III (full cream M/P, 26% milk fat)	Nestle's Products Ltd. Nassau, Bahamas	400	19.50	4.875	28.0	17.41	496	9.83
SMA <sup>3</sup>	Wyeth Pharmaceutical	453	50.90	11.24	11.9	94.5	465	24.2
FAREX	Farley Health Products Ltd., Plymouth, Devon, Eng.	250	22.50	9.0	12	75	390	23.1
FARLEY'S	Farley Health Products Ltd. Plymouth, Devon, eng.	200	13	31.5	6.5	48.5	396	79.5
FARLENE	Farley Health Products Ltd., Plymouth, Devon, Eng.	250	33.50	13.4	20	67	390	34.4
CERELAC	Nestle's	400	37	9.25	1.5	61.7	435	21.26
NESTUM	Nestle's	280	26	9.29	12.5	74.3	384	24.2
COW & GATE INSTANT CEREAL (rice)	Cow & Gate Wiltshire, England	170	19.75	11.61	7.0	16.59	340	34.2

<sup>1</sup>Prices determined in Kandy general market on January 20, 1982

<sup>2</sup>Estimates based upon approximate comparison with Bear Brand Formula III

<sup>3</sup>Label - "Doctors say Breast Feeding Is Best"

\*See Table 11.

\*It is assumed that 60% of the plant and equipment and inventory less that which is in the distribution network is financiable at the Bank of Ceylon Development loan rate of 17%.

\*Estimate for marketing expense allocated to an already existing product in Sri Lanka.

\*Investment is calculated on the basis of 40% of the amount invested in plant equipment and inventory less inventory in distribution system ( $.4 \times 1,961,230 \times 20.56 = 16,129,156$ )

#### General Notes

- 1) No product development costs are included in any cost elements.
- 2) Exchange rates for 1981 and 1982 are estimated at 17.67 and 20.56 Rs./\$, respectively.
- 3) Volumes used to burden cost elements for 1981 and 1982 are 20,596,664 lbs. and 23,808,600 lbs. respectively.

15

production of 'soya and that, as a result of this stimulation and other market forces, there will be sufficient future supplies. Similarly, Table 14 shows maize production is adequate to provide all the maize needed for blending with the soya.

TABLE 14

ESTIMATE OF PERCENTAGE OF NATIONAL MAIZE & SOYA  
CROP USED IN PRODUCTION OF THRIPOSHA

	MAIZE			SOYA		
	Acres <sup>1</sup>	Prod. in MT <sup>2</sup>	Percent of crop used in Thripasha <sup>3</sup>	Acres <sup>1</sup>	Prod. in MT <sup>2</sup>	Percent of crop used in Thripasha <sup>3</sup>
1979-1980 (actual)	57,701	34,912	4.7	2,696	1,083	64.6
1980-1981 (actual)	74,295	44,952	3.6	5,548	2,229	31.4
1981-1982 (target)	84,815	51,317	15.9	18,363	7,376	17.6

<sup>1</sup>Acreage values are taken from "Agricultural Implementation Programme, Ministry of Agriculture Development and Research, October 1, 1981

<sup>2</sup>Production values are actual for 1979-80 and estimated for 1980-81 by the proportions provided for 1979-80.

<sup>3</sup>Based upon actual Thripasha production for each year. (9,343, 9,343 and 10,800 MT respectively; a 30% Soya - 70% Maize mixture blended with 25% ICSM in FY 1981 and 40% in FY 1982).

In conclusion, we note that in a few short years, the manufacture of Thripasha has created the possibility for a

completely indigenous Thriposha production facility. And, given the difficulties of soya preparation in the home, Thriposha remains the cheapest way to achieve wide-spread use of the nutritious soya bean throughout Sri Lanka.

#### H. FUTURE DIRECTIONS

As currently envisioned, the Thriposha program will continue to expand throughout the Government Health System. This expansion will coincide with the phasing out of donated commodities through the substitution of locally grown raw materials for donated ICSM.<sup>20</sup> It is conceivable that the Thriposha Program will be entirely indigenous by 1990.

We support the notion of extending Thriposha distribution further throughout the health system as a component of the "package of services" and, in so far as it is necessary, the maintenance of ICSM donations to facilitate such expansion. In other words, we would prefer that increased use of indigenous raw materials go toward expansion of the system rather than toward the phase out of donated commodity.

The issue of expansion is closely related to the ongoing effort to test the commercial potential of Thriposha on the open market. In 1981, 415,000 pounds of Thriposha, 2.01% of the total produced were sold on the open market in four districts of Sri Lanka. In brief, our review of the commercialization experiment indicates clearly that Thriposha can be marketed quite easily at the test price of 5.5 rupees per pound and, we would guess, for a price considerably higher, say 7 or 8 rupees per pound. A consumer survey of 1200 randomly selected households in January of 1981, three months after test marketing began,

---

<sup>20</sup>Food and Nutrition Public Policy Division, Ministry of Plan Implementation, Nutritional Status: Its Determinants and Intervention Programmes, p. 42.

showed that 62% had purchased Thriposha and that 52% of those had incomes below 300 rupees per month.

The rationale underlying the commercialization experiment is that the open market could supply Thriposha to areas where the health system is not functioning adequately and to recipients of the packaged food through the health system who find their "free" allocation inadequate to meet their needs. Continued commercial marketing of Thriposha raises the interesting question of the allocation of the finished product between the health system and the commercial market. We fear that expansion of the commercial Thriposha distribution may place unwarranted limits on the "free" distribution through the health system. For that reason, we urge that any expansion of the commercial program be reviewed carefully. In fact, we question the wisdom of continuing experimentation with commercial sales until such time as a definite plan for maintaining adequate supplies to the health system while supplying commercial needs is worked out.

We do support the effort to make Thriposha a viable market commodity as long as supply to the health system is guaranteed. The cost analysis showed that Thriposha is not only the least cost method of introducing wide spread use of soya in Sri Lanka but also the most convenient because the difficult problems of home preparation are bypassed. Therefore, commercial marketing is justified and desirable.

We feel that adequate guarantees that commercial sales do not interfere with the distribution through health clinics can be given only if control of production and allocation as well as quality remains with the GSL and CARE. Furthermore, we believe that clever pricing of commercial product might generate additional revenues to support the "free" distribution program. We urge that the details of such a strategy be worked out and put in place in lieu of

continued "experimentation" with the viability of Thriposha as a commercial product.

Given the assumption that the production capacity of the Thriposha plant will continue to grow, several options for expanded distribution, aside from the commercial market, can be considered. At least three options are viable:

- a) distribution of Thriposha through health clinics not now included in the program,
- b) increase the number of beneficiaries in participating clinics through greater outreach into the communities, and
- c) increase the number of beneficiaries through the Private Voluntary Organizations most active in Sri Lanka, especially, Sarvodaya.

Option 1 may be the most costly to the Sri Lankan Government because staffing in the new clinics may have to be upgraded and the transportation costs to those clinics in more remote areas may be quite high. Option 2 is attractive because of the new emphasis on increasing the number of Family Health Workers throughout the health care infrastructure to provide greater outreach. However, there is no hard data, at this time, indicating the number of beneficiaries which can be located through outreach. Option 3 has the advantage of making use of an already existing set of organizations for distribution; however, it is unclear that the package of services provided through the Private Voluntary Organizations is as effective as the package offered through the government run health clinics.

Ultimately, the decision as to how to proceed rests with the Government of Sri Lanka. At first, a mixed strategy might be followed in order to generate some better data and experience with each option. From our perspective, any strategy which results in service to those in need not now served through other channels is well worth pursuing.

#### IV. SCHOOL FEEDING

The second component of the P. L. 480 Title II program in Sri Lanka is the School Biscuit Program. From the outset, it is important to recognize the conflicting priorities of the GSL and AID/Washington with regard to school feeding. In Sri Lanka, school feeding has been ongoing since 1931 and is considered by the current Government to be a high priority. AID/Washington, in the interest of allocating scarce resources to programs designed to assist those individuals most in need, has made school feeding a lower priority than feeding preschoolers and pregnant or lactating mothers and, in fact, is making world-wide cuts in quantities of gifted commodities allocated for school feeding.

##### A. DESCRIPTION

Under the joint management of CARE and the Ministry of Education, the School Biscuit Program has evolved to a distribution of biscuits to primary school children for on-site consumption on a daily basis. Manufactured by two companies in the Colombo area, the biscuits have replaced commodities used previously (rice-gruel, bread with curries, buns produced at local bakeries, and milk) because of the ease with which they are shipped, handled, stored and consumed.

Currently, the biscuits come in two sizes. A daily ration consists of eight of the large size biscuits or 44 grams of the smaller, bite-size biscuits. The biscuits are made from donated 12% soy fortified wheat flour and oil supplemented with locally provided sugar and chemicals. The smaller biscuits are the newer type and they appear to be preferable because they are less subject to breakage and are more easily packaged. They also take up more air space and, therefore, require bigger packages. In practice, the small

biscuits are sent to the more remote places due to their greater durability in transit.

According to the 1981 "Sri Lanka Primary School Nutrition Survey" publication, 1,250,000 primary school children from 7,762 schools received biscuits on each school day.<sup>21</sup> Due to disruptions in manufacturing in 1981, enough biscuits were produced to supply only 55% of the required quantities of biscuits. Apparently, this supply deficit was accommodated by cutting the frequency of distribution to some schools rather than by cutting the total number of recipients.

In 1973, a survey in which nutritional status was measured by the Quac-Stick method (arm circumference-for-height) was conducted to identify those schools with a fair amount of malnutrition. These schools remain as beneficiary schools. Schools formed since the survey and schools not targeted during that survey remain outside the School Biscuit Program; therefore, some 700,000 children are not in the program. Within a school, all primary school children are included, regardless of nutritional status.

