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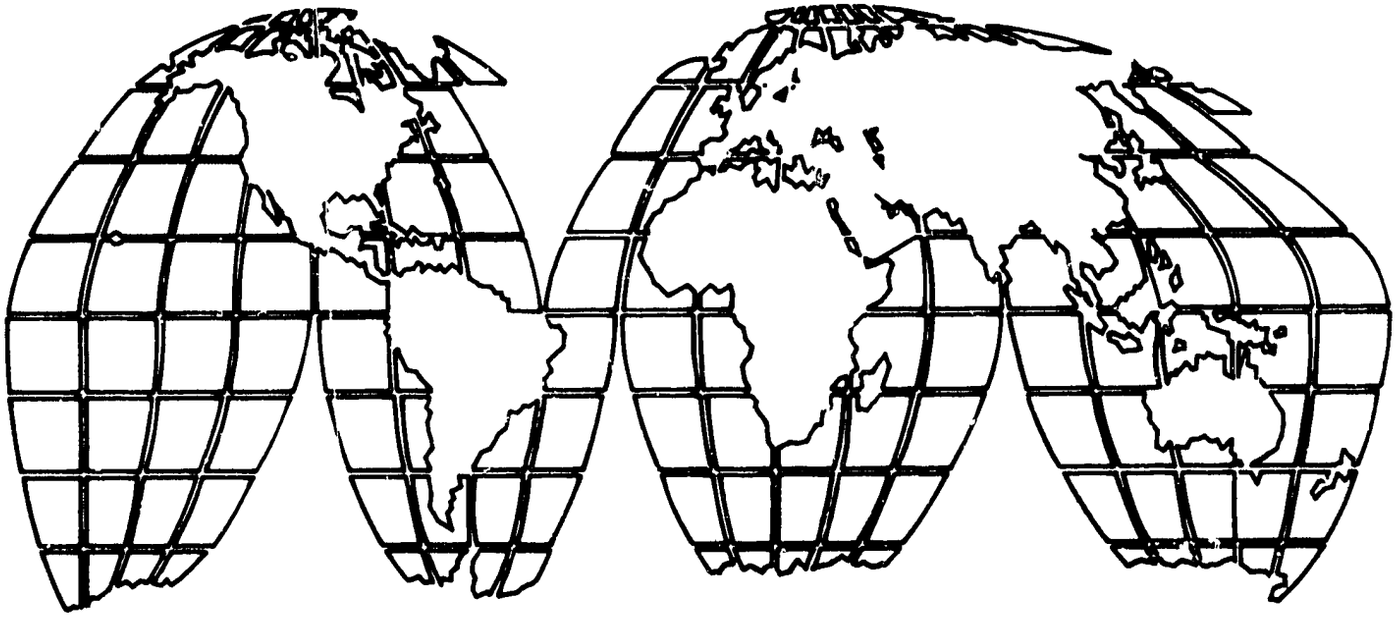
A.I.D. Program Evaluation Discussion Paper No. 10

# A Review of Issues in Nutrition Program Evaluation



July 1981

U.S. Agency for International Development (AID)

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(continued inside back cover)

# A REVIEW OF ISSUES IN NUTRITION PROGRAM EVALUATION

by

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A.I.D. Program Evaluation

Discussion Paper No. 10

Office of Nutrition
Bureau for Development Support

and

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Bureau for Program and Policy Coordination
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## INTRODUCTORY NOTE

This report is issued under A.I.D.'s Evaluation Publications Program as part of A.I.D.'s effort to summarize and disseminate the results of evaluation work pertinent to the Agency's ongoing programs, to describe the kinds of questions asked during evaluation, and to indicate the methods employed to seek answers to these questions.

The work leading to the preparation of this report was initiated and sponsored by the Office of Nutrition (Bureau for Development Support)to meet a need expressed by nutrition specialists for a ready reference which would summarize and critique evaluation studies available through mid-1979. This work was of particular interest to the Office of Evaluation (Bureau for Program and Policy Coordination) because it represented the first such study prepared for the Agency, and because its utility could, with some modifications, be further extended to A.I.D. program staff and counterparts having responsibilities related to the development and evaluation of nutrition programs and projects.

It is hoped that the report will be useful not only by virtue of its substantive content, but also as a basis for further development of pertinent issues and questions for evaluation, and suggestions as to appropriate methodologies and feasible data-collection requirements. Both the Office of Nutrition and the Office of Evaluation welcome comments from the users of this report.

## ACKNOWLEDGEMENTS

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## EXECUTIVE SUMMARY

This review explores the experiences and methodologies employed in evaluating nutrition programs in developing countries. In an effort to systematize the literature and define the scope of this review, nutrition programs are explained using a Nutrient Flow Model which depicts the nutrients available for individual consumption as a function of a number of processes. These include food production, transportation, storage, processing, marketing, intra-familial distribution and biological utilization. Specifically, five types of programs are identified as the interrogative focus of this report: nutrition education programs, supplementary feeding programs, fortification programs, multisectoral programs and planning programs.

While reviewing the literature and contacting various multilateral, bilateral and private voluntary organizations concerning their experiences in the evaluation of nutrition programs, it became acutely obvious that little consensus exists on definitions and terms which describe an array of concepts and activities in the domain of nutrition evaluation. Thus, this report begins by proposing definitions of terms such as evaluation (i.e., process, impact, formative and summative evaluation), assessment, outcomes, objective, monitoring and research.

A Logical Framework (logframe) used by the Agency for International Development for planning, implementing and evaluating non-capital projects is also reviewed and related to the functional types of nutrition programs. Specifically, there are four basic levels of the logframe: inputs, which include items such as capital equipment, personnel and commodities; outputs, which are the expected results of reasonable management of inputs; purpose, which for all nutritional projects is defined as improved nutritional status; and goals, which are a higher objective beyond project purpose, e.g., economic development, or improved community welfare. Each of the types of projects identified in the review is then discussed in relation to the logframe.

It is stressed that the logframe illustrates how the concepts of planning,

implementation and evaluation are interactive. For example, the desired outcomes of a project must be stated explicitly during the planning process in order to facilitate implementation and evaluation. This seemingly simple and straightforward task of formulating desired outcomes in precise and unambiguous terms is frequently overlooked in the literature reviewed. Purposes and goals of nutrition projects are often inferred or perceived, reflecting individual viewpoints or organization perspectives.

A distinction is then made between process and impact evaluation. Process evaluation examines the various components of the causal progression of events depicted in the logframe. The level of input and resource utilization is measured, as is the level of activities or outputs in order to ascertain whether achievement of purpose (i.e., improved nutritional status) can be reasonably be attributed to the program.

Two ways of conceptualizing the range of considerations germane to process evaluation are presented. In the first case, it is possible to differentiate between a process evaluation which examines the delivery of services at the project level as contrasted with examining the context in which these services are delivered. Another way of viewing process evaluation is in terms of three distinct domains of interest for which information is collected: pre-existing indicators; project components, and intervening events.

Regardless of how one chooses to divide up the components of process evaluation, it is fundamental that it be viewed as an ongoing data collection activity, which must be integrated into a comprehensive project monitoring and management information system.

Impact evaluation unlike process evaluation is conceptually simple: a determination of whether or to what extent the stated nutritional purposes of the project are realized. While this task is intuitively straightforward, it proves to be an operational boondoggle. Determination of the achievement of nutritional purposes has proven precarious, and the literature records multitudinous failures. Successful analysis of impact is not only rare,

but methodologically suspect in most instances.

In addition to reviewing the range of impact evaluation designs employed in the literature, we attempted to answer the question, why is there a dearth of "successful" and "verifiable" impact evaluations. One explanation concerns the difficulty in measuring nutritional status, especially in the field setting.

While the selection of nutritional status measures is not the primary focus of this document, a discussion of a way of approaching the task of selecting measures is included. Specifically, criteria for selection should include the measure's objectivity, coverage, directness, completeness and precision. These characteristics are defined and illustrated in the text.

While the difficulties in choosing nutritional status measures impede the determination of impact, they are benign in comparison to two other problems of impact evaluation. The first involves the numerous threats to internal and external evaluation validity. Internal threats (e.g., history, maturation and instrumentation effects) make it difficult to separate "background noise" from the program's impact on nutritional status. External threats (e.g., Hawthorne and multiple intervention-interference effects) make it difficult to generalize findings of an evaluation to other environments. The second major difficulty in evaluating the impact of nutrition programs concerns the subjective nature of the analysis of data; that is, the ability of the analyst to substantiate a range of outcomes from the same data. Specifically, the selection of anthropometric standards (e.g., Harvard standard) to measure nutritional status, and designation of cut-off points (e.g., Gomez classification of Grade I, II and III malnutrition) have a major impact on evaluation results. Likewise, the choice of statistical tests of significance and the relevance of these decisions to policy making is discussed.

Despite the differences in process and impact evaluation, it is suggested that both types of evaluations be employed when possible. It is also pointed out how a number of evaluation issues, such as determining the

appropriateness of an intervention or its cost-effectiveness go beyond the process/impact distinction.

This report also addresses the distinction between research, evaluative research and operational program evaluation. Research is concerned with expanding the boundaries of knowledge. Evaluative research is a special type of applied research which aims at testing the application of existing knowledge, with the findings being used in the context of policy formulation and decision making. Operational program evaluation is characterized by the assumptions that prior to implementation: (1) the scientific principles and hypotheses of the project have been sustained; and (2) the transferrability of this knowledge to the field setting has been explored previously. Thus, it is valid to assume that if services are delivered as planned, the expected outcomes will result.

These differences must be considered in light of the discussion of the purposes of evaluation, also found in the text. For example, whether the sponsors of the evaluation are trying to gain support for expanding or contracting a program, to gain insight into the replicability of the intervention, or to utilize the data in a formative evaluation to improve the project will not only dictate the evaluation methodologies employed, but also who performs the evaluation (e.g., outside objective experts or project personnel).

As initially requested in our contrast, some 70 abstracts of relevant evaluation reports and publications also appear in this document. Emphasis is placed on outlining and describing the evaluation methodologies employed, rather than reporting on the nature or outcomes of the programs.

Finally, the last section of this review presents a brief description of the institutional approaches, past experiences and future plans of various multilateral and bilateral agencies, and private voluntary organizations involved in evaluating nutritional programs. This information is based on conversations with, and available documentation from, these groups.

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# I. INTRODUCTION

In 1979, the Office of Nutrition of the Agency for International Development requested that we review the literature and report on the experiences and methodologies used in evaluating nutrition programs in less developed countries. This document expands and recasts themes developed in the original report, and was prepared under the auspices of the Office of Evaluation as a discussion paper on evaluation issues.

The purpose of this document is to facilitate the activities of individuals and organizations involved in formulating evaluation strategies. Nutrition programs are defined as those which can be hypothesized or demonstrated to modify the nutritional well-being of a designated target group. The impact of these programs must, by definition, be measured in terms of improved nutritional status.

In carrying out this assignment, there were stages and levels of activities that are in and of themselves revealing about the state of the art in nutrition evaluation. Initially, we collected accessible, catalogued literature on nutrrition evaluation available in libraries and from retrievable data bases. A sizable amount of material was uncovered. A large portion, concerned with nutrition programs in the United States, was excluded from this review. In addition, many documents labelled "evaluation," which were in fact reports of research activities or assessments of a population's nutritional status, were also excluded.

Next, we communicated with representatives of numerous international agencies and institutions involved in nutrition programs. The purpose of this stage of activity was threefold: (1) to interview and discuss with appropriate personnel the evaluation methodologies and experiences of their organization; (2) to collect and review the documentation of these groups, so as to clarify and illustrate the nature and content of our conversation; and (3) to discuss plans for the future evaluation of nutrition programs.

With the bulk of documentation collected, we began the task of abstracting the documents, as specified in our statement of work. Based on a review of the general literature on nutrition evaluation and conversations with individuals in AID/Washington, an approach to document abstracting was formulated. Emphasis in the abstracts was to be placed on the evaluation methodologies employed, not on the nature or outcome of the programs. Seventy documents are abstracted, and have been organized by functional program type.

Upon completion of the abstracting process, a number of things became apparent. A range of methodologies and experiences have been reported. Although they are adequately outlined in the documents, little substantive guidance for the design of future endeavors in included. While the documents do elucidate what has been done in the past, little information is provided on the success or failure of the methodologies themselves. Rather, the success or failure of the projects examined received most attention. In other words, if a project was evaluated using a specific model, little discussion or documentation exists about the utility and repeatability of the model itself.

With this in mind, we decided to address several issues related to evaluation of nutrition projects. For this, we relied heavily upon the large body of evaluation literature, i.e., that not focused specifically on the evaluation of nutrition programs, our own personal experiences and those of our colleagues at Community Systems Foundation (CSF).

As a consequence, the paper is organized in the following fashion. In the second chapter, terminology and concepts used in the field of nutrition evaluation, and required for an understanding of the remainder of this report are defined. Chapter III follows with a more detailed discussion of evaluation. Multitudinous reasons are suggested for nutrition evaluation, the interactive tasks of planning and evaluation are stressed, and the distinction between process and impact evaluation is noted. Chapter IV directly addresses methodological issues related to evaluating the impact of nutrition programs. Obstacles to impact evaluation and a brief discussion of evaluation

designs employed in the literature are included.

The selection, use and interpretation of nutritional measures, a topic which alone would form the basis for a literature review is the focus of Chapter V. In Chapter VI the distinction between research, evaluative research and operational programs is examined.

Chapter VII presents abstracts of the program evaluations reviewed. The final chapter contains the findings of communications with other agencies and organizations contacted in 1979, during the preliminary stages of work on this report.

## II. TERMINOLOGY AND CONCEPTS

This review beings with a lexicon of terms and concepts used repeatedly in evaluation literature and found frequently in this report. With the aid of this shared vocabulary, nutrition programs are first defined and then both examined and categorized in light of two theoretical constructs, the Nutrient Flow Model and the Logical Framework.

### A. Definitions

In reviewing the literature on nutrition evaluation, one of the most disconcerting findings was the inconsistency with which many basic terms were used. Apparently words such as project, program, activity, objectives, monitoring and assessment, have different meanings and connotations for different authors. This lack of shared vocabulary has unfortunate consequences: poor communication among researchers and practitioners of evaluation. Agreement on definitions of basic evaluation terminology is vital to communicating and sharing evaluation experiences and methodologies.

Before using these terms ourselves, we offer a set of simple definitions. Each term will be further defined, clarified and qualified throughout the text. In the first six chapters of this review, we have attempted to be consistent in the use and application of the terms cited below.

1. Activity - a function, operation or task performed by project personnel.

2. Project - a site-related set of activities undertaken with a specified objective in mind.

3. Objective - "something which one's efforts are intended to attain or accomplish."[1] Objectives can be conceptualized in both a vertical and lateral fashion. In other words, a hierarchy of objectives

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[1] Random House College Dictionary, 1975.

exists for programs which differentiate between vertical objectives. In addition, the specific objectives at any given level of this hierarchy are determined by the perceptions or orientation of individuals and organizations associated with the program.

4. Program - a conceptual plan from which arises one or more projects. The genus of nutrition programs includes such varied species as feeding, fortification, nutrition education, multisectoral and planning programs. Programs which include one or more nutrition projects are illustrated by a countrywide supplementary feeding program which may include one project feeding site or numerous project sites, e.g., the hundreds of feeding projects in a P.L. 480 Title II feeding program.

5. Outcome - a result or consequence.

6. Logical Framework (logframe) - a theoretical construct used by AID to plan, monitor and evaluate programs. It depicts a causal progression of events.

7. Purpose - a program specific objective used in the context of the logframe to express the primary reason for undertaking the program.

8. Assessment - an activity which takes place at one or more points in time using data collection and measuring techniques. Assessment generally uses an agreed upon standard as a baseline against which data or measures may be compared. Assessment is a static activity in the sense that it makes a statement about the status of an individual or project without reference to a previous or future measurement on that same individual or project. Additionally, it does not relate or seek to tie the observation to project activities since it is only an appraisal of the present situation.

9. Monitoring - an ongoing data collection and analysis effort

designed to describe and quantify project activities, services, and/or the nutritional status of the target population, and those exogenous events which affect nutritional status.