#### B. NUTRITIONAL IMPACT

The daily ration of biscuits provides 190 calories and 7 grams of protein.<sup>22</sup> Table 15 presents the percentage of daily requirements met by school biscuits under different assumptions--with sharing and without.

Due to the lack of regularly collected anthropometric data in the schools, we were unable to assess nutritional impact from school biscuits. However, even if such data existed, it would make little sense to look for measurable nutritional impact from the School Biscuit Program. The

---

<sup>21</sup>CARE/Sri Lanka, Sri Lanka Primary School Nutrition Survey (Colombo, Sri Lanka: CARE/Sri Lanka, 1981) p. 21.

<sup>22</sup>Ibid.

TABLE 15

PERCENTAGE OF DAILY REQUIREMENTS MET BY  
SCHOOL BISCUITS UNDER DIFFERENT ASSUMPTIONS

	Protein	Calories
Daily requirement for a typical 9 year old school child . . . . .	29 gms	2190
Percentage of daily requirements for protein and recommended allowance for calories met by the 44 gm portion spread throughout the 365 day year .	13.80%	4.31%
Percentage of daily requirements for protein and recommended allowance for calories met by portion assuming 50% sharing with siblings' . . . . .	6.91%	2.10%

'This latter assumption is included because there is good reason to believe that interfamilial sharing takes place in many cases, reducing the supplement accordingly.

probability of finding impact is near zero for the following reasons:

- a) the ration is too small to close the nutrient gap of the poorer children (given the 180 day feeding schedule and assuming no sharing, the calorie content is only 4.3% of the WHO suggested daily allowance of 2190 calories for a 9 year old while the protein content is only 13.8% of the 25 grams protein allowance),
- b) the sharing of the already small ration further diminishes its value to a single individual,
- c) the ability of stunted children to grow at faster than the prescribed rate is questionable; therefore, neither weight-for-age nor height-for-age are likely to respond to any treatment (most malnourishment in deprived children results in stunting by the time school age is reached), and
- d) acute malnutrition as identified by weight-for-height is too volatile an indicator to be used to measure impact of a long term intervention due to its terribly narrow range.

The argument is often made that school feeding induces school attendance. Our plan was to explore the impact of school feeding on attendance in the long run and in the short run. We did not have the opportunity to set up a prospective experiment such as the distribution of biscuits into schools which were not receiving them and monitoring attendance changes, so we relied on existing data. Initially, three strategies were employed.

The first strategy was designed to get at the long term impact of school feeding by comparing school attendance in the only years out of the last 50 where school feeding was discontinued to the attendance when school feeding was resumed. Note, biscuits were not in use either before or after the cessation of school feeding; therefore, our analysis cannot be taken as a comment on the current program.

We estimated the percentage of school aged children enrolled in school in each year, nationwide, by first estimating the school age population from the total population of the country and then computing the percentage of those enrolled using actual enrollment figures. The results depend greatly on the method of estimating school age population. We chose a figure of 20% of the total for lack of a more precise estimate. The magnitude of the numbers changes considerably if that 20% is altered by as little as 2 percentage points but the trend is clear. The sequence beginning in 1952 is in Table 16.

There is a clear jump in percent enrolled starting in 1957, the year school feeding was resumed. We are unaware of any other changes in the school system to account for the change and, therefore, we suggest that, in Sri Lanka, an institutional cessation of school feeding might result in a drop in the number of children enrolled in school.

A second strategy for looking at the long term implications of supplementary feeding on attendance is the

TABLE 16

## PERCENTAGE OF SCHOOL AGED POPULATION ENROLLED IN SCHOOL

Year	Pct.	Year	Pct.
1952	73.9%	1957	78.9%
1953	74.6%	1958	81.2%
1954	74.3%	1959	83.1%
1955	73.9%	1960	82.9%
1956	74.3%		

comparison of enrollment in grades where school feeding is institutionalized to those where it is not. Implementation of this scheme becomes greatly complicated by the fact that the break in school feeding begins with grade 6 and that in many, but not all locations, a change in the physical location of the school occurs simultaneously. During our short stay, we were unable to gather sufficient data to implement this strategy and, therefore, we can draw no conclusions.

Finally, we tried to look at the impact on attendance of temporary breaks in school feeding by tracking attendance in several schools before and during the biscuit shortage of 1981 caused, primarily, by a fire in one of the two bakeries producing biscuits. These shortages of the third quarter of 1981 were accentuated by power outages at the other bakery; therefore, many districts received no biscuits for a three month period.

The design called for the selection of ten schools from two districts which experienced stoppages and an equal number from those same districts which were not included in the school feeding program at all. A short term effect of school feeding would show up as an unusually high drop in attendance rates in those schools which normally received biscuits when compared to those who never received biscuits.

The data were gathered and analyzed. (Only 4 non-feeding schools were included.) We found:

- 1) a surprising variation in attendance percentage by school and by month and by year (school attendance varied by 10% for each school and 20% between schools),
- 2) some schools showed drops in attendance during the critical months but others did not, and
- 3) when averaged, the attendance figures did not show any noticeable drop during the biscuit stoppage.

Interpretation of the results is confounded by the fact that some schools are so small that absence of only a few children changes the percentage in attendance substantially. Some schools show periodic changes in attendance according to the season which complicates the search for changes due to the presence or absence of biscuits.

In some schools, the cause of biscuit scarcity was announced and explained; in others, it was not. (We do not know which schools in our sample knew of the reasons for the shortages.) And, finally, there is variation in the number of biscuits reaching each school within a district, even during times the biscuits are available in the district. That is, it is quite probable that schools scheduled for continuous receipt of biscuits in our sample experienced periodic shortages and did not distinguish the sustained shortage from other interruptions.

In conclusion, our results were inconclusive because our design was inadequate. However, the inadequacies that we encountered could be overcome in a more deliberate effort to collect the data. For example, an interesting follow-up study would have to control for several factors not included in our quick attempt to gather relevant data. These are: estimates of the perception of each school as to the causes and expected duration of the interrupted service, records of biscuit stocks on a school by school basis, stratification by school size, and a longer more complete time series.

These factors may be important considerations in the planned nutritional impact of school feeding study scheduled by CARE for initiation in March of this year. This is particularly true for the detailed record of school biscuit consumption on a school by school basis.

The argument is often made that school feeding stimulates attentiveness and, thereby, enhances learning in the schools. Everyone interviewed in Sri Lanka--teachers, principals and officials--claim that this is true, especially for children who get little or no breakfast at home. We were unable to locate data on this subject but the literature offers supporting evidence for this contention. A study in India in 1976, though described in a somewhat sketchy fashion in the published record, offers positive evidence that physical and mental development is enhanced by school feeding.<sup>23</sup>

#### C. THE FEASIBILITY OF TARGETING

As stated earlier, a nutritional status survey done in 1973 still serves as the mechanism for selecting schools eligible to receive biscuits. Aside from the fact that this survey is now obsolete, use of its results for targeting schools is often challenged because many "normal" children receive the ration along with the needy because every child in the school is fed. In the anticipation that commodity allocations for school feeding may drop, administrators are prone to suggest that better targeting methods be used to insure that the truly needy continue to be served.

We believe that no adequate method for such targeting exists. Consider the following four targeting options.

---

<sup>23</sup>Usha Chandrasekhar and M. Amirthaveni, "The Impact of School Lunch Programme on Physical Development Mental Ability and Certain Behavioural Aspects of Selected Primary School Children," The Indian Journal of Dietetics 13 (1976).

- 1) Targeting By District - Most of the nutrition surveys done in Sri Lanka offer evidence that malnutrition is prevalent in pockets far smaller than the district (in fact, far smaller than the population in a single school). Thus, even more "normal" children will be reached if entire districts are covered.
- 2) Targeting By School - We have already argued that targeting by school is inadequate because too many normal children are fed.
- 3) Targeting By Family - Accurate socio-economic and/or health data on the families of school children are not readily available within the school system. Thus, it is infeasible to use the family unit for targeting.
- 4) Targeting By Child - The most logical method of targeting is on a child by child basis. This requires that a suitable measure exist to distinguish the truly needy child and that an inexpensive way to use that measure exist in each school. We have already argued that neither weight-for-age nor height-for-age is responsive to intervention in stunted school age children. Furthermore, children who had been seriously deprived early in life will continue to appear malnourished by either measure even after that deprivation is removed.

Weight-for-height, the so-called measure of "current" nutritional status is far too volatile for accurate targeting. In a recent exercise carried out by members of this evaluation team, a mere .3 kilogram was added to the weight of 500 school children with the net result that 12% of the children below the "cut-point" of 90% of the NCHS-CDC standard crossed over into the normal category.

In addition to the lack of a good measure for deprivation using anthropometrics, the equipment to perform measurements is not readily available in schools. The expense of purchasing such equipment and maintaining it is not small and should not be overlooked. In addition to these technical and financial considerations for not targeting, the political problem which results from feeding some children in plain view of their peers who are not fed should not be ignored.

- 5) Combined Targeting - A combined strategy would be to target by district or school and then by family based upon eligibility for food stamps or some other criteria. It might be feasible to consider such a combined targeting strategy. An investigation of its feasibility should include the logistical and management costs of such an endeavor in relation to the hoped for benefits.

#### D. COST EFFECTIVENESS ANALYSIS

A detailed analysis leading to an estimate of the cost per pound of biscuits at the school appears in Table 17. As in the tables derived for Thriposha, figures are based on invoice audits.

The U.S. contribution to the School Biscuit Program is currently 66% of the total. The non-commodity costs borne by the GSL represents the other 34%. The major portion of the GSL share goes to production and packaging--80% of it or 27% of the total cost. Had production levels been maintained in 1981 according to plans, the total expenditure would have been 141,220,000 rupees--from all sources, USAID and GSL (113 rs. per beneficiary x 1,250,000 beneficiaries). However, actual disbursements were substantially less due to production and distribution difficulties. The target of 1,250,000 beneficiaries with ration size of 44 grams per day over a 180 day school year yields a 21,806,166 pound distribution requirement. Actual distribution deviated substantially from targeted values. Estimates for amount distributed in any time period and the costs associated with those values vary depending on (1) whether the calendar or fiscal year is utilized, (2) whether disbursements, production or distribution values are desired, and (3) at which point in time the exchange rate is determined, and (4) whether ocean freight and non-Ministry of Education expenditures are included. The cost tables state explicitly which basis is used to derive the values shown.

#### E. COMPARISONS BETWEEN THRIPOSHA AND SCHOOL FEEDING

Thriposha and school feeding with biscuits are both forms of food supplementation and, therefore, deserve to be compared with each other. However, any attempts at direct comparison without appreciating how different they are could lead to grossly inappropriate conclusions. Both provide approximately 190 calories to the recipient on each day they

TABLE 17

ESTIMATED COST PER POUND OF SCHOOL BISCUIT  
AT SCHOOL SITE IN 1981

	Expenses Covered By	
	USAID <sup>1</sup>	GSL
1. Commodity cost at U.S. point of embarkation <sup>1</sup> 12% soya fortified bread flour (conversion factor .93750) . . . . .	\$0.13500	
Vegetable oil (conversion factor .11875) . . . . .	\$0.04098	
2. Ocean Freight <sup>2</sup> . . . . .	\$0.06694	
3. Production and Packaging including sugar and other additions <sup>4</sup> . . . . .		1.8000 rs.
4. Railroad and Food Department transportation handling and storage costs <sup>5</sup> . . . . .		0.0491 rs.
5. Transportation, handling and storage costs incurred at the regional level for transportation to local schools . . . . .		0.1799 rs.
6. Expenses incurred by CARE for Sri Lanka operations including administration, monitoring and trunk operations <sup>6</sup> . . . . .		0.0413 rs.
7. Expenses incurred in CARE/New York for handling, marking insurance and administration <sup>7</sup>		0.1083 rs.
8. Total Cost per lb. of biscuit (\$) . . . . .	\$0.24292	\$0.1233
9. Total Cost per lb. of biscuit (rs.) . . . . .	4.29240 rs.	2.1786 rs.
10. Cost per child per school day . . . . .	0.41630 rs.	0.2113 rs.
11. Cost per child per 180 day year . . . . .	74.94000 rs.	38.0380 rs.

<sup>1</sup>All conversions for FY 1981 based upon the weighted exchange rate of 17.67 rs./\$.

<sup>2</sup>Commodity costs are based on invoice audits for 1981 and a 12% net shrinkage during production (11,877,937 lbs. of 12% SFF was utilized although program limits were 21,825,397 lbs.)

<sup>3</sup>Ocean freight based on .06 US\$ per lb. for 12% SFF and .09 US\$ per lb. for vegetable oil (848,072 \$US). The 12% production shrinkage is applied here as well.

<sup>4</sup>Based on contracts let to biscuit manufacturers resulting in six distributions per year of 70,000 mini biscuits and 120,000 cookie cartons of 20 lbs. each. Production and packaging costs were 1.60 rs. and 1.80 rs. per lb. for calendar 1980 and 1981 respectively. (190,000 x 6 shipments x 20 lbs. = 22,800,000 lbs. of biscuits.) Batch formulas is: 750 lbs. 12% SFF, 95 lbs. veg. oil, 80 lbs. sugar and 14 lbs. other yielding 40 cartons at 20 lbs./carton.

<sup>5</sup>Based on values provided by the Ministry of Education for 1981 of 1,072,000 rs. for planned 1,250,000 beneficiaries.

<sup>6</sup>Based on Ministry of Education values for 1981 provided by MOH of 3,928,000 rs. for planned 1,250,000 beneficiaries. Each beneficiary is entitled to 44 grams of biscuit for 180 days per year.

<sup>7</sup>Per CARE audit reports of actual disbursements during FY 1981 (902,170 rs.)

<sup>8</sup>1981 payments to CARE/New York for the School Biscuit Program were 133,841 US\$.

165-

are served. Thriposha gives 10 grams of protein and the biscuit 7 grams per day. Both are viewed as having other benefits than simply food supplementation: namely, incentive to attend health clinics or schools respectively.

More importantly, the target populations are generally quite different. Thriposha is provided primarily to children 0-5 years in age together with pregnant and lactating mothers. School biscuits are provided to school age children in grades kindergarten through grade 5 during the school year only.

Table 18 is a comparison between the two supplements based on the total costs of a daily portion, of the cost per 100 grams of protein and cost per 100 calories, using 1982 cost information. When extending these values to an annualized basis, it should be remembered that Thriposha is provided thirty days per month for whatever number of months the recipient is deemed to be at risk. On the other hand, school biscuits are offered only on school days which amount to a maximum of 180 days per year and, occasionally, somewhat less. School biscuits are more expensive per pound delivered (rs.) and per unit of protein and calorie. As can be seen from the cost analysis which was used to develop these values (Table 9 and Table 16) one of the main reasons for this higher cost is processing. Biscuits require baking while Thriposha utilizes a low cost extrusion process. Furthermore, the raw materials utilized and channels of distribution are different.

#### F. FUTURE OPTIONS FOR SCHOOL FEEDING

We started this chapter by calling attention to the priority differences between USAID/Washington and the GSL. We have been told that the GSL will make every possible effort to maintain or enhance school feeding and we are aware that AID/Washington is contemplating the phase down to its contribution to school feeding. What then may happen?

TABLE 18

## COMPARISON BETWEEN THRIPOSHA AND SCHOOL BISCUITS

	1982 Cost per lb. in rupees <sup>1</sup> (percentage of contribution)			Cost per 100 gm of protein delivered on-site (rs.)	Cost per 1000 calories delivered on-site (rs.)
	GSL	USAID	Total		
Thriposha <sup>2</sup>	1.76 (36.7)	3.04 (63.3)	4.80 (100)	5.27	2.78
School Biscuit <sup>3</sup>	2.18 (33.7)	4.29 (66.3)	6.47 (100)	8.96	3.30

<sup>1</sup>January 1982 exchange rate of 20.56 rs. per U.S. dollar

<sup>2</sup>Thriposha: 50 gm serving provides 190 calories and 10 gms. protein

<sup>3</sup>School Biscuit: 44 gm serving provides 190 calories and 7 gms. protein

671

In answering this question, we must remember that the biscuit has evolved as the most convenient and efficient way to deliver a supplement to school children and that biscuits require wheat. With this in mind, we identify options.

- 1) Indigenous Wheat Production - Thripasha stimulated indigenous soya production; perhaps the biscuits will stimulate wheat. Right now, experiments with wheat have been started on test plots in Sri Lanka; however, it will be many years, if ever, that enough wheat will be produced indigenously to support the biscuit production. Option 1 is improbable if not infeasible in the short run.

Let us consider whether or not P.L. 480 Title II is a disincentive to production. In Sri Lanka, the gifted commodity is a very small portion of total wheat imports. Nine thousand and nine hundred metric tons of fortified wheat are used in the School Biscuit Program which is only 2% of the 487,000 metric tons imported annually. The large disruption in balance of payments due to the overall wheat import program is extraordinary incentive to produce wheat indigenously. It is hardly likely that maintenance of P.L. 480 Title II at current levels is a disincentive. If anything, it is a small relief for the outward cash flow until such time as indigenous wheat production takes off.

- 2) Continued Import of Wheat - Because biscuits require wheat and because biscuits are the preferred form of school distribution due to their transportability and long term shelf-life, the GSL must continue to import wheat to support school feeding. The imported wheat will be donated, concessional through a program such as Title I, or purchased on the open market. This last option is terribly costly in terms of the balance of payments, a serious problem in Sri Lanka due to their dependence on oil.
- 3) Substitution of Other Commodities - Replacement of the biscuit with some other form of supplement implies a return to a type of supplement which has already proven to be unsatisfactory from a logistical point of view.

Aside from the issue of the composition of the biscuit, the school feeding program, in the future, may take an entirely different form. Historically, the distribution of a meal or snack to school children in Sri Lanka has been accepted as beneficial with regard to health, nutrition, attendance and attentiveness. Current U.S. reluctance to

support school feeding without concrete evidence that children benefit in these ways, suggests the possibility of expanding the school feeding program to include health measures to be administered along with the food.

CARE and the Ministry of Education are initiating an experiment to introduce nutrition awareness and education, as well as anthropometric measurement, in a sample of schools in Sri Lanka. We suggest that USAID/Sri Lanka watch this experiment closely to better assess the feasibility of replicating anthropometric measurement in schools as well as the use of the "nutrition report card" in conjunction with school feeding. (USAID/Sri Lanka might consider financial support for the experiment to facilitate rapid analysis of data and, consequently, more rapid generation of results.)

The other options for modifying school feeding to be more health oriented would involve targeting the food according to need as determined by the health of the potential participants. This requires considerable skill, as well as time investment, on the part of already overworked school teachers (many schools are currently understaffed) or greater coordination between the health care system and the schools. Although such a program might still be called school feeding because of the continued involvement of the educational infrastructure, it would really be a health intervention and, perhaps, should be designed as such from the outset.

## V. ORGANIZATION AND MANAGEMENT

The P. L. 480 Title II program in Sri Lanka is just one of many activities designed to ameliorate the problem of malnutrition at a time when the poorest people in the country are suffering severe hardship. It is only natural to look at P. L. 480 Title II in the broader context established by these activities. Toward this end, this evaluation team was asked to consider the issue of organization and management in the area of food and nutrition.