10. Research - an effort which is undertaken to formulate and test hypotheses and underlying scientific principles, with the goal of gaining further insight into the physiological, environmental and social phenomena which constrain or facilitate improved nutritional status. The research exercise tests hypotheses, which if confirmed may then be considered generalizable principles. The principles may then find use in the theoretical formulation of specific development programs.

11. Evaluation - a concept, not a disciple which occurs within the context of program planning and intervention. Evaluation involves numerous activities, most of which require the measurement and comparison[2] of program activities and outcomes to previous measurements of the same phenomenon or to some specified standard in order to analyze and provide information for decision alternatives and, hence, a course of action.

In the literature, four adjectives are commonly associated with evaluation: impact, process, summative and formative. While many authors equate summative with impact and process with formative, linking these terms in this fashion is misleading: impact and process, and summative and formative, are in reality two different species of evaluation. Process and impact focus on one or the other end of the input/output stream, while formative and summative focus on the purpose of the evaluation. These distinctions are amplified below.*

- Impact evaluation - a type of evaluation which measures the extent to which desired purposes have been achieved. For impact evaluation of nutrition programs, nutritional status of the target population is

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[2] Personal communication with O. Lynn Deniston, University of Michigan School of Public Health.

* EDITOR'S NOTE: At the time of publication of this report as a discussion paper in the AID Evaluation Publications, these various distinctions were not accepted unreservedly in the Agency's evaluation policies and procedures, and the Agency's evaluation system was undergoing major review as a consequence of the recommendations of an intra-agency evaluation task force on evaluation.

the phenomena measured since improved nutritional status is by definition the purpose of any nutrition program.

- Process evaluation - a type of evaluation which measures any one or combination of the following: project operations; the extent to which a project activity has been implemented; characteristics of the environment in which a project operates; or, a variety of mediating variables which may affect the achievement of improved nutritional status among the target population.
- Summative evaluation - occurs either concurrently with or subsequent to project activities and involves collecting information on project activities or outcomes. The distinguishing characteristic of summative evaluation is that its objective is static in the sense that the findings are not immediately reinvested in the program with the intention of adjusting the nature of service delivery in an effort to enhance achievement of program purpose. Instead they provide a summary statement of project outcomes which can be used in a number of different contexts; among these are appeasing project funders deciding about program continuation or termination, drawing attention and praise to increase funding and staff, and gaining understanding of program progress, as well as adjusting future programs and projects.
- Formative evaluation - occurs concurrently with program activities and involves collecting process or impact data in order to adjust and alter the delivery of services. This tinkering with program activities and resources has as its objective the increased achievement of program purpose.[3]

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[3] Perhaps the best way to conceptualize the distinction and linkages between the concepts of process-impact and formative-summative is by examining the analysis of the two models of evaluation as presented by Schulbert and Baker (see pp. 74-79, *Program Evaluation Models* in *Readings in Evaluative Research*, ed. Frances C. Caro (New York: Russell Sage Foundation, 1971)). The "Goal-Attainment Model" is concerned with the degree of success or failure of a project, as determined through collection and analysis of impact data alone. Schulbert et al. argue that use of this model constrains

B. Logical Framework

At present, AID/Washington relies on a theoretical construct--the Logical Framework (logframe)--for designing, implementing and evaluating all of its projects.[4] Since this Logical Framework is deeply embedded in the bureaucracy, and our review indicates that it is a valuable conceptual tool, the evaluation of nutrition projects is discussed in the context of this structure.

The Logical Framework depicts a causal progression of events and operates at four basic levels: INPUTS, OUTPUTS, PURPOSE and GOALS (see Figure 1).

Briefly, they may be defined as follows:[5]

INPUT - the resources such as capital equipment, personnel, land, commodities or other items required for the performance of activities, processes, or outputs. These may include resources expended on pre-project activities such as problem diagnosis.

OUTPUT - the expected results of reasonable management of inputs. Outputs are pre-conditions to the achievement of purpose.

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evaluators from applying their findings to the project context itself (formative evaluation). While this application is not precluded, it is extremely difficult to "close the circle" back to the point of implementation. This emphasis on impact data increases the likelihood of the evaluation being viewed and used in a context of summative exercise.

The "Systems Model" has as its point of departure facilitating the achievement of project purposes, not the measurement of this achievement. Feedback on such areas as project activities, organization and resources and, subsequent utilization of this information in the context of the implementation process are the major goals of the Systems Model approach. This approach concentrates on the collection of process data on project operations with the intent of applying this data in a formative fashion to improve the chances of goal achievement. Although collecting impact data may be helpful in formative evaluation, it is not the overriding consideration.

[4] U.S. Agency for International Development, *Evaluation Handbook*, 2d ed., (Washington, D.C., 1976).

[5] Herbert D. Turner, *Program Evaluation in AID: Lessons Learned*, (Washington, D.C.: U.S. Agency for International Development, 1976), pp. 7-8.

CAUSAL PROGRESSION OF PROGRAM EVENTS

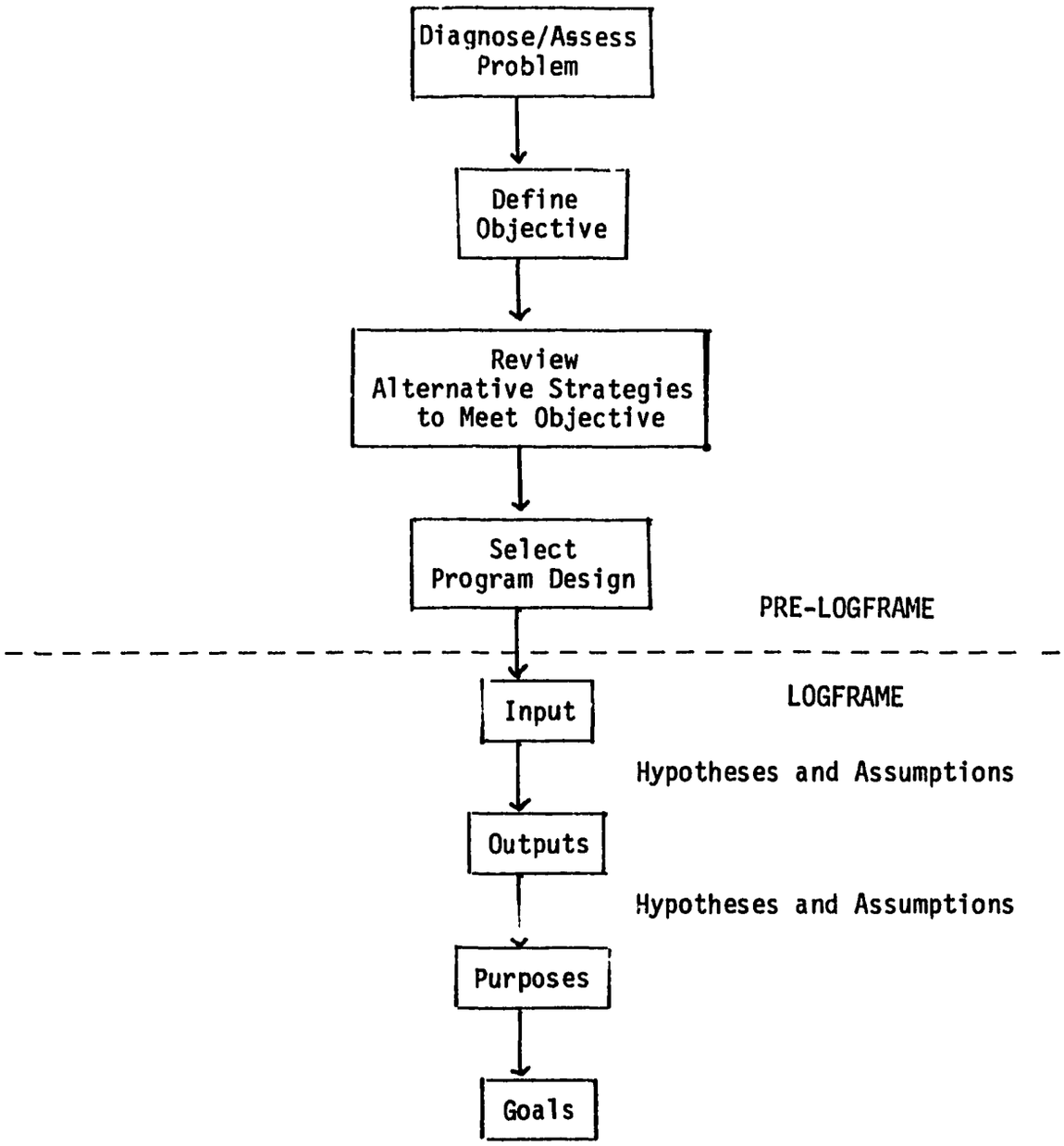


Figure 1

PURPOSE - the expected achievement of, or primary reasons for, the project. The purpose of all nutrition projects is the improved nutritional status of a target population.

GOAL - a higher objective beyond project purpose, to which the program is designed to contribute, often discussed in terms of a sector goal, e.g., economic development, improved community welfare.

In the logframe, a series of hypotheses link input to output, output to purpose, and purpose to goal. That is, there are certain fundamental, generalizable concepts that make reasonable the progression of the logframe from input to goal.

In addition to the hypotheses which link the conceptual hierarchy, there is a series of external influences or factors which affect the logframe progression. These are called assumptions: those external conditions or situations over which project personnel have little control but which must exist in order to assure a project's success (see Figure 1).

It is important to realize that the logframe represents only a few stages in the development of an actual program. A number of pre-logframe stages, such as problem diagnosis, needs assessment and review of alternative intervention strategies precede the selection of the logframe (see Figure 1).

## C. Defining Nutrition Programs

Several ways of classifying nutrition programs are found in the literature. The Nutrient Flow Model provides a way of linking these seemingly disparate elements.

### 1. Nutrient Flow Model

By definition, nutrition programs are a set of activities or initiatives undertaken with a specific purpose--to improve the nutritional status of a target population. Nutritional status can be envisioned as the end point of a system which begins with plant and animal husbandry and the production of food. [illegible] amount of food produced, coupled with a series of processes [illegible] take place in the community and within the family, will eventually [illegible]fect the

nature and amount of food which is consumed by individuals, and hence, the availability of nutrients to an individual.

Conceptually, this is best illustrated with the Nutrient Flow Model[6,7] (see Figure 2) which depicts the nutrients available for individual consumption as a function of a number of "processes"--food production, post-harvest losses, food imports and exports, efficiency of transport, storage and industrial processing, and interfamily distribution (a function of the market place and effective demand for goods). Families who grow or raise their own food may sidestep steps such as transportation and distribution. Once a given quantity of food is available to a family, storage facilities and preparation techniques, coupled with customs which dictate intra-family food distribution practices (e.g., the head of household eats first, followed by the eldest male child, etc.) will ultimately determine the amount of nutrients consumed by the individual. Finally, the health status of an individual will affect how well the nutrients consumed are assimilated and absorbed. If parasitic infestation is widespread, for example, or any of a number of diseases infect the host, biological utilization of ingested nutrients will be lower.

From this model emerges a way in which to conceptualize the intervention process and the nature of the various programs which have been implemented. Specifically, programs which are designed to intervene at one or more of the processes along the flow of nutrients from production to biological utilization, with the purpose of improving nutritional status, are the focus of this document. The point at which the program mediates the flow of nutrients defines

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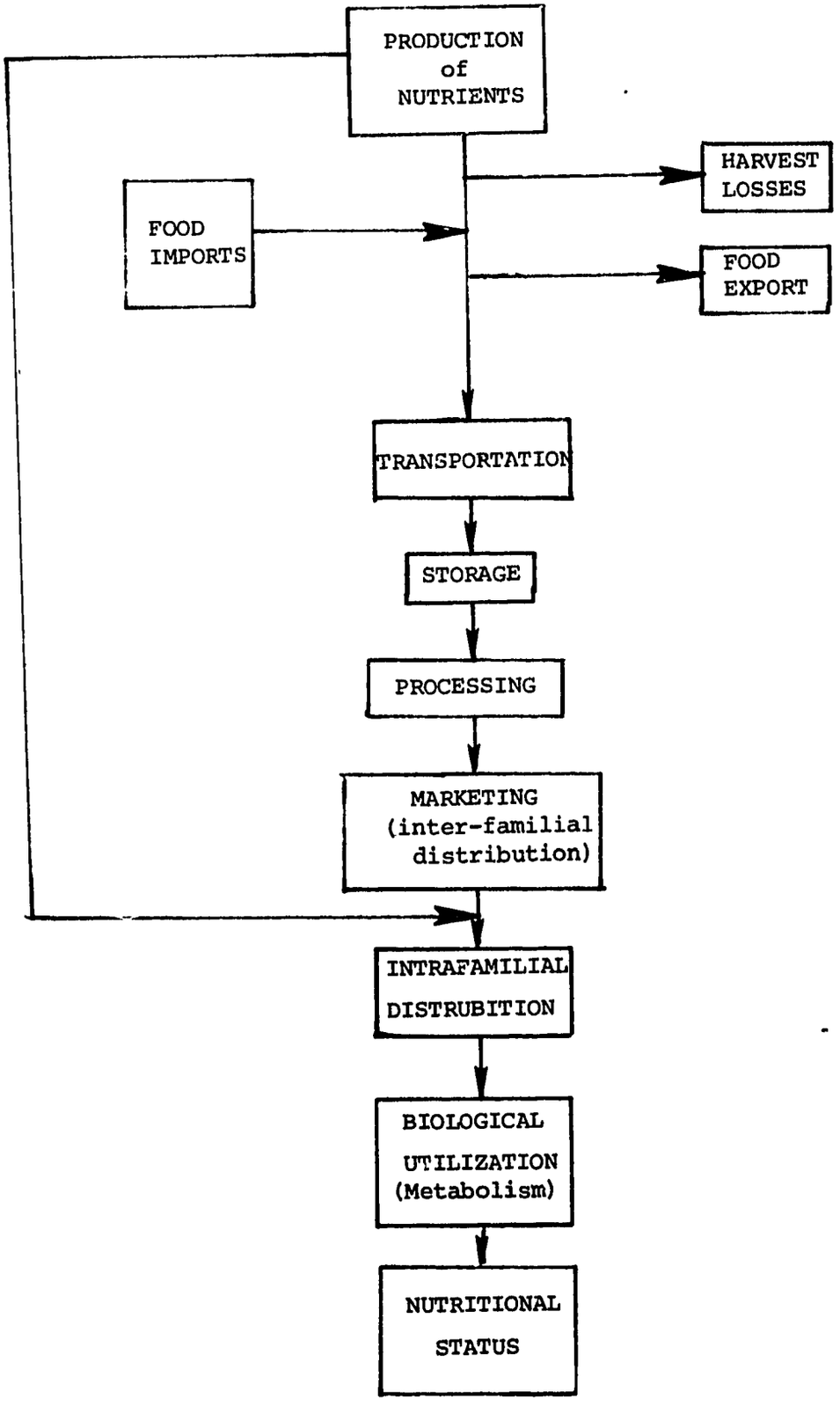
[6] Dean Wilson, Luis E. Lema, *A Systems Approach to the Nutrition Problem in Colombia* (Cali, Colombia: Universidad del Valle, 1971).

[7] Alberto Pradilla, *Development of an Analytical Model for Food and Nutrition Surveillance: Final Report,* Paper presented at the XI International Congress of Nutrition, Rio de Janeiro, Brazil, August 27 - September 1, 1978.

Figure 2

NUTRIENT FLOW MODEL



the type of intervention being examined. Likewise, the site of program intervention recommends practical process evaluation measures and gives an indication of the distance between intervention and outcome. The greater the distance between intervention and outcome, the more difficult it is to attribute a change in nutrition status to project activities.

To attribute a change in nutritional status to project activities it is necessary to monitor the flow of nutrients through the system in order to calculate gains and losses. As project intervention nears the end of the nutrient flow, there are fewer sites for gains and losses of nutrients, fewer sites required for monitoring and consequently greater likelihood of relating change in nutritional status to project activities.

2. Program Types

Characteristic activities associated with nutrition interventions suggest unambiguous types of programs. Two general classification schemes found in the literature support this idea.

In a major study aimed at developing a single document to provide an overview of and guidance for nutrition programming, Austin et al.[8] focus on seven categories, arguing that they "encompass most of the main types of nutrition interventions practiced today" (p. 4).

These are:

1. Supplemental Feeding - which involves take-home and on-site feeding, as well as feeding at nutritional rehabilitation centers.

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[8] James E. Austin et al., *Nutrition Intervention Assessment and Guidelines* (Cambridge, Massachusetts: Harvard Institute for International Development, 1978).

2. Nutrition Education - which encourages better use of existing food resources through formal and non-formal education techniques and mass media. This often accompanies supplemental feeding.

3. Formulated Foods - which involves improving the nutrition quality of foods through new mixtures or forms.

4. Fortification - which aims at alleviating a specific deficiency (usually vitamin A or iodine), through its addition to a food vehicle like sugar, cereal grains or MSG.

5. Consumer Price Subsidies - which involve government efforts to increase consumers' food purchasing power.

6. Agricultural Productivity - whose nutritional impact is often indirect through price and income effects, rather than as an actual transfer of food.

7. Integrated Programs - involve a mix of program types. While this mix usually includes supplementary feeding and another program type such as nutrition education, in this class are also found direct nutrition programs coupled with other related efforts like water sanitation and family planning.

The Office of Nutrition/AID classify their nutrition intervention projects as follows:[9]

1. Planning - "whose purpose is to build planning and operational infrastructures and as such must be distinguished from all other nutrition projects where purpose or goal is improved nutritional status" (p. 6).

2. Multisectoral - which include a number of diverse components

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[9] U.S. Agency for International Development, *Nutrition Evaluation Project*, DSB/N (Washington, D.C., February 1978), p. 6.

"in a variety of permutations" (p. 6).

3. Food - which involves marketing, processing or production schemes, including fortification and home gardening. Agricultural production projects with a nutritional goal are included.

4. Feeding - supplementary feeding programs (excluding P.L. 480).

5. Education - which involves the use of formal and informal media to promote improved nutritional status.

We offer our own classification scheme for this review by designating five types of nutrition programs:

1. Nutrition Education programs sponsor projects which assume many forms, from pamphlet distribution to radio broadcast; from face-to-face encounters to large, impersonal classroom presentations. As a result of these activities, a participant is expected to undergo behavioral change which results in improved nutritional status and a more salubrious lifestyle.

2. Supplementary Feeding programs sponsor projects which provide for the non-commercial distribution of food, usually to children, pregnant women and lactating women, with the intent of improving the nutritional status of the target population through the provision of additional nutrients. In some projects, complementary activities may be supplied to enhance the effectiveness of the feeding component.

3. Fortification programs seek to improve nutritional status through either one or a combination of the two following steps: development, harvest and/or manufacture of exceptional foodstuff; delivery of a food vehicle engineered to provide a single or multiple nutrient(s) to target populations.

4. Planning programs develop the administrative or operational

capabilities with respect to nutrition policy, planning or implementation--generally at the national level. It is hoped that greater organizational visibility, increased or better trained staff, greater influence in the decision-making process and the ability to command more resources will result in improved nutritional status through better program design and management.

5. Multisectoral programs comprise several programs at least one of which is directed towards a sector other than nutrition, e.g., family planning or water sanitation.

Two of Austin's categories, Subsidy programs and Agricultural programs, have been deleted since improved nutritional status is often not a major reason for their development, and there is a scarcity of evaluation literature on the nutritional implications of these projects. The Formulated Foods and Fortification program types have also been collapsed into a single category because, in general, increasing the nutrient content of a regularly consumed food or providing a concentrated source of a nutrient requires many of the same steps.

AID's category, Food, lacked adequate descriptive power and has been replaced by Fortification, a type of program which receives considerable attention in the literature. Although AID's Planning category has been retained, its definition in terms of the logframe has been transformed.

AID's Planning category designated "development of planning and operational infrastructures" as the project purpose. For this paper, improving nutritional status is considered to be the purpose for several reasons. Planning and operational infrastructures are an output, a result of reasonable management of inputs. For the sake of clarity, any program which is called a nutrition program should be expected to improve the nutritional status of a specific, identifiable target group. For the sake of consistency it follows that when one designs a logframe for nutrition programs, the purpose should always be the same, in general terms.

Finally, the real test of any nutrition program and the desired focus during evaluation are whether a program achieves its purpose, i.e., improved nutritional status.

D. Logical Framework and Program Types

As an illustration of how programs are conceptualized in the logframe, an example is presented for a food fortification project. Inputs are the personnel and equipment required for the production, processing and distribution of fortified food. Outputs are the activities which constitute the fortification project, i.e., the production, processing and distribution methods which are tangible evidence of project operation. Project purpose is improved nutritional status in the target population whose poor nutritional status originally suggested the need for a fortification project. Sector or program goals would be improved work capacity or economic development.

For a food fortification project the hypotheses linking inputs through goals are well understood. If personnel and equipment are available, fortified food and a distribution center can be produced; if an organizational unit can be created and fortified food distributed to people, the nutritional status of a population deficient in a single or multiple nutrients can be improved; and if a population has an improved nutritional status, increased work capacity, a healthier population, increased productivity or learning will result.

Linking input to output is the assumption that trained personnel will stay healthy throughout the course of the project. Underlying the output to purpose portion of the logframe is the assumption that recipients will consume the food offered by program personnel.

A wide range and large number of hypotheses and assumptions constitute links between stations of the logical progression. Their identification and comprehension are fundamental to successful nutrition program planning and evaluation. An illustration of the logframe for each program type is found in Figure 3.

ILLUSTRATION OF LOGFRAME BY PROGRAM TYPE

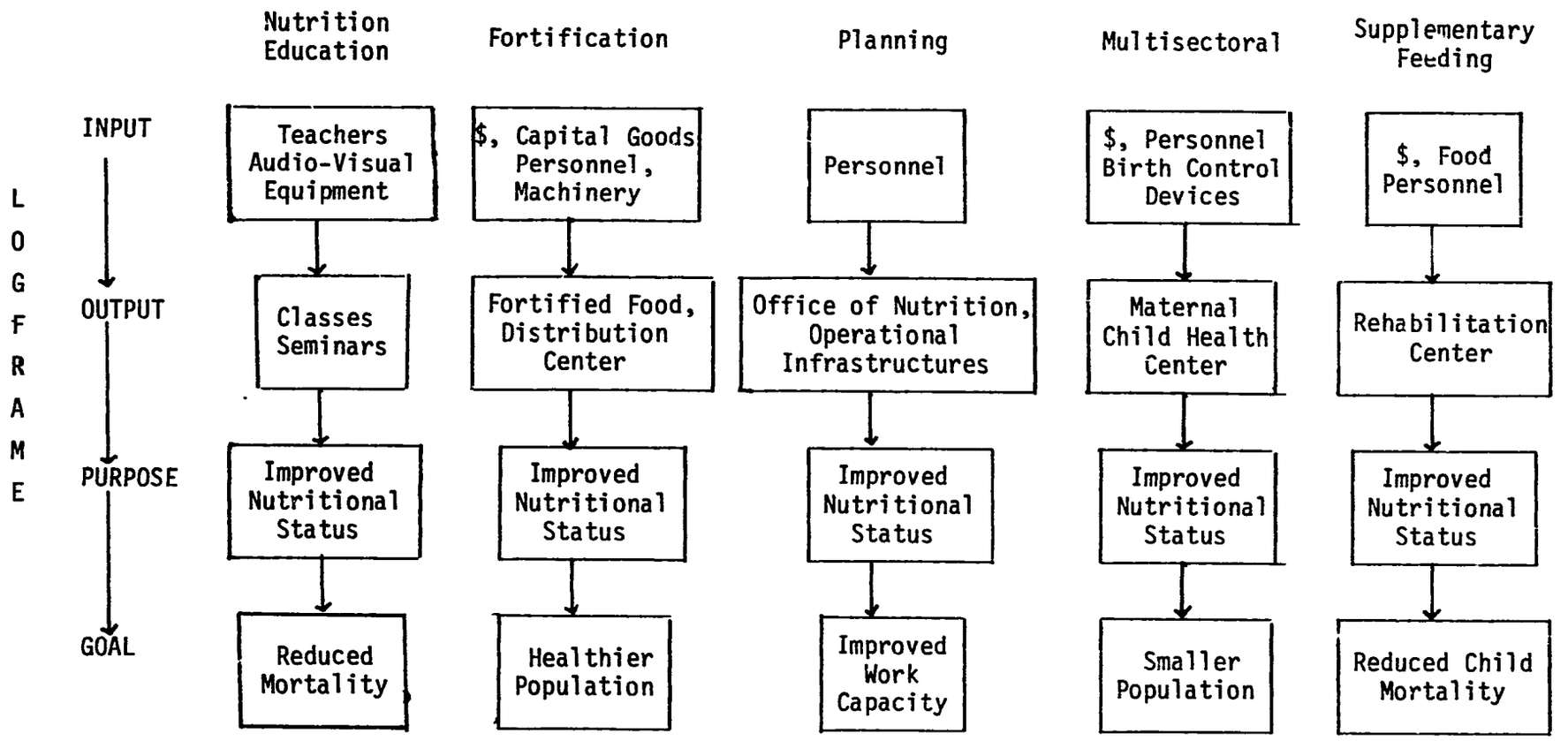


Figure 3

In a document prepared by Checchi & Co.,[10] a number of issues related to the logframe are discussed for non-AID personnel who are unfamiliar with its use. It is remarked that initially the logframe is a netural instrument--"a clean slate." As it is filled in, it loses its neutrality and begins to reflect the priorities and orientation of the designers and is used to assure the formulation of commonly identified inputs and outcomes. The logframe, once formulated, must reflect the viewpoint of individuals, or organizational perspectives, of those involved in program design. Since proper procedure demands that officials scrutinize all aspects of program design, the logframe presents a framework for them to perform this task collectively. Where several contrasting individual or organizational perspectives must be considered, the discussion about the logframe provides a means for understanding or reconciling differences.

E. Final Note

Programs aimed at increasing agricultural productivity through a variety of inputs such as water, fertilizer and new seed varieties, or efforts designed to effect post-harvest food losses, diversion of foodstuffs to animals, land tenure, inequities in income distribution, transportation and infrastructure development, import-export policies, environmental sanitation, and so on, directly impact upon the flow of nutrients through the system. Therefore, they can have a significant influence on the nutritional status of individuals.

However, in the vast majority of these programs improved nutrition is not explicitly stated as a purpose. Efforts such as these are concerned with an expansive range of variables and are responding to an array of different priorities and concerns, some congruent and others incongruent with reducing malnutrition. This report is focused on programs which are explicitly designed to improve nutritional status. Therefore the programs dealing with the various aspects of socio-economic development concerns are by definition excluded from this review, although we recognize their contribution to improved nutritional status of individuals.

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[10] H. A. Lerner, R. P. Manly, T. H. Eighmy, *Evaluation Methods for Child Feeding Projects in Developing Countries, Final Report* (Washington, D.C.: Checchi and Company, 1977), pp. 2/7-2/11.

## III. NUTRITION PROGRAM EVALUATION

### A. Why Evaluate?

According to Anderson and Ball[1] some evaluations are undertaken to: (1) determine whether the program is addressing an existing and felt need; (2) test the technical accuracy of the activities and examine the adequacy of the resources committed; and (3) to aid in decisions about program futures--whether they should be continued, expanded or certified. Other evaluations are intended to: (1) formulate decisions about program modification; (2) search for evidence that will either rally support for or against the program; and (3) aid in understanding underlying social, psychological and other similar processes.

Evaluation of health programs, as described by Knutson,[2] is performed for a number of explicit or implicit reasons which fall into two categories: those which are organization-oriented and others which are individual-oriented. For the organization, underlying reasons for evaluation may include: (1) demonstration of program worth; (2) determination that a program is heading in the desired direction and that it is accomplishing what had been intended; (3) justification of expenditures; (4) determination of monetary costs and human effort; (5) obtaining evidence of program effectiveness, often to gain support for expansion; (6) comparison of effects of different program types, methods and approaches; and (7) satisfaction of someone demanding evidence of effect. For the individual, reasons for wanting evaluation may include: (1) drawing attention and praise to increase budgets and staff; (2) improving status among peers and superiors; (3) making the job more interesting; and (4) getting a better understanding of program progress.

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[1] Scarvia B. Anderson, Samuel Ball, *The Profession and Practice of Program Evaluation* (San Francisco: Jossey-Bass, 1978), pp. 3-4.

[2] Andie L. Knutson, *Evaluation for What?* in *Program Evaluation in the Health Fields*, eds. Herbert C. Schulberg et al. (New York: Behavioral Publications, 1969), pp. 42-50.

Austin[3] answers the question "why evaluate?" by examining the potential users of nutrition evaluation. Specifically, he suggests that:

1. National Planners - maintain a primary interest in the benefits accrued by allocating resources to nutritional projects; the interaction of nutrition with other sectors in the economy; or just the visibility and political impact of these efforts.

2. Funders - are mainly concerned with financial accountability and project performance.

3. Sectoral Planners - have the responsibility for the resources being used in nutrition activities, and are primarily concerned with the optimal use of the resource. Cost-effectiveness data are their central information need.

4. Program Managers - are focused on the delivery of project services to the target group, and require information fed back rapidly from daily operations.

5. Field Workers - are involved in project implementation, need information on their performance.

6. Beneficiaries - are mainly interested in data which indicate the benefits which they have accrued through project participation.

7. Researchers - seek information on a range of biological, social, economic, anthropological, managerial and political considerations to gain insight into the etiology of malnutrition and its control.

The most terse answer to the question "why evaluate?" is given by Fink et al.:[5]

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[3] James E. Austin, "The Perilous Journey of Nutrition Evaluation," American Journal of Clinical Nutrition, Vol. 31, No. 12, December 1978, pp. 2322-2336.

[4] Arlene Fink, Jacqueline Kosecoff, *An Evaluation Primer* (Washington, D.C.: Capitol Publications, Inc., 1978), p. 1.

either to improve the program, or to determine its effectiveness. Numerous other publications discuss the multitude of reasons for evaluating programs, but generally the same underlying reasons are present.[5]

A related question emerges from this discussion of the reason for and objectives of an evaluation: "Who should evaluate?" The nature of the personnel selected to conduct an evaluation is dependent upon what the sponsors expect to do with the findings. To amplify, impact evaluations are traditionally undertaken to enable funders to make decisions about program continuation, expansion or contraction. In this instance, where the primary focus is on the measurement of the extent to which nutritional objectives were achieved, evaluators are not often selected from program staff. However, it is recognized that the "objectivity" of the evaluators, regardless of their affiliation, is a function of both the agenda of the sponsors and the philosophical predelections of the evaluators. Often the sponsors of an evaluation will have a pre-conceived outcome they want or need substantiated by an evaluation. In that instance, they will obviously identify evaluators biased toward a given outcome. The intent is not to ruffle feathers, and to add a touch of credibility to the decisions made about the future of the program.

Alternatively, an evaluation designed to provide an objective look at program impact also commends itself to using outside observers and researchers. However, in that circumstance, the sponsors will try to minimize the bias built into the exercise, identifying the most objective evaluators possible.

One final comment on using external evaluators to assess program impact is the realization that they are often handicapped by their lack of familiarity with the community and project characteristics. Therefore, it is strongly suggested that outside evaluators make special efforts to become sensitive to the environment in which they work. This demands that an attempt be made to enlist the enthusiasm and cooperation of local functionaries, while

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[5] For example, see a discussion of Loeb's six points for evaluating nutrition programs in Reva T. Frankle et al., *Nutrition in the Community: The Art of Delivering Services* (St. Louis: C. V. Mosby, 1978), p. 257.

concurrently minimizing the threatening nature of their presence in a community.

Evaluations which concentrate on the collection of process variables and project monitoring data will necessitate the continual collection of data and the utilization of this information by the implementors in the field. Project personnel are thus the likely candidates for the task. Therefore, if the major thrust of the evaluation effort is to improve project quality and the delivery of services, an emphasis on an evaluation activity conducted by those integrally involved in the project is appropriate. Through this effort, project functionaries gain insight into their activities, notably a better understanding of the reasons for collecting information in the field. Furthermore, the costs are minimized by not requiring outside consultants and experts to be involved in the evaluation.

What emerges from this discussion is the importance of being cognizant of the linkages between purpose of evaluation, design of the evaluation (e.g., impact or process) and who conducts the evaluation (see Figure 4).