In the few short weeks of this evaluation, it was difficult to develop adequate answers to the questions posed in our work order with regard to organization and management. However, we can draw on our experiences in other settings in other countries and develop some thoughts with regard to the organization and management of food and nutrition programs in Sri Lanka. In some cases, it may be inappropriate to call these thoughts "recommendations" but the ideas are worth consideration none-the-less.

### A. COORDINATION WITHIN THE GSL AND BETWEEN THE GSL AND OTHER DONOR AGENCIES

At present, several governmental bodies in Sri Lanka share responsibility for the realization of the nation's nutrition goals. In addition to the operation ministries responsible for administering programs, there are a series of committees to promote intersectoral coordination in the food and nutrition arena. These are described in some detail in the Ministry of Plan Implementation "final interim" report.<sup>24</sup>

There is the National Food Policy Coordination Committee (NFPPC) which deals with all aspects of food

---

<sup>24</sup>Food and Nutrition Policy Planning Division, Ministry of Plan Implementation, Nutritional Status: Its Determinants and Intervention Programmes, pp. 57-61.

distribution, pricing, procurement, processing, imports, exports, buffer stocks and distribution. This committee was established in March, 1979. Simultaneously, the National Food and Nutrition Coordinating Committee, created in January of 1980, monitors the major intervention programs and deals with food and nutrition functions at the inter-ministerial level. A group of five specialized panels services the committee covering a variety of subjects including nutrition, agriculture, food pricing, quality control, soya fortification, low cost food technology, research and others.

Under the purview of the Ministry of Health, there are two additional committees. While dealing with the major problems of health, the National Health Department Committee gives some attention to the issues of nutrition and child care. The National Food Advisory Committee deals with the food law, its enforcement and implementation, food quality control and surveillance of the food control system.

Also, we note that committees have been established to handle coordination at levels of government responsible for geographic sub-areas of the country. At the district level, Food, Nutrition and Population Committees are supposed to coordinate with the district/divisional agencies and to integrate with the District Health Councils and the newly constituted District Development Councils in planning food, nutrition and population activities in the districts/divisions.

The make-up of all of these committees is rather complicated and there is considerable overlap in their memberships. Our experience in several countries shows that systems of coordination based on multisectoral committees tend to wither away. Often, this can be attributed to the lack of strong and continuous technical support to aid in making timely and appropriate decisions. Also, members with primary responsibility in an operating or implementing

ministry become quickly overburdened with committee meetings and, therefore, lose interest and patience in this "exercise in futility."

The situation in Sri Lanka, when viewed by this team of outsiders, has the potential for becoming somewhat cumbersome. During our brief stay, we could not identify specific evidence indicating this is the case, but some signs are there. One important element, still lacking in Sri Lanka, is a clearly stated food and nutrition policy that explains the Government's intent with regard to food supply, consumption and utilization. Such a policy should be translated into specific programs containing measurable goals and objectives. These programs should then be monitored and evaluated as part of a continuing process leading to the strengthening or modification of the general policy and the specific interventions. Whatever the organizational structure, the key to coordination lies in the attitude of the participants and not in the rigorous application of a set of norms and procedures.

One source of conflict which often causes communication between large agencies to break down is misinformation. For example, earlier we alluded to a disagreement with regard to the degree to which CARE was reaching its target number of beneficiaries--a disagreement that arose out of an inconsistency in the interpretation of existing data. In the remainder of this chapter, we will discuss the potential of an information system to serve as the focal point for better communication. Such an information system will periodically update data on the incidence of nutrition problems, its main determinants and consequences, those most severely affected and the progress of the interventions in place to combat those problems.

We believe that should the government have a common source of data, properly collected, collated and analyzed to induce decisions, the need for the number of committees and

panels now in existence could be reduced. For example, we can imagine a structure with only two committees to coordinate between operating ministries: one dealing with problems of food production, availability and distribution and one concerned with the problems of food consumption and utilization, nutritional deficiencies and the interventions to reduce their incidence. The first committee might be nurtured by the Food and Nutrition Policy Planning Division strengthened in human and material resources as needed and by the Marketing Research Unit. The second committee might be supported by the National Health Information Center being organized at present. However, all information should be readily available to every agency of the Government. Ad-hoc groups may be constituted to deal with concrete issues but their views should be reported to one or the other of the two committees. Such a simplified system of committees would facilitate substantive discussions between the GSL and other international donors and voluntary agencies as well as between divisions of the GSL itself. We should add only that if there are active local committees dealing with problems of human development and well being, they should be kept informed, so as to enlist their cooperation when necessary.

#### B. AN APPROACH TO INFORMATION SYSTEMS FOR FOOD AND NUTRITION PLANNING

We start with the assertion that much of the relevant data for an information system in the food and nutrition arena emanates from the field. An information system to monitor and evaluate the maternal and child health program should be organized, per force, within the health infrastructure starting at the basic units, the household and the clinic.

We offer some guiding principles for the design of such a system.

- 1) Data that are not used for triggering decisions and actions are not worth collecting. Collection of such data quickly becomes expensive as well as frustrating to the people who must record them. A corollary of this principle is that the quantity of data recorded and analyzed should be kept to a minimum.
- 2) Data should be used for improving programming and management of health services including food supplementation. For this purpose, both process (actions performed) and outcome (results obtained in terms of objectives) data should be gathered for appropriate analysis leading to corrective measures.
- 3) Analytic procedures for converting the data into management information must be well defined and understood by program staff at all levels.
- 4) The staff has to understand and be committed to the concept of managing a program to achieve operational goals--in this case nutritional improvement of the beneficiaries.
- 5) The information system for monitoring health-nutrition programs should be part of a larger nutrition surveillance system for long range planning and program evaluation.

We believe that in Sri Lanka, with its extended coverage of health services and the high literacy rate in the population (over 80%), the potential for implementing a system based on these principles is high. The notion of using data at many levels of a hierarchical structure is consistent with the ongoing delegation of powers, functions, and duties to the provincial authorities.<sup>25</sup> Such a system should be applied first on a trial basis--in a district with a high incidence of poverty, malnutrition, and infection--and if proven feasible, extended progressively throughout the country.

A great deal of the design for such a system is spelled out for the MCH programs using supplementary foods in India

---

<sup>25</sup>Ministry of Health, Sri Lanka, White Paper on the Reorganization of the Ministry of Health (Colombo, Sri Lanka: Ministry of Health, 1980).

in a recent report.<sup>26</sup> The system calls for the collection of outcome indicators, process indicators and stock inventory data. In Sri Lanka, outcome indicators (some might use the term "impact" indicators) include measures of preschooler nutritional status, mortality data, morbidity data, birth weights, weight gain of pregnant women, and anemia in pregnant women. The selection of the measure of preschooler nutritional status is one of the more difficult choices in designing the system. Currently in Sri Lanka, children are weighed and the weight-for-age score is used as a screening device. The addition of height data in selected clinics would facilitate the identification of a state of chronic undernutrition superimposed with an acute episode as described in work by Waterlow.<sup>27</sup>

Process indicators include the record of immunizations given and series completed, the number of children receiving Thriposha, a count of program dropouts, and the number of family planning acceptors. Stock inventories include the quantities of basic material inputs on hand and an indication of the rate of flow of those inputs to beneficiaries. The former signals the system that replacement materials are needed when stocks are low, while the latter indicates whether the services are being delivered at the expected rate.

The system described for India calls for a hierarchical management structure whose success depends on strong supervision and management of clinic or village level operations. The current preventive health system in Sri Lanka operates with such a structure--Family Health Workers,

---

<sup>26</sup>Roy I. Miller and David F. Pyle, Toward A Monitoring and Evaluation System for P.L. 480 Title II Maternal Child Health Programs In India (Ann Arbor, Michigan: Community Systems Foundation, 1981).

<sup>27</sup>J. C. Waterlow, "Classification and Definition of Protein-Calorie Malnutrition," British Medical Journal (September 2, 1972) p. 567.

Public Health Nurses, Assistant Medical Practitioners and Medical Officers. To utilize this structure effectively, it is necessary to have a sufficiently small span of control at each level to facilitate frequent review of the performance of lower level staff. The review is as much a part of the continuing education of the staff as it is an inspection.

"Management By Exception" is a useful guiding principle for such a structure. It calls for the identification, through the analysis of data, of the exceptional case because it is performing extremely well or poorly. Poor performance suggests remedial action. Superior performance suggests that some technique may be working in one area that could be useful throughout the system. Consolidation (aggregation) of impact indicators at all levels of the structure enables the application of this principle at all levels.

To implement the principle of "Management By Exception" using data currently available in Sri Lanka, one could aggregate the nutritional status data from each clinic on a periodic basis. We recommend that the device used for this aggregation be the characteristic curve described earlier in this paper. Because there is a constant turnover in beneficiaries at any given clinic due to the procedures invoked in targeting, such a procedure would have to partition the beneficiaries into four categories at each aggregation--continuing participants, new participants, drop-outs, and participants who have responded to treatment. (This last number, the number of beneficiaries no longer receiving food supplements because they no longer need them, is the best single indicator of the efficacy of any given clinic.)

The data per province and/or district should be at the disposal of the corresponding Superintendent of Health Services. Data from all SHS districts should be received by the National Center of Health Information at the Ministry of

Health for further analysis and presentation to the National Health Development Committee for policy decisions. The same information should be regularly available to the Food and Nutrition Policy Planning Division and, after appropriate evaluation, submitted to the Food and Nutrition Coordination Committee. Any other interested agency in the Government should be privy to the data and also the cooperating international organizations. Thus, every governmental structure will have a concrete picture of the problems related to poor health and malnutrition and the outcome of programs. It is expected that the Food and Nutrition Policy Planning Division in the Ministry of Plan Implementation will correlate these data with socioeconomic factors so as to guide government resources, particularly those reflecting an active national income redistribution, to those communities showing a greater frequency of absolute poverty and social ills.

The analysis will justify the need for introducing nutrition objectives in the planning of food production and availability. The same reasoning could apply to economic policies, particularly those dealing with fiscal and monetary matters that may have an adverse effect on the nutritional status of the poor.

In synthesis, as decided by His Excellency the President of Sri Lanka, there should be sectoral coordination at central and local levels by integrating population, nutrition, sanitation and health care services.<sup>2\*</sup> We submit that an information system of the type described above would further Sri Lankan efforts toward such coordination.

---

<sup>2\*</sup>Food and Nutrition Policy Planning Division, Ministry of Plan Implementation, Nutritional Status In Sri Lanka: Its Determinants and Proposed Corrective Measures, Cabinet Paper presented by His Excellency the President, 1980).

## VI. NEXT STEPS: EXPERIMENTATION

An information system originating from the basic units delivering health services would generate data on a routine basis to facilitate communication regarding the functioning of the interventions operating on a grand scale in the field. It would also serve as the focal point for improved management at all levels of the health infrastructure. We strongly recommend that experimentation with the implementation of such a system on a small scale be initiated as quickly as possible. A careful review of the system that has evolved in Jaffna should be done to serve as the model for what can be done in this regard in Sri Lanka.

The information system will help answer basic questions about the operation of the existing set of interventions in the field. Many questions regarding the design of such interventions can be answered only through special experimentation. We recommend that, in addition to exploring the viability of an information system focusing on the basic units of service delivery, special experiments be initiated to shed light on the more pressing issues of intervention design in Sri Lanka.

We partition the additional experiments into three categories. The first category, labelled "research questions", calls for special studies in the form of surveys and/or prospective studies involving carefully conceived research designs. Answers to these questions are likely to emerge only after a relatively long period of experimentation (six months or more). The second category, labelled "operational questions," pertains to minor variations in the nature of existing interventions. Tests can be carried out fairly easily by modifying procedures in selected clinics and monitoring the changes in impact or efficiency of service delivery resulting from each modification. In many cases, clinics are already testing out possible variations on their own initiative and the

experiment might consist of nothing more than monitoring the response of the beneficiary population to those variations. For example, we discovered that many of the ideas put forth by the team for improving the package of services delivered along with Thriposha are already being implemented in Jaffna. The third category, labelled "cross-sectoral" experiments, includes exploration of the linkages with other food and nutrition related interventions. These experiments go beyond the nutrition arena and may require coordination of governmental agencies outside of the food supplementation system.

We want to stress that the importance of field experiments is derived from the need to learn more about the responsiveness of Sri Lankans to new and different intervention strategies before any large scale changes are implemented which may cause irreparable damage to existing systems. A series of experiments will lead to the evolution of better programs through a careful and systematic review of the feasibility and impact of various options given the local culture and environment.

#### 1. Research Questions

- a) Pregnant and Lactating Mothers Study - A review of the special problems of pregnant and lactating mothers to determine if additional services are needed to assist mothers to a normal delivery and successful lactation.
- b) Thriposha Effects Study - A carefully controlled experiment to separate the effects of Thriposha from the broader package of services now delivered through the basic health system.
- c) Income Mediated Effect - An attempt to determine the degree to which the Thriposha and/or School Biscuits have a secondary nutritional impact due to the fact that mothers can purchase additional food products with the cash not spent on the food provided by the supplement.
- d) Non-Governmental Food Supplementation Study - A determination of the quality and quantity of food supplementation programs sponsored by religious organizations, other voluntary agencies, etc.

- e) Beneficiary Count Experiment - A review of the best ways to set quantitative targets for feeding programs, including Sarvodaya's program (an exploration of the true relationship between "ABC" and "HEAD" counts for all major feeding programs in Sri Lanka).
- f) Food As An Incentive To School Attendance - A statistically rigorous experiment using retrospective and/or specially generated data from "new schools" to measure the attendance generated through school feeding.
- g) Food As An Incentive To School Performance - An experiment similar to "f" but regarding school performance.
- h) Food Stamps and Thriposha Study - A statistically rigorous study to establish the cost-effectiveness ratios of food stamps and direct food supplementation.
- i) Kola-Kende and Other Supplementation Alternatives - A review of the relative costs and nutritional benefit derived from other locally available supplements.
- j) Use of High Energy Supplements to Increase Productivity - A test of the impact on productivity and general well-being of a high energy supplement on workers in intensive labor jobs; for example, in the Mahaweli area.

## 2. Operational Questions

- a) Alternative Thriposha Distribution Procedures - An exploration of alternatives regarding the best method of distributing Thriposha (at the time of the health examination or on a separate day, issuance of a stamp to be redeemed elsewhere, etc.)
- b) Training of Mothers for Weighing, Plotting and Recording Weight Data - An exploration of the ways to include mothers as more active participants in the intervention.
- c) On-site Feeding - A test of the viability of having mothers use Thriposha to prepare children's meals for on-site consumption.
- d) Local Diagnosis of Community-Level Problems - An exploration of procedures that can be used at the local level to help communities identify their own special problems and to marshal the resources to solve them.

- e) Improved Transport for Family Health Workers - An examination of the beneficial effects of transport such as bicycle or bus-fare allowances on targeting, education, etc.
- f) Test of Alternative Information Systems Designs - A test of the accuracy, costs, utilization patterns and information content of various information collection and processing schemes including the local based system described in the last section, use of surveys and other "mixed" strategies.
- g) Use of Other Indigenous Foods Along With Thripasha - An exploration of the degree to which other locally available foods can be used to complement Thripasha.
- h) Use of Non-food Interventions Along With Thripasha - Trials of the marginal effect of additional services on the package now used such as oral rehydration training.
- i) Assessment of the Impact of Milk on School Children - A test of the primary and secondary benefits (such as an increase in the on-site intake of biscuits) and the possible harmful side effects (lactose intolerance) resulting from a milk distribution in the schools.

### 3. Cross-Sectoral Experiments

- a) Potable Water Enhancement Programs - A search for ways to bring more potable water into high need areas including food for work options.
- b) Sewer and Solid Waste Disposal - A similar search for ways to finance and implement such programs as latrine construction, etc.
- c) Local Food Production Enhancement - An exploration of the viability of instituting home, school or community gardens for the production of nutritious foods for local consumption and a search for ways to finance such programs such as Food For Work.
- d) Improvement of Transport Linkages - A study of the benefits derived from providing better transport options between mothers and clinics, family health workers and mothers, parents and employment opportunities, households and schools, etc.
- e) Multisectoral Approach to Nutrition in Resettlement Areas - A study of the best method for approaching nutrition as part of a resettlement scheme where services such as health delivery, water, schools and

related social infrastructure are totally lacking at the start; for example, in the Mahaweli area.

## VII. CONCLUSIONS AND RECOMMENDATIONS

### A. THRIPOSHA PROGRAM

1. Overall Assessment - The Thripasha program has developed into one of the better maternal child health care programs sponsored under P. L. 480 Title II. Several features of the program set it apart from most others. The Thripasha, itself, is a weaning food formulation that is inexpensive to prepare, acceptable to the beneficiary and easily consumed. Moreover, in addition to its direct nutrition effect, Thripasha serves as an incentive for beneficiaries to come to the Government sponsored health clinics, not just once but on a regular basis, allowing the health staff the opportunity to treat cases and provide preventive services to their clientele. As with all programs of this kind, there are abuses (sharing of the food, selling of the food, etc.) but on balance, the combination of the preventive measures bolstered by Thripasha is having the desired effect.
2. Specific Recommendations
  - a) Recipient Targeting - Thripasha is targeted, to preschool children who are classified as suffering from either second or third degree malnutrition or are identified, by qualified medical doctors, as likely to fall into those more serious states of malnutrition.

*In our sample, which was drawn from clinics with successful weighing (and, therefore, targeting programs), 4 out of 5 beneficiaries met these criteria. However, targeting can be strengthened, program-wide, by checking that proper procedures are followed in all clinics.*

- b) Commodity Mix - Thriposha is a blend of ICSM, corn and soya beans fortified with vitamins and minerals. It is precooked by a low-cost extrusion cooking process at a plant near Colombo, where it is packaged for easy and convenient consumption by its recipients. One particularly attractive feature of Thriposha is the ease with which it can be consumed without additional cooking in the home.

*Thriposha is a carefully conceived product using appropriate commodities. The planned phase-out of gifted ICSM should be accompanied, if possible, by the addition of milk to (a) keep the consistency and solubility of the product the same and (b) keep the quality of the protein up.*

- c) Expansion - It has taken several years for the production process for Thriposha to mature to a point where the capability for reaching the targeted number of beneficiaries is nearly assured. If current plans to expand the plant are executed and if shipments of ICSM are not phased out faster than plant capacity is added, then the limiting factor on expansion would become the capacity of the Sri Lankan health system to service additional families through outreach or through the inclusion of new centers into the program.

*We are sufficiently impressed with the success of the Thripasha program to encourage its expansion. We urge the Government of Sri Lanka, CARE and USAID to work together to establish a reasonable expansion plan, considering production capacity, transport costs for additional commodities and the capacity of the health system for increasing coverage. To the degree possible, expanded coverage should be provided by increasing the percentage of locally grown commodities. Any phase out of donated ICSM should be coordinated with the expansion plan.*

- d) Funding Levels - U.S. commodity contributions of ICSM in fiscal year 1981 were valued at \$2,881,036.

*We urge AID to support expansion by maintaining or increasing its level of support through P.L. 480 as the shift toward indigenous materials progresses.*

- e) Delivery - Historically, delivery problems are traceable to production shortages. In the past, these shortfalls have been attributed to failures in the equipment and/or management of supplies in the old production facility; however, as noted above, great strides have been made to eliminate most of the causes of production shortfalls by the construction of a newer, more efficient processing plant.