B. Program Planning and Evaluation

Frankle et al.[6] stress the importance of evaluation as a part of the planning and problem solving processes. Seven steps for the development, implementation and evaluation of a program are identified: (1) determination of needs; (2) development of a precise plan; (3) development of plan priorities; (4) development of methodology to achieve objectives; (5) incorporating participatory management; (6) consideration of critics and audiences; and (7) collection or appropriate data for decision making (evaluation).

In addressing the question of why perform evaluation, Austin[7] also describes evaluation as essential to the planning process. Without information on

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[6] Frankle, *Nutrition in the Community*.

[7] Austin, "The Perilous Journey of Nutrition Evaluation."

Linkages Between the Purpose of Evaluation, Type of Evaluation Design and Who Conducts Evaluation

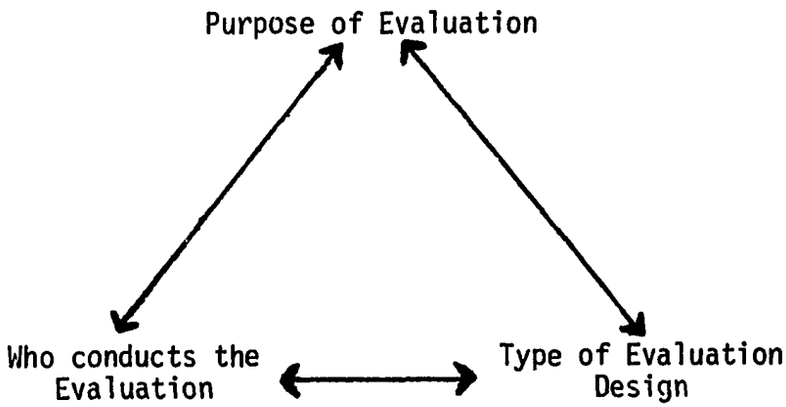


Figure 4

program activities and their effectiveness, it is impossible to allocate resources judiciously, and expect improvement in programming decisions. Therefore, Austin recommends that nutrition programs and policies should include an evaluation component, which will facilitate the planning and implementation of similar endeavors.

What becomes clear is that the concepts of planning, implementation and evaluation are interactive; one supports the other, and if either is missing, the other's role and meaning is greatly diminished. Planners with foresight recognize evaluation as an essential element in project design, and likewise, the results of evaluation are an integral part of the planning process. Although the logframe is essentially a program and project planning device, it serves also as a foundation for understanding evaluation, providing a blueprint of program operations and highlighting specific points of interest.

For example, during the initial stages of nutrition planning, communities are identified as potentially at risk on the basis of general indicators, e.g., large population of low income individuals, high infant mortality rate, or chronic exposure to conditions of drought and famine. An assessment is made of the specific kinds of problems which exist in order to determine the nature and extent of the problem.

If program planners decide that a nutritional problem is prevalent and serious enough to warrant intervention, and if means exist to diminish the saliency of a problem, objectives described in terms of nutritional improvement (purpose) are stated. In logical program planning, the extent of the problem should be specified ahead of time, along with the design of a logical framework which serves as the conceptual basis for program operations.

The task of the evaluator, whether he or she be internal or external to program operations, is to compare actual program attainment with the original proposed level of attainment, and to examine the causal chain of program events which defined the logframe. Therefore, it is imperative that, at the outset, the degree to which the project hopes to affect the problem be delineated. This does not intimate that once the expectations of purpose achievement are stated,

it becomes cast in concrete, never to be changed or revised. Rather, as the project evolves and ages, the adjustment of goals is an integral part of the implementation and evaluation cycle. However, initially a statement of what the project hopes to achieve is necessary.

This seemingly simple and straightforward task of formulating and making explicit intended project outcomes has frequently been overlooked in many nutrition projects, and thus, makes evaluation difficult. Desired outcomes of an intervention are rarely stated in precise and unambiguous terms, and as a consequence they are often perceived differently by various individuals or organizations involved in the project. They reflect individual viewpoints or organizational perspectives which are often incongruous with one another. Occasionally, they are even irreconcilable. As a result, the operation of the project is often hindered, and the evaluation process debilitated. And almost without exception, even when desired outcomes are clearly stated, projections of the degree to which purposes are to be achieved, i.e., intended quantitative improvements in nutritional status, are conspicuously absent in the literature. One plausible explanation for project planners overlooking delineation of intended project outcomes is that projects possess multitudinous objectives which depend not only on perspectives but on a combination of different dimensions, e.g., time, place and degree of generality.

Since objectives range from completion of administrative tasks in the project context (immediate objectives), to the actual delivery of project services (intermediate objectives or the intended output), to the improvement in nutritional status (ultimate objective, or project purpose), it is important that planners make explicit, implementators be aware, and evaluators be conscious of and focused on a common set of objectives.

Unless expectations are explicitly stated, measurement and comparison of intended objectives with actual achievement will be impossible; summative and impact evaluation are thus precluded. Likewise, if objectives are not understood, or are entangled with other priorities or intentions, the effectiveness of formative and process evaluation in improving the delivery of project services will be hindered since little guidance will exist as to

what end should be achieved by altering the implementation process.

## C. Process Evaluation

While the interrogative focus for process evaluation is often not manifest, it can best be described as an attempt to establish with some degree of certainty that any improvement in nutritional status is attributable to project operations. As such, it examines various components of the causal progression of activities which define the logframe. The level of input resource utilization is measured as a means of establishing the fact that stated outputs can be attributed to inputs. In other words, by examining inputs and related organizational, logistical and administrative issues, it can be determined whether the resources which were employed can reasonably be expected to have subsidized or facilitated the level of activities stated. In a similar vein, the level of activities or outputs are measured to ascertain whether impact or purpose can reasonably be attributed to project outputs. Hypotheses and assumptions which were to serve as links in the causal progression of events in the logical framework (i.e., inputs to outputs, outputs to purposes) are also reconsidered and examined in process evaluation. In process evaluation, numerous measures are used and no terse list would do justice to the creativity and imagination of investigators. Unlike impact evaluation which has a single set of measures which may be applied regardless of program type, process evaluation requires measures which are often specifically designed for each program type (see Figure 5).

The range of considerations germain to process evaluation can be conceptualized in a variety of ways. For example, it is possible to differentiate between a process evaluation which examines the delivery of services at a project level as contrasted with examining the context in which those services are delivered.

- Service Delivery

  When focusing on service delivery at the project level, questions are asked such as: How was a service delivered?; What service was delivered?; Who delivered service?; When was service provided? In

PROGRAM EVENTS AND TYPE OF EVALUATION

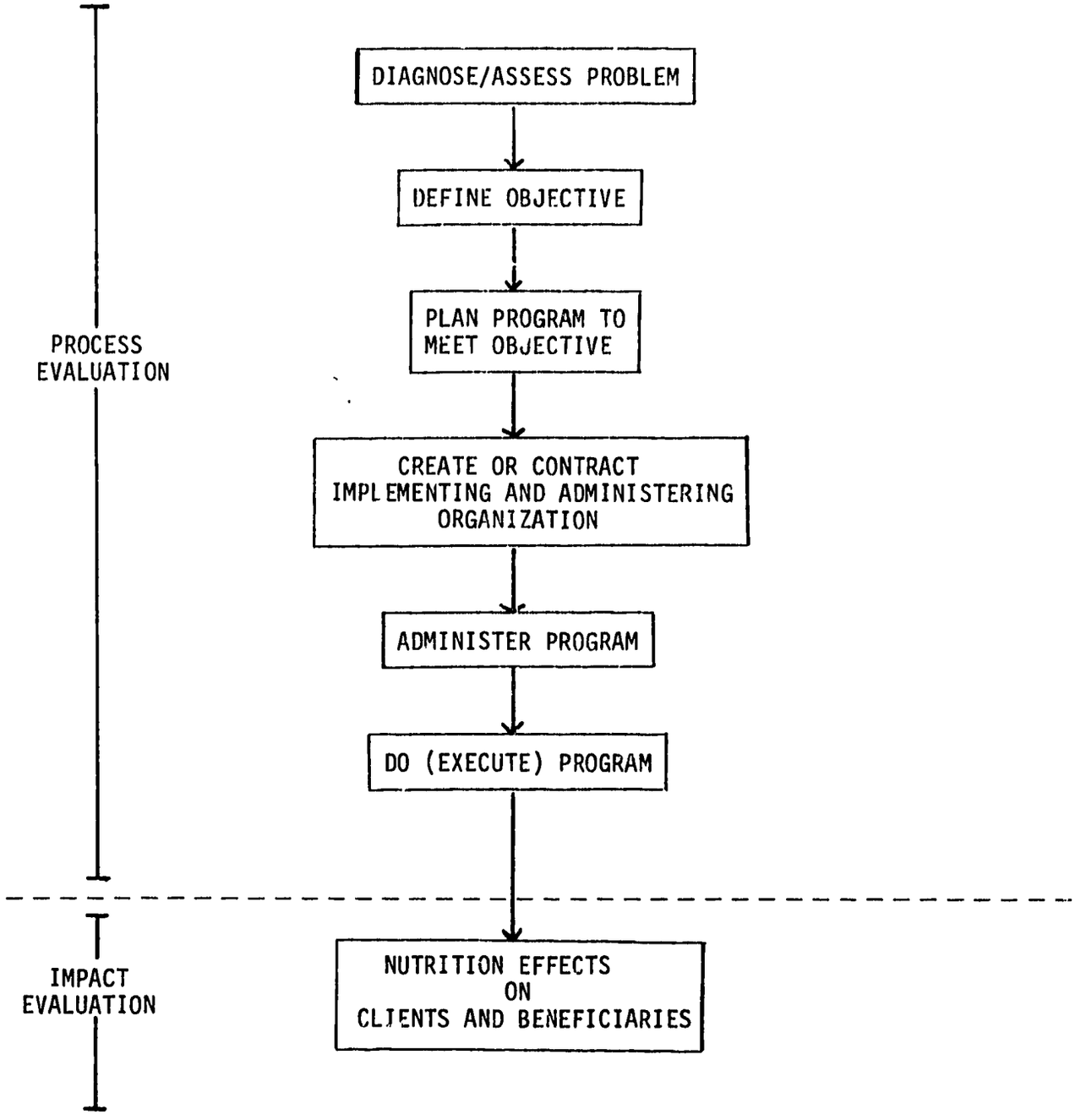


Figure 5

terms of the logframe, answers provide evaluators with information about output--its nature, extent, cost[8] and quality--as well as information about linkages (hypotheses and assumptions) between input and output, output and purpose.

An example

Some of the specific concerns of this first type of process evaluation are illustrated in the following discussion of a maternal and child health feeding (MCH) project. The logframe may be stated as follows: food and personnel are the inputs; the MCH program is the output; improved nutritional status, the purpose; and community development, the goal.

In order for food provided in the MCH project to have an impact on a child's health and nutritional status, several hypotheses must be verified and assumptions validated. For example, a hypothesis might be that by providing a 300 calorie supplement to a malnourished child, a measurable effect on his growth rate can be demonstrated.

Similarly, some assumptions which need to be substantiated include that:

a. nutrient intake in the target group is deficient in the absence of the feeding program;

b. the food distributed meets the nutrient deficiencies in the target group;

c. food reaches and is consumed by the individuals in the target groups in the quantities specified (no sharing);

d. substitution for other family food does not occur;

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[8] See Austin, "The Perilous Journey of Nutrition Evaluation," for a discussion of costing.

e. nutrient losses due to infection or parasite infestation do not occur.

If these assumptions are not substantiated, then nutritional impact of the food will be reduced. For example, if the supplemental food is shared with other family members, the quantity reaching the target individual will be smaller and therefore of less nutritional benefit. Similarly, if targeting is inadequate and some beneficiaries are not nutritionally deficient, then the food which goes to them cannot be cited as the reason for their adequate nutritional status.

This suggests that process evaluation is a prelude or at least should be simultaneous to impact evaluation.

Interestingly, for MCH feeding it is often hypothesized that improved nutritional status (purpose) will result in improving the quality of human resources and further the cause of development (goal). That is, it is believed that in the absence of nutritional supplementation, poor nutrition would result in a population whose physical capabilities were diminished and whose productivity would be reduced. This relationship between chronic undernutrition and reduced productivity is an example of a hypothesis which has not been fully substantiated, and is, therefore, a subject for ongoing and future research.[9,10,11,12,13]

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[9] Samir S. Basta, A. Churchill, *Iron Deficiency Anemia and the Productivity of Adult Males in Indonesia,* Staff Working Paper No. 175 (Washington, D.C.: World Bank, 1974).

[10] G. B. Spurr et al., *Clinical and Subclinical Malnutrition: Their Influence on the Capacity to do Work* (Milwaukee, Wisconsin: Medical College of Wisconsin, 1976).

[11] Pedro Belli, "The Economic Implications of Malnutrition: The Dismal Science Revisited," Economic Development and Cultural Change, Vol. 20, No. 1, October 1971, pp. 1-23.

[12] Barry M. Popkin, "Economic Benefits from the Elimination of Hunger in America," Public Policy, Vol. 20, No. 1, Winter 1972, pp. 133-153.

[13] Samuel Weisbert et al., *Nutrition and Productivity: Their Relationship in Developing Countries* (Washington, D.C.: League for International Food Education, 1972).

- Project Context

A second level of process evaluation focuses on the context within which a project operates. No single category or link along the logical framework is examined at this level, rather the raison d'être or context of project operation--which to a large degree determines the inputs, outputs, purposes and goals[14]--is explored. One illustration of this second type of process evaluation is worth further consideration because of its uniqueness.

An example

Ruther[15] describes criteria and considerations for evaluating the policy setting, organization/administrative context and socio-cultural context in which nutrition projects operate. Two dimensions are discussed. The horizontal dimension includes not only the primary nutrition agency but other administrative agencies at a comparable organizational level which compete for program resources such as money and personnel. The vertical dimension is bounded at one end by the individual and at the other by the international family. In between are the nuclear family, community, state and nation.

Analysis of the policy-setting environment requires information about four characteristics of the planning procedure: (1) the extent of interest in nutrition at policy level; (2) number and gravity of decisions required to implement program activities; (3) type of decision making structure and process; and (4) adequacy of location of the planning or program implementing entity.

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[14] Antonio Ugalde, Robert Emrey, *Political and Organizational Issues in Assessing Health and Nutrition Interventions*, in *Evaluating the Impact of Nutrition and Health Programs*, eds. Robert E. Klein et al. (New York: Plenum Press, 1979), pp. 309-331.

[15] Nancy L. Ruther, *Contextual Evaluation in Food and Nutrition Planning*, Paper presented at the XI International Congress of Nutrition, Rio de Janeiro, Brazil, August 27 - September 1, 1978.

Analysis of all of these aspects provides the evaluator with an indication of both the types and nature of support which are possible at the highest vertical level in addition to an understanding of whether the horizontal relationships among organizational entities at this level will functionally support a multi-disciplinary approach to intervention.

Analysis of the administrative/organization setting is oriented almost exclusively towards vertical relationships. Program coordination requirement and the degree and types of funding authority are the subjects of investigation.

Noted as being of particular relevance are the coincidence between the budget process and program requirements, liquidity requirements of a program and the degree to which sources of revenue and sites of resource allocation decisions are amenable to program viability and stability.

Analysis of the socio-cultural setting focuses on the horizontal relationships at the individual/family/community end of the vertical scale. Organizational and participatory patterns are identified by evaluators as a means of testing the appropriateness of program design; determining the extent of life-style change required of participants for program success; and characterizing the degree of support which participants will require from the program to produce or reinforce behavioral change.

A reading of Shortell and Richardson[16] suggests another way of conceptualizing the realm of process evaluation. Specifically, three areas of investigation can be identified:

- Pre-existing indicators which examine the target group, the implementing agency and the project environment. Some of this information may have already been collected in the planning phase of evaluation. For example,

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[16] Stephen M. Shortell, William C. Richardson, *Health Program Evaluation* (St. Louis, Missouri: C. V. Mosby, 1978).

nutritional status assessments and diagnostic procedures will provide useful data. However, there may be other socio-economic or demographic information which is of significance to the project design, e.g., if land reform is a component of the project, one may want to collect food production or income data prior to its initiation. Concerning information on the organizational structures of the implementing agency, information on their philosophy, personnel structure, and institutional capability should be examined. Likewise, a reading of the geopolitical situation extant in the community or region should be considered a priority.

- Project components can best be described in two parts. The first are project inputs. It is necessary to closely monitor the financial, material and personnel inputs into the project. More specifically, the total cost of the project should be determined. This includes specifying administrative, personnel, equipment, material, and other costs, along with an inventory of their nature and quantities, e.g., the type and amount of Vitamin A supplement or irrigation pipe used. It also follows that the training of personnel be identified. The second aspect of the project components includes a measurement of project outputs--the operational outcome of the utilization and management of inputs. Describing participation in project activities, e.g., the number of children eating food at the supplementation site, represents the major concern to be addressed.

- Intervening events are perhaps the most difficult area about which to collect information, because they are so difficult to define. Essentially, they are the significant phenomenon which occur within the implementing agency, the lives of the target group, or the environment in which the project is operational, which might affect the impact or process of the intervention. Such factors are numerous, and might have a positive or negative influence on the delivery of services, and the subsequent impact of the project.

Regardless of how one chooses to conceptualize process evaluation, it is

fundamental that it be viewed as an activity that must be integrated into a comprehensive project monitoring and management information system.

D. Impact Evaluation

Impact evaluation is conceptually simple: a determination of whether and/or to what extent the stated nutritional goals of the project were realized with an implicit but not proven attribution of this improvement to the delivery of project services. This definition is in accordance with the ideas expressed in the previous section which state that since nutrition programs are formulated to address a nutritional problem, their performance should be evaluated in the same terms. In reference to the logframe, impact evaluation of a nutrition program examines the achievement of purpose.[17]

While this concept is intuitively straightforward, it proves to be operationally complex. Determination of the achievement of nutritional goals has proven precarious; the literature records multitudinous failures. Successful analysis of impact is not only rare, but methodologically suspect in most instances.

Why is there a dearth of "successful" and "verifiable" impact evaluations? The answer focuses on selection, utilization and interpretation of nutritional status measures. This is a subject which in and of itself is sufficient to fill volumes; Chapter V of this report discusses a way to conceptualize these tasks.

The difficulties in choosing nutritional status measures, however, are benign

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[17] Development Alternatives, Inc. suggests three orientations for impact evaluation: (1) that generated by the commitment of resources; (2) benefit continuation which represents the "potential that . . . benefits will be sustained after the donor's resources are exhausted or withdrawn"; and (3) benefit growth--which accounts for "the prospects for future development in related activities by the same participant population; based upon the success of the present project." A. H. Barclay, Jr. et al., The Development Impact of Private Voluntary Organizations: Kenya and Niger--Final Report (Washington, D.C.: Development Alternative, Inc., 1979).

in comparison to two other problems. This first involves the numerous threats to evaluation validity which characterize various evaluation methodologies traditionally employed. The second major pitfall in evaluating the impact of nutrition programs concerns the subjective nature of the analysis of nutritional data. That is, the ability of the analyst to substantiate a range of outcomes from the same data. These two constraints to impact evaluation will be discussed in detail in Chapter IV.

## E. Is There a Choice? Process vs. Impact

Is there a rule of thumb for deciding whether to conduct process or impact evaluation? Ideally both types of evaluation should be conducted. However, realistically, the structure and design of an evaluation depend upon the magnitude, scope and resources of the project, the types of stated objectives which a project has, and the nature of the linkages which join stages of the logframe.

For instance, suppose the results of an assessment of nutritional status in a province of Kenya suggest that the major nutritional problem is a calorie deficit equivalent to 50% of the average recommended daily allowance for the citizens of that province. In response, AID sponsors a supplementary feeding project with the stated purposes of increasing average caloric intake to 100% of the recommended level. In addition, the project commands sufficient resources to supply the additional 50% of calories required.

An evaluation of this type of program with its stated objectives and adequacy of resources and coverage would best conform to a combination process/impact design as a means of determining whether the primary objective has been met. The measures used for assessing impact could reasonably be applied in a search for program effects.

But follow a second example: an assessment of nutritional status in a subcontinent of India reveals that citizens consume, on the average, only 50% of recommended levels of calories. In response, AID allots x tons of wheat and other grains to several voluntary agencies for distribution throughout the country. It is clear, however, that the amount of food made available for

distribution by the American government is nowhere near enough to raise the average caloric consumption to meet recommended daily allowances. In fact, if one calculates the possible incremental increase in calories, it might be less than 10% of the target population's needs.

An outside contractor is funded by AID to perform a nation-wide evaluation. A process evaluation to determine whether the infrastructure pipeline exists, or is free enough of obstacles to deliver what aid is provided makes sense. An impact evaluation, however, would be a futile exercise because the amount of food available will produce little change in nutritional status and most impact measures are not capable of determining such slight changes in nutritional status even if they were to occur (see p. 122 for the India example).

The difficulty in determining program impact is further illustrated by the Nutrient Flow Theory (see p. 12). As one moves further from the nutritional status endpoint, it becomes more difficult to attribute change in nutritional status to project activities. For instance, regardless of how much of a high yield, highly nutritious hybrid grain is produced, or the amount of vitamins added to a fortified food, there are many points between growth or processing when food may "leak" from the system and become unavailable for physiological needs.

In a similar fashion, regardless of the number of nutrition education classes to which a project participant has been exposed, and regardless of how thoroughly lessons taught have been internalized by participants, still an unhealthy participant with metabolic problems (e.g., infection or intoxication) may be unable to utilize the nutrients consumed. This means that negative outcome, or failure to detect any outcome during evaluation of project activities may be the result of factors outside the control or realm of the project. These negative influences overwhelm or overshadow the real affect of program activities.

Often, only negative external influences are considered. However, just as possible are positive contributions unrelated to project activities which may improve nutritional status in the target group. For example, a project

participant may have a chance encounter with a neighbor or friend at the market place during which a new food, or method of preparing and storing food is suggested. Curious to see whether this new food or method works as well as the neighbor suggests, it is tried. Coincidentally the food or technique results in improved nutritional status. During evaluation of a program in which the participant is involved, the improvement is attributed to some program activity when in reality the facts are otherwise.

The above example represents a threat to the validity of the findings of an evaluation, a topic which will be discussed at length in the next chapter. But in the context of this discussion, it is necessary to admonish the evaluator to be conscious of the tenuous linkages represented by the hypotheses and assumptions which join inputs to outputs, and outputs to purposes, which represent the causal progression of events in the logframe. It is therefore recommended that whenever possible, both process and impact evaluation be performed, since the former will provide evidence and substantiation that the conclusions of the latter are reasonable and logical.

## F. Beyond the Process/Impact Distinction?

The literature describes other ways to conceptually partition the tasks of evaluation which avoid use of the terms process and impact.[18] Suchman's[19] categories include:

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[18] One concern which will not be discussed, although mentioned by numerous authors, is measurement of the side effects or unplanned outcomes which programs and projects may foster. No doubt, attempts should be made to determine whether outcomes advantageous or disadvantageous have occurred, but these concerns should not burden the evaluative effort with additional data collection unless excess resources are available, or there is good reason to suspect that the project will produce secondary effects. See Thomas D. Cook, Emily G. McAnany, *Recent United States Experience in Evaluation Research with Implication for Latin America*, in *Evaluating the Impact of Nutrition and Health Programs*, eds. Robert E. Klein et al. (New York: Plenum Press, 1979), p. 13; and O. Lynn Deniston, *Evaluation of Disease Control Programs* (Atlanta, Georgia: U.S.D.H.E.W.S., 1974), p. 43.

[19] Edward A. Suchman, *Evaluative Research: Principles and Practice in Public Service and Social Action Programs* (New York: Russell Sage Foundation, 1967), pp. 62-64.

1. Effort - which represents the amount and quality of input regardless of output.

2. Performance - which measures the results of the effort (generally the amount of service given or received).

3. Adequacy of Performance - which determines the degree to which "performance is adequate to the total amount of need" (providing information on how "effective a program has been in terms of the denominator of total need").

4. Efficiency - which asks whether there is a better way of meeting objectives in terms of resources used (money, personnel, and public convenience).

5. Process - which deals with the attributes of the project, the characteristics of the population served, the types of project effects and the situational context of the project.

Deniston[20] proposes another set of considerations for evaluating projects:

1. Appropriateness - which relates the values of a society to the nature of the problem being addressed, by asking questions such as whether the project meets a dire need or whether there are other problems which are more significant and demand greater attention.

2. Adequacy - measures the extent to which the project reduced the problem.

3. Effectiveness - measures attainment of project objectives and requires (1) measuring the size of a problem; (2) estimating what the size of the problem would be without the program; and

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[20] O. Lynn Deniston, *Evaluation of Disease Control Programs* (Atlanta, Georgia: Training Program, Center for Disease Control, U.S.D.H.E.W., June 1974).

(3) proposing an objective--or the degree to which problem size will be diminished as a result of the project.

4. Efficiency - determines the ratio of attainment of project objectives to expenditure of resources and examines how close that is to the expected ratio.

Austin[21] divides the task of evaluation into three categories: (1) target group identification; (2) costing, involving the market approach and social costing procedures (which are used to calculate the actual project cost, and the benefit to society of an alternative use of resources, respectively); and (3) use of performance indicators. Performance indicators fall into three categories: biological cost-effectiveness (e.g., $/infant mortality rate, $/degree malnutrition); delivery cost-effectiveness (e.g., $/target group recipient, $/nutrient delivered) and operating-effectiveness which includes coverage (e.g., % target group participating), nutrients (e.g., % deficient covered), permanency (e.g., relapse rate), personnel (e.g., number professionals/ target group), and leakages (e.g., % storage loss, % absorption loss).

Deniston, Suchman and Austin propose frameworks which guide the selection of measures to be used in project evaluation. In all three schemes described, however, there is an indiscriminate mix of process and impact measures. For example, in Austin's description of performance indicators, the biological measures presented relate impact (e.g., infant mortality, malnutrition) to inputs, which are a measure of process. On the other hand, the performance measures of delivery, and operating cost-effectiveness are all process measures. So while Austin's use of performance implies determination of program "impact," it also includes examining program processes.

In categorizing Suchman's evaluative concerns in terms of whether they are process or impact measures, effort and process suggest process measures. For effort, one would use measures such as the number of dollars spent or number of days taken to plan a project. For process, one would look at the context in

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[21] Austin, "The Perilous Journey of Nutrition Evaluation."

which a project operates.

Performance and adequacy of performance suggest either process or impact measures. For example, one could measure process: whether the nutrition education classes were held, how many people attended, the amount of new knowledge presented; or impact: change in dietary behavior or other anthropometric, clinical and biochemical measures of nutritional status. Measures which are described as a ratio of process to impact are needed for determination of efficiency.

Deniston's model emphasizes impact more than the two categorical schemes previously cited. Adequacy, effectiveness and efficiency as defined by Deniston, are variants of impact measures. Appropriateness is a philosophical concern which eludes placement in either process or impact category and appears to be a third evaluative concern to be added to process and impact.

What emerges from this brief analysis is a partial explanation for the diversity evident among evaluation activities, and a means to clarify evaluative concerns. A different evaluation terminology and focus is proposed by each model builder. These strategies in turn suggest the selection of different categories and types of measures. Almost all of the specific evaluative concerns, however, can be subsumed in the process and impact categories.

## F. Final Note

Unless understood in a specific project context, process and impact evaluation represent concepts which can be used interchangeably depending upon one's outlook and perception. For example, some project supply personnel would classify the number of vitamin A capsules distributed or the efficiency ratio involved in their distribution as impact measures, since with regard to their project responsibilities, such measures quantify goal attainment. Nutritionists would classify the number of healthy individuals free from clinical signs of vitamin A deficiency as the impact measure and view number of capsules distributed as a process measure. These different viewpoints, then, are a source of confusion. In order to clarify, we stated at the outset that the

purpose of all nutrition projects is to improve the nutritional status of target populations. It should be clear, therefore, that changes in nutritional status are to measured during impact evaluation of nutrition programs and projects.

## IV. METHODOLOGICAL ISSUES: EVALUATING THE IMPACT OF NUTRITION PROJECTS

Determining the impact of nutrition projects presents special problems and considerations which will be addressed in this chapter. Two major factors that have debilitated the search for nutritional impact will first be discussed This is followed by a brief review of the variety of impact methodologies that were employed in the evaluations abstracted in Chapter VI.

### A. Obstacles to Impact Evaluation

In other reviews of nutrition interventions, authors have commented on the scarcity of substantive finding concerning project impact.[1,2,3,4] While this can partially be attributed to the fundamental problems of measuring nutritional status, discussed in the next chapter, there are two additional problems which have resulted in the indeterminancy of evaluation findings.

First, causality cannot be assured. A series of threats to validity which cause one to ask to what extent competing issues rather than project activities are responsible for the observed changes in nutritional status of the target population must be countered. Secondly, analytic techniques must be chosen. Their selection will likewise influence the results of the evaluation.

#### 1. Threats to Evaluation Validity

In impact evaluation, two major problems are encountered:

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[1] Hans W. Singer, *Food Aid Policies and Programmes: A Survey of Studies of Food Aid* (Rome, Italy: World Food Programme, 1978).

[2] George H. Beaton, Hossein Ghassemi, *Supplementary Feeding Programmes for Young Children in Developing Countries* (New York: ACC Sub-Committee on Nutrition of the U.N.; UNICEF, 1979), p. 2.

[3] Austin, "The Perilous Journey of Nutrition Evaluation."

[4] Robert E. Klein et al., eds., *Evaluating the Impact of Nutrition and Health Programs* (New York: Plenum Press, 1979), p. 1.

(1) to what extent are there rival explanations for relating measured change in nutritional status to the services provided during the period--that is, how well does the evaluation separate "background noise" of simultaneous but perhaps exogenous variables and events, and secular changes, from the project's impact on observed outcome; and (2) to what extent are the results generalizable to other environments. These factors which are discussed by Campbell and Stanley,[5] Campbell,[6] Tien[7] and Shortell and Richardson[8] are usually labelled threats to internal and external validity, respectively. The more salient and applicable threats are outlined below:

a. Threats to internal validity

- History Effects represent events which transpired during the period of project implementation but which occurred outside the context of delivering services associated with the project; that is, between the beginning of the project when an initial measurement was taken, and a subsequent point when another measurement of the same phenomenon is taken.

  Since all community level nutrition projects are executed in complex and volatile environments, many of which impact upon an individual's nutritional status, these historical events are of special significance. Included in this category of threats to validity are: (1) physical phenomena (e.g.,

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[5] Donald T. Campbell, J. C. Stanley, *Experimental and Quasi-Experimental Designs for Research* (Chicago: Rand McNally, 1966), pp. 13-22.

[6] Donald T. Campbell, "Reforms as Experiments," American Psychologist, Vol. 24, No. 4, April 1969, pp. 409-429.

[7] James M. Tien, "Toward a Systematic Approach to Program Evaluation Design," IEEE Transactions on Systems, Man, and Cybernetics, Vol. SMC-9, No. 9. September 1979, pp. 494-515.

[8] Shortell and Richardson, *Health Program Evaluation*, p. 38.

climate, earthquakes, measles outbreak); (2) social factors (e.g., influence of radio messages of urbanization resulting in a drastic change of food habits); (3) economic factors (e.g., the increased price of oil, seasonal or yearly fluctuations in selling price of crops); and (4) political considerations (e.g., the instability or repressiveness of a government which might portend any of a number of policy changes, affecting the welfare of a community). Individually or collectively, events which transpire outside the context of the delivery of project services will represent the major determinants of nutritional status. The presence of a nutrition project can also have an effect, but may be overwhelmed by physical, social, economic and political characteristics of an individual's environment.

Nutritional status, then, is a function of a diversity of factors and an attempt must be made to control for, or at a minimum, to identify and record fluctuations in the environment which occur during the delivery of project services. If this is not done, little meaningful can be said about the link between program activities and measured impact on the target group.

- Maturation effects on participants and processes are those mental and physical changes within the project target group or project functionaries which are a function of the passage of time and will also impinge upon the nutritional status of an individual or community. Perhaps the best illustration of maturation effects concerns the aging of the beneficiaries of a project as described by Drake et al.[9]

Two concepts are associated with the observed effects of

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[9] William D. Drake, Roy I. Miller and Margaret Humphrey, *Analysis of Community-Level Nutrition Programs* (Ann Arbor, Michigan: Community Systems Foundation, 1979). (Draft Final Report.)

population aging. First, the age distribution within a target population rarely remains constant. In a longitudinal study, the participants are getting older, synchronously with their participation in the program. Thus the age composition of the individuals in the study cohort changes. Similarly, in a cross-sectional evaluation, it would not be expected that the size of the age cohorts (e.g., 12 to 18 month olds, 18 to 24 month olds) would remain static over time. Rather fluctuations in fertility, pregnancy outcomes and rates of project enrollment will result in shifts in the age distribution of the population at two points in time.