*One potential remaining problem can be alleviated if the operating reserve on raw materials coming from the U. S. be raised from the current 5% level. This would enable the storage of sufficient raw materials at the plant to avoid production stoppages due to late shipments from the U. S.*

- f) Future Directions and Phasing - Current plans call for the phasing down of donated commodity in the Thripasha blend by adding locally produced product made from indigenous corn and soya. One question of primary importance in the future is the role of commercial sales of Thripasha to (a) enable recipients to supplement their consumption through purchase of the product on the market, and (b) to enable people in areas not adequately covered by the health system to have access to Thripasha through commercial outlets.

*We recommend that the GSL and CARE continue to collaborate in an effort to add capacity and increase coverage through both the MCH system and the commercial market. The rate of commercialization and the geographic expansion plan should remain under GSL and CARE control. Sales, distribution and promotion should be contracted out to a single firm who, in exchange for their opportunity to make a profit in a low risk venture, return an agreed upon percentage of the profit to CARE and the GSL to defray the costs of the MCH program expansion.*

- g) Miscellaneous - In general, because the Thripasha is distributed through health clinics run by accredited physicians, the distribution is handled quite well as is the administration of related services.

*We recommend that serious consideration be given to enhancing the operation of the program by training mothers to assist in filling out and interpreting the road-to-health charts. This would relieve the staff of the burden of weighing and add to the educational component of the program.*

## B. SCHOOL FEEDING

1. Overall Assessment - The benefits of School Feeding are virtually impossible to quantify at this time. The mechanics and logistics of the program are currently adequate; in fact, the use of the pre-cooked biscuit as a supplement is an improvement over other programs around the world which distribute a commodity that needs on-site preparation. Again, we note that there are abuses and problems (sharing, spoilage, breakage) but, on balance, the operational aspects of the program are satisfactory.
2. Specific Recommendations
  - a) Recipient Targeting - School biscuits are given to those schools which exhibited a high degree of malnutrition in a 1973 survey, conducted by CARE, using the Quac-stick method (arm-circumference for height) of measuring malnutrition. As of 1981, schools formed since 1973 are not included nor are those schools which were excluded after the 1973 survey. (Minor changes in school selection were made on the basis of a 1981 survey of schools administered by CARE.) Currently, the Government of Sri Lanka wants to feed all elementary school children while, in the face of possible resource cutbacks, USAID is interested in finding a more exacting method of beneficiary selection.

Targeting at the level of the individual child would be both costly and ineffective, unless it was a component of a health care program. The equipment needed to assess individual nutritional status is not now available in schools, nor are the potentially feasible methods of assessing nutritional well-being, based on anthropometrics, adequate for that task. If scarce commodities force targeting, the current method of identifying the worst schools is as good as any. However, the current basis for targeting is obsolete and ought to be updated.

- b) Commodity Mix - Currently, school feeding is accomplished through the distribution of a ready-to-eat biscuit made from donated 12% soy fortified wheat flour and oil supplemented with locally provided sugar and chemicals. The biscuits come in two sizes; the smaller are used for more remote schools because they break less easily. Eight large sized biscuits or 44 grams of the small size are served on each school day.

Unless the biscuits are replaced by something else entirely, which we feel would be a mistake, a wheat based commodity must be used for preparing them. It could be a wheat flour milled in Sri Lanka or an imported wheat flour such as that used now. Constraints on milling in Sri Lanka are not now known and must be determined in a special study.

The addition of milk, if potable water can be found in all schools, would enhance the biscuit both through the nutritional value of the milk and the effect a liquid would have on the acceptability of the biscuit, thereby enhancing in-school consumption as well.

- c) Funding Levels - In 1981, the United States commodity contribution (12% soya fortified bread flour and oil) was valued at \$1,684,254.

*The Government of Sri Lanka wants to expand school feeding island-wide. This should not be supported by P. L. 480 Title II. However, because of the adverse effects on the balance of payments from importing wheat, the current levels of support should be maintained so as not to place added burden on the GSL by forcing it to use wheat from the open market.*

- d) Delivery - We did not do an exhaustive study of the system for biscuits; however, our field observations did indicate adequate supply at most school sites, appropriate school level records showing receipts, disbursements and current inventory levels and a well designed distribution system.
- e) Future Directions and Phasing - School feeding, as it is currently implemented, is not linked directly with health concerns. To make it a more health-oriented program, through better targeting and the selective use of food to combat malnourishment, one should encourage the involvement of the health sector. Most likely, school teachers would make poor substitutes for physicians with regard to diagnosis and prescription of treatment. CARE is initiating an attempt to introduce health concerns into the school feeding program on a limited basis by providing selected schools with scales with which to weigh children and "nutritional" report cards to be sent home. This experiment should shed a great deal of light on the feasibility of introducing health matters directly into school feeding. In the interim, until this experiment is completed, AID/Washington's interest in curtailing school feeding is likely to dominate future programming concerns.

*Due to the especially strong commitment of the GSL to school feeding, the current program should be maintained unless a mutually agreed upon plan for phasing down is in effect.*

### C. ORGANIZATION AND MANAGEMENT

The organization and management of food and nutrition policy making functions and program implementation falls under the control of a series of Ministries and Committees. The make-up of the structure is rather complicated and there is considerable overlap in their memberships.

*We recommend that a simplified structure for coordinating all food programs within Sri Lanka be sought. More importantly, we urge that an attitude disposed to coordination be adopted by all concerned parties.*

One of the problems which results from the fragmented control of food and nutrition matters is the lack of an appropriate focus for discussion. Furthermore, there is little commonly accepted data with which to hold constructive discussion about critical issues. Too often, debate centers around the validity of the information around which a premise is advanced rather than the premise itself.

*We further recommend that an information system be developed to achieve better systems operation and management. This system of monitoring and evaluation should be based on the routine collection and use of a minimum level of relevant data at the point of delivery of services. Such a system should be designed to facilitate better operation of the delivery system through the careful monitoring of impact as well as process variables.*

#### D. RESEARCH AND FIELD EXPERIMENTATION

Many of the pertinent questions in the food and nutrition arena are unanswerable, except by the subjective opinion of individuals involved in the system, because of a lack of valid data with which to test hypotheses concerning those questions. Much could be gained, in our opinion, if the energy devoted to arguing about these questions be channelled into the design and implementation of field experiments to generate an empirical basis for decision making.

*We recommend that in addition to experimentation with a new system of monitoring and evaluation, experiments should be designed and carried forth which explore some of the basic issues of intervention design and implementation. A broad categorization of experiments is:*

- 1. Research Questions -- special studies designed to elicit answers to fundamental research questions,*
- 2. Operational Questions -- field experiments designed to shed light on the efficacy of alternative methods of running current programs, and*
- 3. Cross-sectoral Experiments -- exploration of the linkages between food and nutrition and other related sectors such as water, transport and housing.*

## REFERENCES

- Blumenfeld, Stewart; Flores, Maria-Bernardita; Mack, Maura; Norton, Maureen and Robert Pooley (1981): The Impact of PL 480 Title II in the Philippines. Draft of a Report of a Program Evaluation for USAID/Philippines.
- CARE/Sri Lanka (1981): Sri Lanka Primary School Nutrition Survey. CARE/Sri Lanka, Colombo.
- Chandrasekhar, Usha and Amirthaveni, M. (1976): "The Impact of School Lunch Programme on Physical Development Mental Ability and Certain Behavioural Aspects of Selected Primary School Children." The Indian Journal of Dietetics 13.
- Drake, William D.; Miller, Roy I. and Margaret Humphrey (1980): Final Report: Analysis of Community-Level Nutrition Programs. Community Systems Foundataion, Ann Arbor, Michigan.
- Food and Nutrition Policy Planning Division, Ministry of Plan Implementation (1980): Nutritional Status In Sri Lanka: Its Determinants and Proposed Corrective Measures. Cabinet Paper presented by His Excellency the President at the Cabinet Meeting on July 27, 1980. Food and Nutrition Policy Planning Division, Ministry of Plan Implementation, Publication No. 4, Colombo.
- Food and Nutrition Policy Planning Division, Ministry of Plan Implementation (1981a): Nutritional Status: Its Determinants and Intervention Programmes. Food and Nutrition Policy Planning Division, Ministry of Plan Implementation, Colombo.
- Food and Nutrition Policy Planning Division, Ministry of Plan Implementation (1981b): Evaluation Report of the Food Stamp Scheme. Food and Nutrition Policy Planning Division, Ministry of Plan Implementation, Colombo.
- Lashman, Karen P.; MacCorquodale, Donald W. and James R. Brady (1980): Health Population and Nutrition Sector Review For Sri Lanka-1980. Prepared for the USAID Mission to Sri Lanka--For use only by A.I.D. and H.E.W. Not for Public Quotation.
- Miller, Roy I. and Pyle, David F. (1981): Toward A Monitoring and Evaluation System for P.L. 480 Title II Maternal Child Health Programs In India. Community Systems Foundation, Ann Arbor, Michigan.
- Ministry of Health, Government of Sri Lanka (with CARE/Sri Lanka and the Center for Disease Control, Public Health Service, United States Department of Health Education

and Welfare) (1976): Sri Lanka Nutrition Status Survey 1976. Office of Nutrition, USAID, Washington, D.C.

Ministry of Health, Sri Lanka (1980a): White Paper on the Reorganization of The Ministry of Health. Ministry of Health, Sri Lanka, Colombo.

Ministry of Health, Sri Lanka (1980b): Annual Health Bulletin 1980. Ministry of Health, Sri Lanka, Colombo.

United States AID Mission to Sri Lanka (1982): Country Development Strategy Statement Update FY 1983-1987. USAID/Sri Lanka, Colombo.

Waterlow, J. C. (1972): "Classification and Definition of Protein-Calorie Malnutrition." British Medical Journal September 2, 1972.

World Food Programme (1981): Activities of World Food Programme In Sri Lanka. World Food Programme, Colombo.