Second, malnutrition is not uniformly distributed over all age groups. For example, it can be hypothesized that in a given population with a pattern of abrupt weaning between six and twelve months, coupled with an absence of locally available nutrient-dense weaning foods, protein-energy malnutrition will be observed largely in the 12 to 24 month old age group. In another population (e.g., urban slum) where there has been a marked decrease in breastfeeding high rates of malnutrition (i.e., wasting) might be found in infants below 12 months.

It can therefore be concluded that the rate of malnutrition within a community will change markedly, and in an unpredictable fashion, as the age distribution of the target group changes. This means that regardless of whether or not there was an intervention, the rate of community malnourishment is likely to change. Furthermore, since the relationship of the degree of malnourishment for a given age is dependent upon a host of complex variables, it is difficult to pre-determine the nutritional impact of a change of age distribution in a population.

More often than not, maturation effects will be biased toward

a positive outcome of the project, since there is a tendency for populations to get older, and there is a tendency for older children to be better nourished. In fact, Drake[10] has proposed the concept of the "least-cost intervention" in which during a longitudinal investigation no services are provided and children are simply allowed to get older. As a result, measurements on the same cohort indicate improvements in nutritional status.

Maturation effects on the project as contrasted with those which are the result of participant aging are also extant in many interventions. Variations in the design or delivery of project activities once the project is operational, coupled with adaptation in the manner in which the target group or audience responds to the project, make it difficult to attribute changes in nutritional status to specific features of project design.

For example, initially project staff could be apprehensive about a new intervention, or alternatively, very enthusiastic. As time passes, the apprehension might disappear; or the enthusiasm be transformed to boredom. While project inputs, such as number of staff, food ration and administrative dollars remain constant, the attitudinal changes of functionaries will affect operational efficiencies, and, as a result, project impact.

Obviously, a number of different scenarios of how a project matures in terms of attitudes and behavior of functionaries and beneficiaries may be sketched. However, it remains essential to realize that observed changes in nutritional status may be attributable to a variety of events or processes occurring within the project context with the

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[10] Personal Communication with William D. Drake, Community Systems Foundation.

passage of time. And the longer the time interval between the initiation of the evaluation and the taking of final measurements, the more likely that maturation will affect evaluation validity.

- Testing Effects recognize that if a test is taken to gather baseline data, and then again for follow-up purposes, the results of the second test might be influenced by the first test.

  The importance of this threat to validity is best illustrated in relation to a project which used dietary recalls as an impact measure. If one initially gathers data on dietary intake with a 24-hour recall as a means to assess eligibility for program benefits and establish baseline data, and then repeats this exercise periodically to reconsider eligibility and assess program impact, participants are likely to learn the criteria for eligibility and thus recall the "correct" response. As such, indications might be that nutrient intake has improved due to the project, when in reality, the use of the test was primarily responsible for this finding.

  Another threat associated with the testing effect is the anxiety in taking a test, or completing a questionnaire, either at the outset or termination of the evaluation. This may precipitate an over or underestimation of the true effect of the project.

- Instrumentation Effects are a result of either the changes in calibrations of an instrument (e.g., scale, skin caliper), or alternatively, the way in which a test or questionnaire is administered or coded. The propensity for measurements to be inaccurate due to poor maintenance of equipment, coupled with insufficient quality control over measurement and interviewing techniques, make these important threats to

validity in field settings. Furthermore, the incorrect transcription of information from the questionnaires to key punch cards or similar machine readable formats represents another related hazard.

- Regression Artifact Effects involve pseudo-shifts which occur when persons are selected to be in the treatment group solely on the basis of extreme scores. Because of this selection bias their subsequent scores would be expected to regress toward the mean, regardless of project influence. In the case of nutrition projects, this possible source of evaluation bias is most probable when one analyzes a project's impact on the most severely malnourished group (i.e., those with Grade III malnutrition). Even without intervention, over a period of time some of the Grade III malnourished children will naturally recover, or at least move up to Grades II or I. In other words, a proportion of the Grade III malnourished will improve spontaneously in the absence of a project. Since they are already at the bottom of a measuring scale, there is nowhere to go but up.

  This concept admonishes evaluators to focus efforts on a representative sample of the target population, rather than on a subset of the most severely malnourished children.

- Attrition or Addition Effects recognize that members of a target group can drop out of a project. New individuals can enter. The entrance or exit of project participants is attributable to many natural and unnatural events, such as births, deaths, migration, and extension or contraction of the geographical areas serviced by the project. Likewise, a budget windfall or financial hardship can potentially increase or decrease participation. Obviously, these factors change the composition of a target population.

Drake et al.[11] emphasize the importance of such attrition and addition effects as a result of changes in the geographical area covered by the project. To illustrate, consider a project initiated in a small rural village in which chronic malnutrition is endemic and characterized by stunting and less than optimal growth. Despite these conditions, the incidence of acute malnutrition, accompanied by clinical manifestations of nutrient inadequacies is rare. As the project becomes entrenched and accepted within the community, it might expand to include families living in more remote areas in which there is subsequently found to be more malnourishment due to a variety of socio-cultural, economic and geo-political factors. As such, the target population has been markedly altered by the addition of new participants, and project effects may appear to be negligible.

In another scenario, the individuals drop out of projects because the distance travelled to participate is too great, or because illness or familial problems dictate that other priorities need to be addressed. In these instances, the project might appear to be improving the welfare of the population, when in fact this is not the case. Likewise, the deaths of the most severely malnourished, or the out-migration of the most destitute, will have a similar effect.

b. Threats to external validity

- Hawthorne and placebo effects represent changes in participant behavior which may occur solely as a function of participation in a study. Essentially, Hawthorne effects involve the acknowledgement that a true change in the status of the population may have occurred. However, measured change was not due to project design or service delivery, but rather to the presence of an intervention which altered behavior of the target group. As such, there should not be

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[11] William D. Drake et al., *Analysis of Community-Level Nutrition Programs*.

expectations of similar findings when the project is replicated elsewhere.

- Multiple intervention interference is a result of multiple interventions applied to the same target group, whether at the same time or prior to the intervention being

subject's responsiveness or sensitivity to the delivery of project services. Data obtained for the pretested population are not representative of the project's impact on all subjects covered by the intervention. For example, in a nutrition education program, baseline examination of nutrition knowledge may sensitize those individuals being tested to the value and importance of subsequent education messages delivered during the project's lifetime. The same sensitization does not occur in those not previously exposed to the test.

2. The "Objective Analysis of Data"

While threats to validity create major obstacles to impact determination, the role of the analyst who interprets data introduces still another influential variable in the evaluation of nutrition programs. Two major issues are paramount. The first concerns the selection of standards and cut-off points against which to make judgments. The second involve attribution of signifiance to observed improvements in nutritional status.

a. Selecting Standards and Cut-Off Points

A range of anthropometric, biochemical and dietary standards exist against which an individual's measurements may be compared in order to make a determination of nutritional status. The selection of standards seriously affects findings concerning the extent of malnutrition. That is, the percentage of children who are classified as malnourished on the basis of anthropometric, biochemical or dietary data is strictly a function of the standard employed. Applying a different standard to the same data will screen out a very different group.

Unfortunately, there is neither consensus about the acceptability of a single set of standards for a given population, nor

consensus regarding the appropriateness of a single standard to different racial or ethnic groups. For example, the use of North American growth standards may not be appropriate for certain populations in developing countries.[12]

In addition, once a growth standard has been selected, designating cut-off points associated with that standard in order to determine the degree of malnutrition represents an important analytic variable in assessing program impact.

For example, the Gomez classification of cut-off points[13] was used widely in the evaluations reviewed in Chapter VII. It classifies children falling between 76% and 85% of a standard as Grade I malnourished; children falling between 61% and 75% as Grade II; and children 60% and below as Grade III. If these cut-off points are altered, especially when there is clustering of observations below or above one of these arbitrarily designated percentiles, once again, the data lend themselves to completely different interpretation.

In Table 1, Drake et al.[14] illustrate just how much an "objective" analyst can affect evaluation results once data have already been collected. The 828 observations of weight-for age have been analyzed with two weight-for-age standards, Harvard and Gomez. In addition, two sets of cut-off points are employed to designate

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[12] For comments on this controversy see: Jean-Pierre Habicht et al., Height and Weight Standards for Preschool Children--How Relevant ar Ethnic Differences in Growth Potential?", Lancet, Vol. 1, No. 7858, April 6, 1975, pp. 611-615; Vimlesh Seth et al., "Growth Reference Standards for Developing Countries (Determination of Criteria for India)," Journal of Tropical Pediatrics and Environmental Child Health, Vol. 25, Nos. 2 & 3, April/June 1979, pp. 37-41; Stanley Garn, "The Applicability of North American Growth Standards in Developing Countries," Canadian Medical School Association Journal, Vol. 93, October 23, 1965, pp. 914-919.

[13] F. Gomez et al., "Malnutrition in Infancy and Childhood, with Special Reference to Kwashiorkor," *Advances in Pediatrics*, Vol. 7 (Chicago: Year Book Publishers, Inc., 1955), p. 131.

[14] Drake et al., *Analysis of Community-Level Nutrition Programs.*

Table 1

Nutritional Status of the Same Population, Using Identical Weight-for-Age Data with Different Standards and Cut-off Points

| | | Grade III | Grade II | Grade I | Normal | Total |
|---|---|---|---|---|---|---|
| | Classification (%) | 30-60 | 61-75 | 76-85 | 86+ | |
| GOMEZ | Number | 6 | 85 | 210 | 526 | 827 |
| | Percent of Total | .7 | 10.3 | 25.4 | 63.6 | |
| | Classification (%) | 30-60 | 61-75 | 76-85 | 86+ | |
| HARVARD | Number | 10 | 170 | 176 | 372 | 828 |
| | Percent of Total | 1.2 | 20.5 | 33.3 | 44.9 | |
| | Classification (%) | 30-69 | 70-79 | 80-89 | 90+ | |
| GOMEZ | Number | 34 | 134 | 223 | 426 | 827 |
| | Percent of Total | 4.1 | 16.2 | 28.2 | 51.5 | |
| | Classification (%) | 30-69 | 70-79 | 80-89 | 90+ | |
| HARVARD | Number | 72 | 224 | 257 | 275 | 828 |
| | Percent of Total | 8.7 | 27.1 | 31.0 | 33.2 | |

Source: William D. Drake et al., *Analysis of Community-Level Nutrition Programs.*

first, second and third degree malnutrition as a percentage of the standard (i.e., 90%, 80% and 70%; or alternatively 85%, 75% and 60%).

As can be seen, just by changing the standard and cut-off points the range of normal children varies from 33.2% in one case, to 63.6% in the other, while the range of Grade III malnourished ranges from 0.7% in one to 8.7% in the other, respectively. Clearly, the analyst can assign either outcome to the same data.

b. The Analysis of Significance of Evaluative Data

Selection and interpretation of statistical tests of significance are crtiical variables in the analysis of program data. This is best illustrated in the example below.

The authors of Project Poshak[15] conclude that there was significant evidence of improved nutritional status in the experimental group. They base their assertion on the data presented in Tables 2 and 3. Concerning Table 2, the authors say that "it is evident that the experimental or intervened group of children demonstrate a clear growth benefit over their control counterparts." These data, however, are subject to different interpretation considering that 59%, 59.5% and 59% of the control group, the PHC (primary health center) experimental group, and SHC (sub-health center) experimental group, respectively, are above the 41st percentile weight-for-age. This hardly seems like a clear demonstration of impact.

From Table 3, the authors once again claim that the experimental groups fared better than the controls. However, this finding has

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[15] Tara Gopaldas et al., *Project Poshak,* Vol. 1 and 2 (New Delhi: CARE-India, 1975).

Table 2

Weight Comparison of Experimental and Control Groups of Children by a Percentile Classification

(Extensive Phase)

| Percentile classes of weights of control group | Control group (N = 73) | Experimental Group PHD (N = 244) | Experimental Group SHC (N = 244) |
|---|---|---|---|
| 20th and below | 15 (20.5) | 84 (18.9) | 49 (16.4) |
| 21st - 40th | 15 (20.5) | 96 (21.6) | 60 (24.6) |
| 41st - 60th | 15 (20.5) | 90 (20.3) | 43 (17.6) |
| 61st and above | 28 (38.5) | 174 (39.2) | 101 (41.4) |

N denotes sample size.

Figures in parentheses indicate percentages.

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Source: Gopaldas et al., *Project Poshak*.

Table 3

Comparison of Mean Final Weights of Experimental (Having Collected 60 Per Cent and Above of Targeted 'Take-Home' Food) and Control Groups

(Extensive Phase)

| Age in months | | Control Group | | Experimental Group | |
|---|---|---|---|---|---|
| Initial stage of Intervention | Final stage of intervention | Mean wt. in kg. | S.D. | Mean wt. in kg. | S.D. |
| 6-11 | 18-23 | 8.01 | 1.13(18) | 8.11 | 1.20 ( 62) |
| 12-23 | 24-35 | 9.17 | 1.24(32) | 10.71* | 0.54 (110) |
| 24-36 | 36 and above | 11.07 | 1.77(23) | 12.63* | 0.89 (173) |

* Significantly different from control group ($p > 0.05$).

Figures in parentheses denote sample sizes.

Source: Gopaldas et al., *Project Poshak*.

been disputed by Singer.[16] Although the mean weights are higher for the experimental groups, the standard deviations are all high. Therefore, when subjected to a T-test (a standard statistical test for significance), the difference between the means is not significant at the five percent level.

Even if an analysis did reveal a significant difference through some other statistical test, a policy maker would be hard pressed to justify the expenditure of funds on such small differences in outcome. In fact, Singer also notes that if mean weights are plotted according to the Gomez scale, the differences between the control population and the experimental group are so small, that the mean of both groups would remain classified as second degree malnourished.

Furthermore, children who were enrolled in the Poshak program, but had a low rate of participation, were excluded from the analysis. Therefore, if the entire experimental population were included, the difference between them and the controls might be infinitesimal.

## B. Impact Evaluation Designs

A broad range of impact evaluation designs has been utilized in social research. This same range is evident in nutrition program evaluation. But while the literature is replete with detailed discussions of alternatives, the applicability of many of these designs in nutrition field interventions is limited. Concerns with application, and designs which have most frequently been employed in the literature abstracted in this document are discussed briefly below[17] based on the classification schemes of Campbell

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[16] Singer, *Food Aid Policies and Programmes: A Survey of Studies of Food Aid.*

[17] This is not to suggest that these are the only designs appropriate for one used in the evaluation of nutrition programs.

and Stanley[18] and Shortell and Richardson.[19]

An important trade-off must be made during the selection of an evaluation design. These trade-offs can be considered in terms of complexity (the level of skill and rigor required to control for threats to evaluation validity) and accuracy and sensitivity of the measures used to determine nutritional status, on the one hand, versus the cost or level of financial commitment on the other. The task of selecting a design for the determination of impact can therefore be conceptualized as an attempt to maximize complexity, accuracy and sensitivity while minimizing cost.

- Expert judgment involves gathering opinions of experts through ad hoc observations and/or interviewing. This technique estimates rather than measures the likelihood of certain project outcomes. Expert judgment may also include a descriptive case study type of approach, providing a narrative or assessment of the operational aspects of the project. Conjecture about the achievement of nutritional objects is a central focus.

  Interestingly, this expert judgment approach is frequently employed in nutrition evaluation, especially evaluation of supplementary feeding projects. As remarked by Maxwell,[20] few empirical studies of impact have been done, although numerous "descriptive evaluations" have been performed. Among these, the methodology for the evaluation of the Food-for-Peace Program, P.L. 480 Title II, best illustrates this approach (see abstract, p.124 ).

  Likewise, various World Food Programme evaluations can be characterized as expert judgments (see abstract, p.139). These are officially referred

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[18] Campbell and Stanley, *Experimental and Quasi-Experimental Designs for Research*.

[19] Shortell and Richardson, *Health Program Evaluation*.

[20] Simon Maxwell, "Food Aid for Supplementary Feeding Programmes--An Analysis," Food Policy, Vol. 3, No. 4, November 1978, pp. 289-298.

to as Interim Evaluations and involve dispatching a team of experts into the field for two or three weeks to carefully examine available data and project operations, with the intent of addressing a series of areas such as administrative and organizational concerns, food management and market displacement issues and/or nutritional impact.

This approach enables evaluators to get a macro view of the program and the context in which it is operating, as well as gather existing data which may be analyzed away from the field. However, in general, only previously collected nutritional status measures are available and time constraints do not allow for their rigorous analyses. And even when existing data are carefully analyzed at home, it is difficult to control for most threats to validity. Conclusions are thus subject to a range of subjective distortions, and there is a propensity for such efforts to be anecdotal accounts of the project. Despite these drawbacks, the simplicity, quickness and low cost of this methodology has proved alluring.

- Situational assessment is similar to expert judgment but goes one step further: it involves rapid estimation of the magnitude and nature of the service being delivered to a target group and relates this to an estimate of the size of the problem or some previously determined standard. This initial assessment involves cursory and preliminary calculations designed to estimate whether the extent of impact observed can be reasonably attributed to the intervention.

  For example, in an evaluation of the P.L. 480 Title II Program in India (see abstract, p. 122), this methodology is used in an attempt to determine the possible nutritional impact of the school feeding and maternal and child health feeding projects. The nutritional value of the food ration is calculated, and adjusted to account for the number of feeding days and ration dilution through sharing and intrafamilial substitution. The results suggest that the possible range of caloric need fulfilled by the food supplement is 1.2% - 12%. However, the evaluation team asserts that the lower

number is probably more realistic, and that a measurable nutritional impact is precluded given this scenario.

While such assessments indicate whether the possibility for impact exists, it does nothing to measure its magnitude, nor the differential impact on participants. And, as with expert judgment the validity is poor. Therefore, the utility of this approach should be viewed purely as an initial perusal and preliminary approximation to determine whether to invest the resources in "real" impact evaluation. Cost here is somewhat greater than in expert judgment.

- One-Group Before-and-After Design is perhaps the simplest of the non-experimental evaluation designs. Simply, it involves measuring the nutritional status of the target group at one point in time (usually at the outset of the intervention), and subsequently repeating the measurement on the same group at a later point. Difference in status would then be attributed to the project.

  While this technique has been used in studies such as the Indian Population Project in Karnataka (see abstract, p.133), it controls for few of the threats to validity discussed earlier and findings are subject to rival explanations. However, when process evaluation variables are collected, the implementation process is quantified and qualified, and major exogenous events recorded, statistical techniques can be used sometimes to sort through background "noise" in the community. This will facilitate the determination of program impact.

- Statistical Control Evaluations use statistical controls to determine the influence of project inputs on nutritional status. That is, the statistical controls are formulated to account for confounding variables and the related threats to evaluation validity. The researcher examines the correlations and general statistical relationships between treatment variables, impact variables and non-treatment variables.

Essentially "the statistical control approach makes use of what is known and can be assumed about the relationship between variables and the observed correlations to make statistical adjustments that remove the influence of nontreatment variables on outcome variables so that the independent relationship between the treatment variables and outcome variables can be estimated."[21, 22] Most important for the evaluation team is to identify a priori those variables that appear on philosophical or empirical grounds to be associated with certain outcomes. This type of evaluation is based not only on accurate measurements, but on accurate assumptions about causal relationships of the variables being studied.

There are a series of problems associated with this method of evaluation. Most often it is used retrospectively, when data have been collected without a specific evaluation design in mind. One important assumption made by evaluators is causality. For example, if the nutritional status of children whose mothers have a high school education is observed to be superior to those with no education at all, one might conclude that nutritional status is a function of education. If that assumption is incorrect, and, in fact, some other variable such as religion affects both the nutritional status and educational level of the mother simultaneously, the results of the analysis could be biased.

Statistical techniques such as regression analysis prove to be excellent tools for dealing with these types of problems. But regression models are only as good as the insight of the model builder, who requires formidable insight into the dynamics of the project, the problems being addressed, and the community environment.

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[21] K. M. Hennigan et al., *Clarification of Concepts and Terms Commonly Used in Evaluative Research* in *Evaluating the Impact of Nutrition and Health Programs*, Robert E. Klein et al., eds. (New York: Plenum Press, 1979), pp. 387-432.

[22] For a lucid example of employing the techniques of statistic controls in analyzing nutrition data, see Roy Miller and William Drake, *The Promotora Program in Candelaria: A Revisitation Two Years after Program Ending, 1976* (Ann Arbor, Michigan: Community Systems Foundation, 1980).

- Recurrent Institution Cycle Design compares the results of individuals already in the project with a group of newly enrolled participants. In the recurrent institutional cycle design, an individual who is being measured concurrently with project enrollment, or who has been participating for a shorter period of time, serves as the control to those in the experimental group. In other words, the duration of involvement and/or the intensity of participation is used to designate subsets of the population, who are similar except for the variable of project exposure.

  This technique is often used in evaluating programs with inadequate baseline data, or when cross-sectional data only are available. This methodology is used in CARE's Preschool Nutrition Project (see abstract, p. 127) and in the Catholic Relief Services projects in Ghana and Rwanda (see abstracts, pp. 173 and 175).

  One major advantage of this methodology is that it can generally be assumed to control for the historical threats to evaluation validity discussed earlier, since individuals participating in the project and those about to enroll or who have been participating for a shorter duration, will be exposed to similar exogenous events. Similarly, it is not necessary to withhold services from individuals in the target population in order to formulate a control group.

  This design also controls relatively well for testing, instrumentation, addition and attrition, and selection-interaction effect, all of which represent competing explanations with evaluation findings. Maturation effects, however, may prove problematic. Conducting an analysis of sub-groups using age intervals or categories will enable the evaluator to determine the magnitude of this threat to validity. In fact, if one compares the nutritional status of new enrollees with individuals who have been participating for a longer duration, differentiating on the basis of age groups, one can largely control for maturation effects.

Regression-artifact effects also represent a potential problem with the Recurrent Institutional Cycle Design. This is especially true when the sickest or most malnourished children are the first to enroll in the program.

- Comparison Groups require a group to be selected which is characteristically similar to the treatment group. The first group serves as a control population. The greater the ability to "match" the two groups, the greater the confidence that can be placed in the results of the evaluation. In those instances where the match is imperfect, and recognized as such, statistical adjustments can be made using covariance or regression.

  Non-equivalent comparison groups were found to be employed most often in the studies reviewed for this report. However, it is necessary to distinguish between the two types of designs. In the first, baseline data are collected on both the experimental and control groups. At some later point in time, the same phenomenon is measured in each group. The change in status of each group is then compared, to judge the extent of impact. This is illustrated by the corn, rice and wheat fortification studies (see abstracts, pp. 157, 160, and 161).

  In the other approach the two groups are assumed to have been identical at the outset and perfectly matched. Thus, measurement is made at only one point in time, and the difference between the groups at that juncture forms the basis for impact determination. For examples of this approach refer to the cross-sectional evaluations of the Special Nutrition Programme done in the Tribal areas of Andhra Pradesh (see abstract, p. 136) and in the slums of Karnataka (see abstract, p. 133).

  The major drawback to those cross-sectional studies is that without baseline data to substantiate the similarity of experimental

and control groups at the outset of the intervention, it is often presumptuous to consider them adequately matched.

Another major design consideration in non-equivalent comparison groups addresses whether participants and non-participants are matched from within the same village, or alternatively whether distinct villages or communities considered sufficiently similar are designated treatment and control group. If the villages or individuals are too proximate to one another, there is a high likelihood of "spillover effects" in which the control group is affected by the delivery of services to the treatment group (as was witnessed in the study in Karnataka). On the other hand, if the villages or individuals are too distant from one another, the probability is increased that they will experience different environmental and other historical phenomena. Finally, individuals in a treatment village are often self-selected. Motivational factors which cause individuals to volunteer distinguish them from the rest of the population. It is all but impossible to control for such an intangible motivational factor with a comparison group design.

- Experimental Designs involve the random assignment of individuals to experimental and control groups prior to the intervention. If the sample is small, randomization can be supplemented by matching individuals prior to random assignment. Furthermore, a "pre-test-posttest control group design" may be used in which the randomly allocated experimental and control groups receive a test to substantiate their "equality" or "similarity." Thereafter, the project services are delivered to the experimental group, followed by a "posttest" to determine program impact.

The experimental design approach controls for most of the threats to evaluation validity, since it is reasonable to assume that the treatment and control groups are the same, except for the delivery of services associated with the project. Therefore, rival

explanations for observed effects are largely eliminated.

Despite these advantages, why was random assignment of experimental design not employed in most of the evaluations reviewed? What are the constraints and problems in applying this accurate methodology in the context of community level nutrition evaluation?

One answer is provided by Hatry et al.,[23] who refer to experimental evaluations as the "Cadillac of program evaluations." Its application is limited considerably by costs and logistical constraints. Another potent argument for not employing randomization in health and nutrition programs is the issue of morality. To withhold a service which has been hypothesized or proven to be effective is often considered unconscionable.

As if all these drawbacks were not enough, it must be recognized that the process of randomization is difficult to operationalize, and requires formidable advanced planning, in addition to accurate panels from which to differentiate experimental and control villages or individuals.

Once again, it is emphasized that the designs outlined above are not mutually exclusive and are used frequently in combination with one another. Furthermore, in selecting a given methodology, the techniques being considered must be related to the threats of evaluation validity. Specifically, it is the task of the evaluator to determine the purpose and use of the evaluation and decide whether impact information is required. Thereafter, the trade-offs between evaluation validity and cost must be assessed in light of choices among evaluation designs.

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[23] H. P. Hatry, R. E. Winnie, D. M. Fish, *Practical Program Evaluation for State and Government Officials* (Washington, D.C.: Urban Institute, 1973).

## V. MEASURES

For impact evaluation four classes of measures were commonly identified: anthropometric, biochemical, clinical and dietary.[1] Anthropometric measures were those such as height, weight, body part circumference and fat fold. Biochemical measures included, e.g., serum or urine analyses, and hemoglobin or hematocrit determination. Clinical measures required the identification of signs or syndromes associated with a particular nutritional deficiency, e.g., Bitot's spots, wasting, edema. Dietary measures employed methods such as a 24 hour recall, food frequency questionnaire, food balance sheets, or food diaries to obtain estimates of the types and amounts of food or nutrients consumed by individuals.[2]

Measures, in general, possess certain characteristics summarized by Deniston:[3] objectivity, coverage, directness, completeness and precision. Each class of impact measure varies in terms of these characteristics.

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[1]A series of other possible measures of nutritional status, such as vital statistics, age of menarche, morbidity rates are recognized and discussed in Susan Evers et al., "Social Indicators of Human Nutrition: Measures of Nutritional Status," Social Indicators Research, Vol. 4, No. 2, May 1977, pp. 185-205. However, we will not address these since this chapter is not designed as a thorough review of the measurement of nutritional status. Rather, it is intended to propose a framework in which to consider and judge measures. This will hopefully precipitate a rethinking about what techniques to employ, and even more importantly, serve as impetus for a review of this complex and controversial subject - how to measure nutritional status - in the near future.

[2]Three of the most useful summaries of measures and their uses as applied to specific population groups are: George Christakis, ed., *Nutritional Assessment in Health Programs,* Part 2, (Washington, D.C.: American Public Health Association, 1974); Derrick B. Jelliffe, *The Assessment of the Nutritional Status of the Community,* (Geneva: World Health Organization, 1966); David C. Miller et al., "Simplified Field Assessment of Nutritional Status in Early Childhood," Bulletin of the World Health Organization, Vol. 55, No. 1, 1977, pp. 79-86.

[3]O. Lynn Deniston, *Evaluation of Disease Control Programs,* (Atlanta, Georgia: Training Program, Center for Disease Control, U.S.D.H.E.W., June 1974).

A. Objectivity

"Objectivity of measures is closely allied to reliability. Reliability is usually thought of in terms of the 'repeatability' of scores. The greater the agreement between different observers on a score or the greater frequency with which a single observer obtains the same score when he measures the same thing several times, the more reliable is the measure."[4] "In general, we can consider a measure to be more objective the more detailed and exact the procedures for making the measurement."[5] Thus, readers will be aware of the attempts made in several of the evaluations herein to train study personnel in measurement or assessment techniques to insure that personnel employ comparable technique at any given point in time or over a period of time."[6]

Dietary measures represent the least objective measure. The manner of inquiry into dietary patterns and the way in which the questions are posed have tremendous influence on the respondent and response. As such, different interviewers in different settings will potentially elicit different responses, even thought the diet remains the same.

Biochemical measures have the greatest potential for objectivity, with clinical and anthropometric measures somewhat less objective, depending on the specific measure. For example, assessment of iron status using hematocrit is more objective than a clinical determination based on skin pallor. Objectivity also varies within each class of measures. For example, weight of an infant will usually be a more objective measure than recumbent length since an infant can be weighed in the arms of a parent but must be positioned properly on a board for length to be measured. Other factors, such as the age of the participant when the measures

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[4] Ibid., pp. 12-13.

[5] Ibid., p. 11.

[6] For a discussion of measurement variability, see Reynaldo Martorell et al., "The Identification and Evaluation of Measurement Variability in the Anthropometry of Preschool Children," American Journal of Physical Anthropology, Vol. 43, No. 3, November 1975, pp. 347-352.

are taken, the quality of tools used and the nature of the training required to do the measuring must all be considered when judging objectivity.

The important point, however, is to strive for greatest objectivity in measurement. Trade-offs in the allocation of resources among level of training required,quality of equipment used, allotment of measuring time and other variables effecting objectivity, should be factored to assure optimum reliability and repeatability.

B. Coverage

For the purpose of nutrition interventions, measurement coverage relates the degree to which the entire group under study has been examined.

Total coverage might mean either that all members of the target group had been examined, or that all members of a valid statistical sample of the entire population under study had been examined. Most studies reported below attempt to measure some proportion of individuals in the target population: a proportion which is realistic based on project resources of time, money and personnel, and large enough to provide results of the study with statistical significance.

Great attempts are made to select a sample which is representative of the entire population with regard to features thought to be of relevance to the variable under study. More often than not, the ideal target group shrinks in size as participants move from the area, die, miss appointments, decide not to participate in the study or as data are found to be improperly coded, missing or otherwise incorrect. Each of these influences the coverage of the measure and tends to make conclusions or inferences drawn from evaluations somewhat suspect. The range of coverage attempted by evaluators in the documents abstracted below varies tremendously and the degree to which evaluators were successful in realizing the ideal is equally varied.

Although coverage is noted to be an often uncontrollable feature in the actual conduct of studies, the measure selected to estimate the affect of nutritional intervention has a great deal to do with the extent of coverage obtained.

Generally, coverage is inversely related to the complexity, specificity and obtrusiveness of the measure. Thus in most instances it is easier to gather a height or weight than it is to gather height for age or weight for age since an additional piece of data, age, must be collected. A more instrusive measure, such as a fat biopsy or serum sample obtained by venipuncture, will allow evaluators even less coverage.

This phenomenon can be explained through two observations. First, more individuals will be willing to submit to the less intrusive method. Second, with limited resources available for taking measures, the simpler the measure the less its unit cost and the greater number of people who can be measured.

C. Directness

As described by Deniston, directness is "the nearness or relationship between the phenomenon we want to measure and the actual phenomenon observed."[7]

Nutrition projects are designed, by definition, to have an impact on nutritional status. Consequently, evaluators are interested in the degree to which there has been a change in nutritional status. By Deniston's definition, change becomes the phenomenon "we want to measure."

Changes in nutritional status are reflected by the difference between nutritional status at time x before program intervention

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[7]Deniston, *Evaluation of Disease Control Programs*, p. 12.

and at time y, after intervention.[8] If therefore we are able to measure nutritional status, we will be able to calculate change in nutritional status, if the same measure is used both times.

We face a problem. Unlike singular phenomena such as temperature where different but comparable measures such as degrees Fahrenheit or Centigrade exist, nutritional status is a conglomerate phenomena for which no single measure is sufficient. Measurement of nutritional status relies upon several, if not dozens of different measures which are suggestive of the whole; and the relationship between measures is often uncertain.