## APPENDIX A

### SCOPE OF WORK

Major questions to be answered by the Evaluation Team include the following:

#### Nutritional Impact:

1. What are the major nutritional problems in Sri Lanka?
2. Who are those most in need of food aid?
3. To what extent are "most vulnerable" groups presently receiving assistance through P.L. 480, Title II, CARE programs?
4. a) Are existing food interventions considered to be adequate to meet the nutritional needs known to exist?  
b) Is the Title II food assistance resulting in a measurable improvement in nutrition status of beneficiaries?
5. How can/should the ration be improved?  
In terms of calorie/mineral/vitamin/protein content?  
In terms of amount?  
In terms of type of feeding; i.e., biscuits vs. cooked meal, in school vs. take home, Thripasha distribution?

#### Cost Effectiveness:

1. a) What are the total costs of the program to the U.S., to the GSL, and to CARE?  
b) Is the level of nutritional improvement and other impacts achieved worth the cost of maintaining the program? Are there any other alternative nutrition interventions that have the potential for being more cost-effective and should these be considered by AID?
2. Are other types of nutrition programs feasible which would reach the desired target groups through a different delivery system, such as distribution through rural cooperatives?
3. Given the absence of anthropometric data on school feeding beneficiaries, how effective is the school feeding program from a cost-effectiveness standpoint?

#### Secondary Effects:

1. a) Have the Title II activities had any demonstrable developmental benefits in agriculture, education, health, public administration, community development?
- b) Have Title II programs contributed to institution building and/or human resource development in these areas? Have they affected GSL food and nutrition policy? How?
2. What secondary effects, if any, have the programs had on school enrollment, on health education and other health activities such as early identification of disease, inoculation campaigns, etc?
3. What is the relationship of Title II activities to Title I food aid and the Agriculture/Food/Nutrition Strategy of the GSL? Can these be more closely coordinated? What is the relationship to other GSL feeding programs such as the food stamp program?
4. Is the Title II program consistent with other aid and USAID developmental priorities as identified in the CDSS, the ABS and other planning and policy documents?

Organization and Management:

1. How are food programs presently coordinated within the GSL?
2. Can/should coordination within the GSL and between the GSL/CARE/USAID be handled differently?
3. Can/should coordination be handled at a lower/higher level within the GSL?
4. What other type of food assistance is available to recipients?
  - from the government?
  - from multilateral programs?
  - from other donors?

Future Directions:

1. a) What provision has been made for the future directions and phasing of Title II activities?
- b) What specific changes should be made in program levels and priorities to achieve greater integration of food aid with developmental efforts?
2. Are these plans realistic in terms of the GSL capacity to assume responsibility and/or U.S. and other donor support programs?

3. Should the U.S. attempt to pursue modified or other types of Title II programs in Sri Lanka? Is the division of responsibility for different types of food assistance between the U.S. and the World Food Program a valid one?

## APPENDIX B

### PERSONS INTERVIEWED BY P.L. 480 TITLE II EVALUATION TEAM

1. Miss Sarah Jane Littlefield, Director. USAID, Sri Lanka.
2. Dr. James R. Brady, Assistant Director, USAID, Sri Lanka.
3. Mr. Robert L. Chamberlain, Chief of Human Resources, USAID, Sri Lanka.
4. Mr. John M. Miller, Program Officer, USAID, Sri Lanka.
5. Mr. Oswin Silva, Special Assistant to Director, USAID, Sri Lanka.
6. Mr. Tilak Samaranayake, Economic Specialist, (Program Specialist) USAID, Sri Lanka.
7. Mr. Michael Korin, Chief, Office of Rural Development, USAID, Sri Lanka.
8. Mr. Velupillai Premkumar, Agriculture Economic Specialist, Office of Rural Development, USAID, Sri Lanka.
9. Mr. Jeffrey W. Evans, Chief, Office of Mahaweli Development, USAID, Sri Lanka.
10. Mr. Fred Davis, Director, Care, Sri Lanka.
11. Mr. George Taylor, (Former Director), CARE, Sri Lanka.
12. Mr. Earl Goodyear, Project Director, CARE, Sri Lanka.
13. Mr. F.W. Kulatunga, Project Director, School Feeding Program, CARE, Sri Lanka.
14. Mr. Sunil Govinnage, Assistant Project Director, School Feeding Program, CARE, Sri Lanka.
15. Dr. Beatrice de Mel, Nutritionist, CARE/MRI, Sri Lanka.
16. Mr. D.D. Jayatilleke, Nutrition Educator, CARE, Sri Lanka.
17. Mr. Gamini Jayasuriya, Minister of Health.
18. Mr. B.C. Perera, Secretary, Ministry of Health.
19. Dr. S.D.M. Fernando, Director, Ministry of Health.

20. Dr. Tudor Silva, Deputy Director, Public Health, Ministry of Health.
21. Dr. S. Munasinghe, Deputy Director of Health Planning, Ministry of Health.
22. Dr. Ranjith Atapattu, Minister of Family Health and Colombo Group of Hospitals.
23. Mr. Tissa Devendra, Secretary, Ministry of Family Health.
24. Dr. S. Goonesekera, Medical Officer (Nutrition) Family Health Bureau.
25. Dr. Davy Perera, Nutritionist, Medical Research Institute, Ministry of Health.
26. Dr. Raja Ameresekere, Director, Food and Nutrition Policy Planning Division, Ministry of Plan Implementation.
27. Mr. Sriyan Weerasinghe, Deputy Director, Food and Nutrition Policy Planning Division, Ministry of Plan Implementation.
28. Mr. N. Hettiaratchy, Assistant Director, Food and Nutrition Policy Planning Division, Ministry of Plan Implementation.
29. Mr. P. Kirubaithilakan, Deputy Director, Food and Nutrition Policy Planning Division, Ministry of Plan Implementation.
30. Dr. Wickrema Weerasooria, Secretary, Ministry of Plan Implementation.
31. Mr. Ronnie Weerakoon, Director, External Resources Division, Ministry of Finance and Planning.
32. Mrs. P.J. Alailima, Deputy Director, National Policy Division, Ministry of Finance and Planning.
33. Mrs. S.L. Kuruppu, Deputy Director, External Resources Department, Ministry of Finance and Planning.
34. Mr. Merrick Perera, Director, National Policy Division, Ministry of Finance and Planning.
35. Mr. M.F. Mohideen, National Policy Division, Ministry of Finance and Planning.
36. Mr. A.G.W. Nanayakkara, Assistant Director, (Sampling Survey Division), Ministry of Plan Implementation.

37. Mr. R. Christenson, WHO Consultant, Planning Division, Ministry of Health.
38. Dr. R. Jayasooriya, Planning Division, Ministry of Health.
39. Mr. S.K.N. Wijewardene, Planning Officer, Nuwara Eliya District (MOPI).
40. Mr. T.B. Subasinghe, Director, Agrarian Research and Training Institute (ARTI).
41. Dr. R. Silva, Agrarian Research and Training Institute.
42. Mr. Chandra de Zoysa, Secretary, Ministry of Educational Services.
43. Mr. A.R. de Silva, Project Manager, Nutrition Feeding Unit, Ministry of Educational Services.
44. Mr. Raja Subramaniam, Accountant, Nutrition Feeding Unit, Ministry of Educational Services.
45. Dr. Priyani de Soysa, Consultant Paediatrician and Professor of Paediatrics, Lady Ridgeway Hospital.
46. Mr. Maurice Perera, Marketing Manager, Thripasha Commercial Marketing Program, Lever Brothers, Ltd.
47. Mr. Nihal Corea, Research Officer, Thripasha Commercial Marketing Program, Lever Brothers, Ltd.
48. Mr. M. Rajasingham, State Plantations.
49. Mr. Rohan Samarànayake, State Plantations.
50. Mrs. Y. Rodrigo, Manager, Social Department Division, Janatha Estate Development Board.
51. Dr. N. Mahesan, Program Specialist, Program Office, USAID, Sri Lanka.
52. Dr. D.N.W. Vidyasagara, Assistant Director, MCH, Ministry of Health.

**PERSONS INTERVIEWED DURING FIELD VISITS  
TO KANDY, JAFFNA, AND KALUTARA**

1. Dr. (Mrs.) S. Ekanayake, Medical Officer, Maternal and Child Health, Kandy Municipality.
2. Dr. (Miss) I.M. Thaha, Medical Officer, Peripheral Unit, Akurana.
3. Dr. (Mrs.) Viswaratnam, Medical Officer, Maternal and Child Health, Superintendent of Health Office, Kandy.
4. Professor Malcolm Fernando, Dean of the Faculty of Medicine, Peradeniya University/Coordinator of Hindagala Project, Kandy.
5. Dr. Balasuriya, Senior Lecturer, Department of Preventive Medicine, University of Peradeniya.
6. Dr. Sextus Corea, Senior Lecturer, Department of Preventive Medicine, University of Peradeniya.
7. Dr. D.B. Niyangoda, Superintendent of Health Services, Nuwara Eliya and Kandy.
8. Mr. W.H. Rodrigo, Estate Medical Assistant, Hantane Estate, Kandy.
9. Mr. A.H.G. Tissera, Superintendent, Le Vallon Group, Pupuressa, Galaha.
10. The Principal, Hindagala Maha Vidyalaya.
11. The Acting Principal, Haloya Maha Vidyalaya.
12. The Principal, Kanista Vidyalaya, Galaha.
13. Dr. T. Thevendran, Medical Officer of Health, Kankesanthurai, Jaffna.
14. Dr. Manikkam, Superintendent of Health Services, Jaffna.
15. Dr. (Miss) S. Ponnadurai, Paediatrician, Government Hospital, Tellipalai.
16. Dr. Godwin Fernando, Director, National Institute Of Health Sciences, Kalutara.
17. Dr. S.A.P. Gnanissara, Chief Medical Officer of Health, Kalutara.
18. Mrs. K. Epa, Public Health Nurse, Paiyagala.

19. Mrs. A.M.S. Perera, Public Health Midwife, Paiyagala.
20. Mrs. P. Jayasinghe, Public Health Midwife, Paiyagala.
21. Mr. M.J.H.P. Fernando, Vice Principal of K/Bandaranayake Maha Vidyalaya, Paiyagala.
22. Mr. R.P.J. Perera, Assistant Teacher of K/Bandaranayake Maha Vidyalaya, Paiyagala.
23. Mr. A.T. Ariyaratne, President, Sarvodaya Shramadana Movement, Moratuwa.
24. Mrs. Jayasooriya, Sarvodaya Shramadana Movement.
25. Miss Thilekeratne, Sarvodaya Shramadana Movement.
26. Mrs. Rajasooriya, Vice President, Sarvodaya Shramadana Movement.

## APPENDIX C

### ANNOTATED BIBLIOGRAPHY

Berggren, Gretchen C. and Abeyakoon, Dilsiri R. (1981): Weaning Foods And The Weaning Diet In Kirillapone Shanty, A Project Area of Save The Children Federation, Colombo, Sri Lanka. A Hoviprep Consultant's Report.

This document reviews the nutrition component of the Save The Children Federation intervention in Kirillapone Shanty, Colombo. Observing the high rate of malnutrition in the Shanty, the consultants recommend the introduction of local weaning foods in place of Thripasha while reserving the Thripasha for "treatment" of children most at risk. The strength of the community involvement (special mother's group) adds to the feasibility of such an approach. They also recommend strengthening of the nutrition education component of the feeding program.

CARE/Sri Lanka (1981): Sri Lanka Primary School Nutrition Survey. CARE/Sri Lanka, Colombo.

In 1979, a survey of primary school children was conducted jointly by the Ministry of Education and CARE to obtain a statistically valid assessment of the nutritional status of students in the primary schools. It was hoped that the data would serve as a baseline for future surveillance and that the results could be used as the basis of school selection in the School Biscuit Program.

Significant results include: 3.4% of the sample of 67,650 suffer acute malnutrition, 50% are chronically malnourished and 1.48% are both. Acute undernutrition is not significantly different between the rural and urban sectors; however, the estate sector has significantly higher chronic malnutrition.

Field, John O. and Kannangara, Nimali (1981): Save The Children's Program of Community Development in Kirillapone Shanty. Sri Lanka.

On the basis of published reports and field observations, the authors were asked to evaluate the application in Kirillapone--a slum settlement in Colombo--of the Community Based Integrated Rural (or Responsive) Development or the "CBIRD Methodology" followed by Save The Children Federation. The ultimate objective is to transfer decision making and functional competence to the community for the implementation of specific projects. These are

related to skill training and employment generation, economic infrastructure development, housing and health care, including nutrition.

After an experience of two years, results appear to be uneven. The housing scheme, the key to the total effort, was only then ready for activation. The nutrition component was poorly organized and this prompted the special analysis of weaning foods and the weaning diet by Gretchen Berggren and Dilsiri Abeyakoon, included in this annotated bibliography. Issues of staff size and costs were also mentioned.

The project seems to have great potential for replication of some of the specific components in other poor communities but not the model as a whole.

United States International Development Cooperation Agency. Country Development Strategy Statement, FY 1983-1987, United States AID Mission To Sri Lanka. Agency for International Development, Washington D.C. January 1981.

This annually prepared document presents and explains the USAID mid-range (5 year) development strategy for Sri Lanka. The economic dislocations in Sri Lanka since 1977 are well documented. The case for continuing assistance is based on the assertion that the intense development strategy embarked upon by the Government of Sri Lanka will be a success in the long term but that interim aid is needed to a) bolster that development strategy and, b) see to it that social progress of earlier years is not eroded. Arguments for a more flexible method of assistance, free of some of the red tape of traditional aid projects, are presented. Finally, the proposed program for 1983-1987, emphasizing support to the Mahaweli Basin Development, Food Production and Natural Resource Management and Human Productivity and Well-Being is described.

Thenabadu, G. (1982): Trends in Malnutrition and Associated Socioeconomic Factors-A Study of Sri Lanka. Office of Human Resources. USAID/Sri Lanka.

This document is a useful overview of the present status of malnutrition and its socioeconomic and cultural determinants. It is intended as a comprehensive study based on different sources of information that will be valuable for AID consultants and other interested scientists.

The report summarizes the results of a series of surveys and studies on the nutritional status of selected samples of the population starting in the early thirties. It refers with some detail to the etiology, consequences, and associated factors inducing malnutrition and different types of nutritional deficiencies. It also provides brief descriptions of food habits, customs, beliefs, and types of food consumed. It further refers to malnutrition as an outcome of the interactions of poverty, disease and fertility. The ongoing supplementary feeding programs sponsored by the Government and different international organizations are described with particular emphasis on Thripasha and School Feeding as well as on the role of USAID in providing aid to Sri Lanka.

Food and Nutrition Policy Planning Division, Ministry of Plan Implementation (1981): Evaluation Report Of The Food Stamp Scheme.

This is an important document dealing with one of the most significant efforts of the Government of Sri Lanka to improve the nutritional status of the very poor segments of the population, those with an income below 300 Rs. per month. At present, 7% of the Government's total expenditure is committed to the Food Stamp Scheme.

The analysis shows the strengths and weaknesses of the program which, on balance, tend to support the retention of the present form of the food subsidy, although modified in accordance with a series of recommendations. Some of the problems relate to the criteria of eligibility. Thus, while 10-12% of prospective beneficiaries are omitted, as much as one third of those included in the scheme would not be eligible if their incomes are properly declared. As a result, the selection procedures at the district level must be improved and the problems of administration and management reduced.

Robert R. Nathan Associates, Inc. (1978): An Evaluation Report Of The P.L. 480 Title II Program In Sri Lanka.  
Robert R. Nathan Associates, Washington, D.C.

In 1978, Nathan Associates conducted a review of P.L. 480 Title II in Sri Lanka. In brief, the report points up the weaknesses in the MCH delivery system but praises the introduction of the new food Thripasha. Its recommendations to strengthen the MCH concept include use of community workers and the development of an ongoing monitoring and evaluation system. The report praised the school

infrastructure for its ability to handle food distribution but was negative with regard to the quality of the biscuit.

Ministry Of Health-Sri Lanka (1980): Annual Health Bulletin

This document is a summary of a variety of health statistics and relevant, general, background statistics for Sri Lanka. It includes cost data, staffing data, data on the various specific health programs, data on utilization of health care facilities and gives an indication of plans for health care for the next twenty years.

Ministry of Health, Government of Sri Lanka (with CARE/Sri Lanka and the Center For Disease Control, Public Health Service, United States Department of Health, Education and Welfare) (1976): Sri Lanka Nutrition Status Survey 1976. Office of Nutrition, USAID, Washington D.C.

In 1976, a survey was done to a) provide a statistically valid assessment of the nutritional status of the preschool population, b) provide a reliable reference base for planning interventions and monitoring their impact, and c) develop the capability of Sri Lanka personnel to conduct a survey. This survey serves as the principle source of data for describing malnutrition in Sri Lanka.

Food and Nutrition Policy Planning Division, Ministry Of Plan Implementation (1981): Nutritional Status Its Determinants and Intervention Programmes. Interim Report Submitted To The Government.

Based on an analysis of nutrition and socioeconomic status surveys in eight districts and a review of other studies regarding nutrition, this document presents policy recommendations for the short term needed to prevent further aggravation of the malnutrition problem in Sri Lanka. Among its major recommendations are : 1) strengthening of the Food Stamp Scheme by improving beneficiary coverage and adjusting the value of food stamps in accordance with changes in rice prices; 2) continuation of the Thripasha Program and School Biscuit Program pending more detailed analysis; 3) integration of the Thripasha and School Biscuit Programs into the Food Stamp Scheme; 4) Discouraging importation of milk products while encouraging domestic production; 5) discouraging alternatives to breast feeding; 6) seeking self-sufficiency in soya production while experimenting with soya fortification; and 7) stressing the preventive aspects of all major development schemes, etc.

## APPENDIX D

### DESCRIPTION OF WORKING DOCUMENTS

There were three working documents utilized during the course of this study. Because of their bulk and state of completeness, it was decided to describe their contents herein but to avoid treating them as formal appendices. Copies are available at USAID/Sri Lanka; Asia Bureau, AID/Washington; and at Community Systems Foundation, Ann Arbor, Michigan. In addition, all of the data utilized in this report has been placed in the CSF Data Base Management Information System and is available for future analysis if needed. (A tape with all the data processed in Ann Arbor was presented to the Ministry of Plan Implementation while the evaluation team was in Sri Lanka.)

Working Document 1 "Title II PL 480 Evaluation-Phase I: Assessment of Data Quality and Availability," Community Systems Foundation, July 13, 1981.

This document reviews the quality and availability of data in Sri Lanka for performing the evaluation and lays out the approach to be used during Phase II. Various forms used in the field data collection process are included.

Working Document 2 "Sri Lanka Title II PL 480 Evaluation Phase II Data Analysis Report No. 1," Community Systems Foundation, December 22, 1981.

This report consists of four sections. Section 1 presents seven charts showing the relationship between malnourishment and age of child under different circumstances. Both the NCHS-CDC standard and Philippines standard are used.

Section II and III presents 43 pages of histograms, tables and regression analyses. Section IV provides a detailed dictionary documenting the various data sets stored in the CSF Data Base Management Information System.

Working Document 3 "Commercial Thripasha Production Expansion and Alternatives," February, 1982.

This document includes various analyses which were utilized during the course of Phase II. Comparisons with an indigenous formulation are made.