For example, if a visitor from Canada comes to the United States, a temperature measure will be given in degrees Fahrenheit which can be directly converted to Centigrade by using a prescribed formula. One measure defines the other and is interpretable based on an understanding of the other. This is not the case for measures of nutritional status. If an individual has a low hematocrit reading (biochemical measure), this is suggestive of poor nutritional status and inadequate dietary intake of iron. However no direct relationship exists between hematocrit and dietary measures of iron status since the poor iron status could be due to a variety of causes unrelated to the amount of iron in the diet, e.g., phytate blockage or illness.

How certain can we be that any single measure measures nutritional status directly? In a sense this question could be rephrased to read: how closely can one examine an individual whose nutritional status is of interest?

We may logically separate measures into groups. The first group contains dietary measures. These are one step removed from the

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[8]See Majorie F. Fruin et al., "Some Considerations in the Measurement of Change," Journal of the American Dietetic Association, Vol. 73, No. 1, July 1978, pp. 15-19.

individual since not only is there "many a slip twixt the cup and the lip" but also many a slip twixt the lip and the loo! Despite seemingly adequate consumption, nutritional status may be poor due to infection, excessive work or improper metabolic function.

Anthropometric measures form another group since they actually measure some physical characteristic of the individual and adequate nutrition is a necessary but not sufficient factor for growth. Biochemical measures and clinical measures are the final two groups. They measure physical characteristics of individuals and are also closest to the object of interest, nutritional status. Unlike dietary and anthropometric measures, however, they often measure a single aspect of nutritional status, such as mineral or vitamin levels.

Measures which evaluate the impact of nutrition projects fall on a continuum of directness which ranges from least direct to most direct (see figure 6). We have chosen to break that continuum to form two discrete sets, which are referred to in the literature as process and impact measures. Conceptually, impact measures, which tend to fall closest to the "most direct" end of the continuum, are referred to as measures of nutritional status. Process measures, which tend toward the "least direct" end of the continuum, are only suggestive of nutritional status as they measure elements that are thought to be "distant" from nutritional status.

Directness of Measures

Figure 6

The four types of measures used for impact evaluation, anthropometric, clinical, dietary and biochemical, have been outlined earlier in this section. Although each of these fall in the set of impact measures, their directness varies. Similarly, the different process measures can be represented at different points along the continuum, some more direct than others.

The theory of a continuum which describes the characteristic of directness is best examined by illustration. The output of a nutrition education program is that women are given classroom instruction related to food purchasing and menu preparation in order to gain knowledge and change behavior. The purpose is to improve nutritional status. Process evaluation measures document whether or not the classes occurred, or if they did occur, how frequently. This falls toward the least direct end of the continuum. Another process measure, that of whether the participants were able to reiterate nutrition information or purchasing hints, is a more direct process measure.

As we continue toward the "more direct" end of the continuum, we begin to examine process issues such as behavioral change in purchasing and preparation. It is not, however, until we look at change in dietary intake, that we cross the boundary between impact (nutritional status measures) and process. Dietary data represent the least direct of the impact measures. Anthropometric, clinical and biochemical represent more direct types of measures (see figure 7).

Directness of Measures of Nutrition Education Program

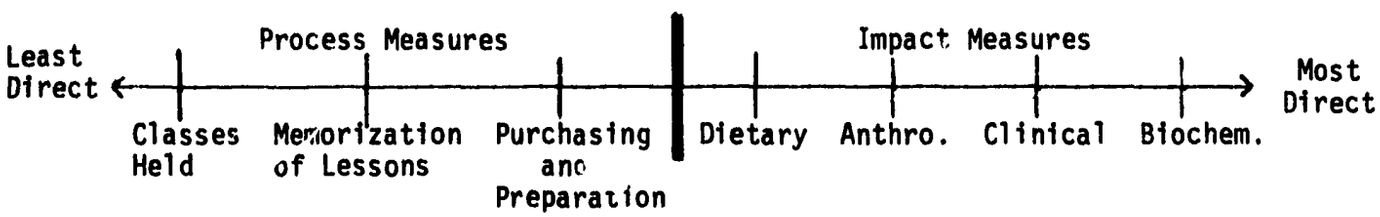


Figure 7

In examining this case of a nutrition education project, it becomes apparent that, as with evaluation methodologies in general, each project or program type defines a different directness continuum. That is, the positioning of the measures within the process or impact sets is variable. However, the contents of the sets themselves are well defined (i.e., dietary, anthropometric, clinical and biochemical are the set of impact measures).

To amplify with another example, a P.L. 480 Title II supplementary feeding project has a purpose of improving general nutritional status, to address the chronic and acute malnutrition in the population. A calorie and protein supplement (e.g., bulgur, rice) is provided to at-risk children. The process measurement of whether the food is distributed is a very indirect measure of nutritional status. The series of assumptions and hypotheses between dishing out plates of gruel and the resultant nutritional impact are numerous and unsubstantiated (see p. 25). On the other end of the continuum for the feeding program, anthropometric data is a most direct measure as it quantifies the improvement in nutritional status as determined by growth.

In vitamin A fortification project, measuring the extent to which vitamin A capsules or enriched food are distributed is a measure similar to measures which quantify provision of a P.L. 480 general food supplement. However, the fortification process measure is more direct, since the causal chain of events which link vitamin A ingestion with improved vitamin A status is short, substantiated and well understood. Note the care which is taken in most fortification projects to select a widely consumed food for fortification. In capsule distribution projects capsules are generally consumed at the project site.

Unlike the feeding program, however, the use of anthropometric measures to determine impact is a relatively indirect method for evaluating the impact of the vitamin A project. Rather, measures

such as serum retinol levels are closer to the "most direct"end of the continuum for the vitamin A fortification project, and conversely are extremely indirect for the feeding projects (see figure 8 ).

Directness of Measures for Supplementary Feeding

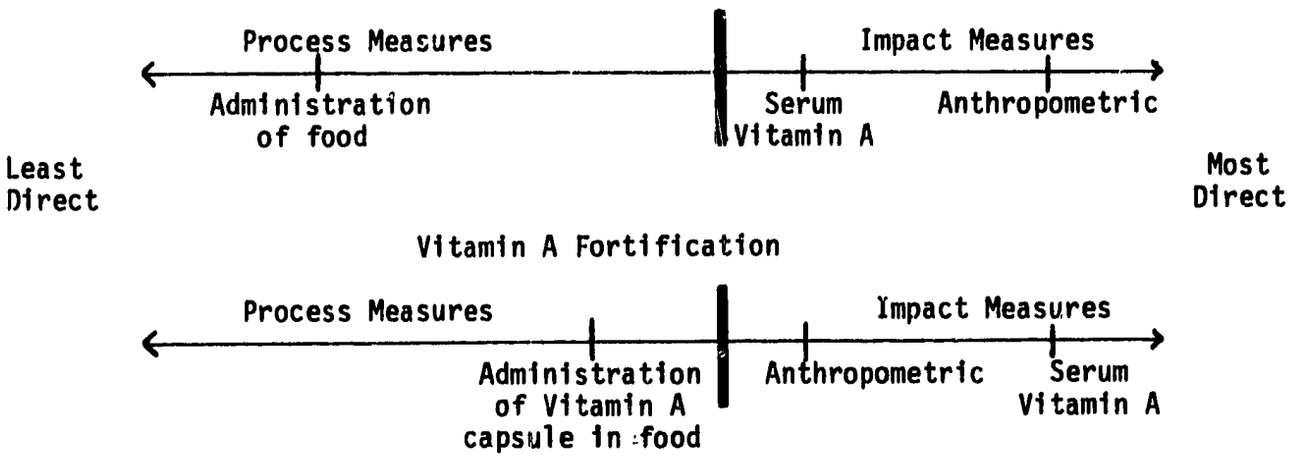


Figure 8

What emerges is that if we disaggregate nutritional status into its components or subunits the characteristic directness appears in a different light. And often this disaggregation is the case for nutrition interventions where preliminary investigation has determined that specific nutrient deficiencies are extant. We then seek to measure not nutritional status as a general, comprehensive phenomena, but specific phenomena of interest such as vitamin A status, iron status or protein consumption. For these subunits a range of measures exist which vary in their directness. For vitamin A status for instance, serum retinol (a biochemical measure), presence of Bitot's spots (a clinical measure), consumption of leafy green vegetables (a dietary measure) may all be used. The order of magnitude of "directness" in this list varies directly with the order in which they are mentioned.

Disaggregating even further, each of the measures mentioned above is found most direct for measuring specific phenomena. If our object of interest - instead of vitamin A status - is level of

vitamin A found in the blood, then a laboratory test for serum vitamin A is exceptionally direct. If our object of interest is clinical manifestation of vitamin A deficiency, presence of Bitot's spots becomes exceptionally direct. If consumption of vitamin A is our phenomenon of interest, then dietary measures are our choice for most direct.

D. Completeness

The fourth characteristic of measures, completeness, is described by Deniston as "the extent to which (measures) assess the full extent of a phenomenon of interest ... whether or not the observed phenomenon is the phenomenon of interest."[9] Dietary measures such as the 24 hour recall are notoriously incomplete since individuals may forget what foods were consumed or attempt to please investigators by reporting increased consumption of nutritious foods. Food frequency questionnaires may be written in such a fashion that major foods consumed by individuals in a region are not listed if inadequate preliminary investigation has been conducted. Biochemical measures vary in their completeness as is well illustrated for a number of parameters by Sauberlich,[10] and by Cook[11] in his discussion of hemoglobin, transferrin saturation, free erythrocyte protoprophyrin and serum ferritin. Anthropometrics are seemingly more complete since they measure what they intend to measure. But they are subject to measurement error as well as erroneous interpretation.[12]

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[9]Deniston, *Evaluation of Disease Control Programs*, p. 13.

[10]Howerde E. Suaberlich, *Biochemical Parameters in the Nutrition Assessment of Infants, Children, Youth, and Pregnant Women*, in *Proceedings: Nutrition Assessment of Children and Youth Workshop*, Lansing, Michigan, May 2-4, 197, pp. 33-61.

[11]James D. Cook, *Iron Deficiency: Methods to Measure Prevalence and Evaluate Interventions*, paper presented at the International Symposium on Nutrition Interventions, Santiago, Chile, August 20-24, 1978.

[12]For a discussion of these potential problems, see Stanley M. Garn, *The Last Word: Hazards and Interrelationships in Nutritional Screening and Monitoring*, in *Proceedings: Nutrition Assessment of Children and Youth Workshop*, Lansing, Michigan, May 2-4, 1977, pp. 137-153.

The completeness of a measure varies depending upon whether the object of interest is a single indivjdual, or a community or even a nation; e.g., aggregate dietary data may be more complete for the evaluation of the nutritional status of a community while individual, dietary data may be an incomplete measure and of little use.

The extent to which any single measure may be used to determine nutritional status varies tremendously, and this topic has been the subject of considerable discussion in the literature.[13] As a result of prior research or baseline data collected in the geographical area under study, evaluators may be able to identify single measures or groups of measures which may seem reasonably complete, but it should not be assumed that a single measure found useful or found to correlate well with overall nutritional status in one area will be useful elsewhere.

E. Precision

The exactness with which a measure is able to describe a phenomenon of interest - is a final measurement characteristic. For instance, height as expressed in inches is more precise than height as expressed in feet; weight as expressed in pounds and ounces is more precise than weight expressed solely in pounds.

Precision is not a virtue in and of itself and the extent to which precision is important in evaluation of nutritional status depends upon the type of individual under study. Weight measured in pounds and ounces might be more valuable for an infant, whose total weight soon after birth is approximately five pounds, than for an obese adult weighing 250 pounds.

The degree of measurement precision required also varies in terms of who will use the information. Comparatively precise anthropometric

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[13] Michael C. Latham, *Planning and Evaluation of Applied Nutrition Programmes*, FAO Nutritional Studies No. 26. (Rome: FAO, 1972), pp. 82-85.

measurements are frequently made in terms of fractions of inches or centimeters. Although such measures may be of value to physicians or researchers, often such data is converted into less precise categories, e.g., first or second degree malnutrition, which are of greater use to program planners, resource allocators and unsophisticated field workers.

The same measure may be sufficiently precise in one organizational or field setting and not precise enough in another. Clinical measures are sufficiently precise for developing nations since signs of primary dietary deficiency diseases are quite manifest. Nutritional status is therefore a discrete condition and the categories illness and lack of illness, or deficiency disease and lack of deficiency disease are precise enough. The same measures are insufficiently precise in developed nations where frank malnutrition is less obvious.

Degrees of precision certainly can be identified within each type of nutritional measure - for instance serum ferritin is more precise than hemoglobin determination as a measure of iron deficiency. Likewise, a 24 hour dietary recall is more precise than a food frequency questionnaire, as a measure of nutrient intake.

## F. A Final Note

A final observation about these measures is warranted. The utility of a measure varies according to who uses it. Process measures may be "direct enough" for program planners and administrators who are interested in movement of food or the purchase of commodities, but be indirect and of little value to project personnel who are daily faced with the need to determine who are the individuals suffering from malnutrition, and to high level decision-makers or funders who are charged with the responsibility for allocating sufficient resources to ameliorate problems of malnutrition.

Once again, we highlight the basic issue which confronts evaluators and program planners alike - the need to clearly define what it is a program, as well as the subsequent evaluation, intend to accomplish. The clarity of definition determines to a large degree the the measures which can best be used to assess levels of project achievement and assure the most objectivity, coverage, directness, completeness and precision.

## VI. RESEARCH, EVALUATIVE RESEARCH AND OPERATIONAL PROJECT EVALUATION

One finds frequent use of the terms research and evaluation in the literature; sometimes these words are used together as in evaluative research; often the words are used separately but interchangeably; and still other times great care is taken to distinguish one from the other. The formulation of a distinction between research, evaluative research and evaluation of operational programs was a task we attempted to avoid because on first look it appeared to be a red herring in the difficult search for evaluation truths. It soon became clear, however, that some distinction was in fact useful. This conclusion reflected our growing awareness that the documents typically referred to as the "literature on nutrition evaluations" were written by authors who had distinctly different orientations toward the subject.

### A. Research

Wolf says that "research is concerned with the production of knowledge that is generalizable."[1] The primary motivation for research is to expand the boundaries of knowledge. Researchers ask whether hypotheses are sustainable and acknowledge their ignorance about outcomes. The goal of contributing to an understanding of natural, physical and social phenomenon, through the formulation of and testing of hypotheses and scientific principles is central. As such, utilization of scientific method and controlled experimentation is characteristic.

Since researchers state their objectives in terms of gaps in the state of knowledge, they manipulate independent variables to understand their effect on dependent variables; the plight and welfare of the study population is significant but not of primary concern.

Some examples of nutrition research include a determination of dietary

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1 Richard W. Wolf, *A Guide to the Evaluation of Nutrition Education Programs*, ED-75/WS/87 (Paris: UNESCO, 1975).

requirements of various populations and the development of appropri te growth standards. Likewise, an exploration of: the effectiveness of a formulated food in the convalescence of malnourished infants (see abstract, p. 88) or a new high yielding variety maize in improving growth (see abstract, p. 90) or the determination of whether there exists a causal relationship between maternal and child malnutrition and growth failure, developmental retardation and infant morality (see abstract, p. 85), all fall in the domain of research. What must be stressed is that research can be laboratory based in the confines of a research facility, or alternatively conducted in a field "laboratory."

B. Evaluative Research

According to Suchman[2] evaluative research "is a specific form of applied research whose primary goal is not the discovery of new knowledge, but rather a testing of the application of existing knowledge." In other words, evaluative research can be viewed as field intervention trials. Emphasis is placed on not only determining the benefit accrued to an individual from the manipulation of an independent variable in the environment, but also on assessing the improvement in the welfare of the community in general. As such, the feasibility of intervention in a community context is examined.

The purpose of an evaluative research activity, like all research, is rarely defined in terms of improving the welfare of the study community. Instead, the findings are mainly utilized in the process of decision making and policy formation, since the focus of interest is on the viability of a given intervention strategy, and its replicability in other settings. Therefore, such evaluative research efforts often encompass such activities termed "demonstration," "pilot," "model" or "prototype" projects, which are being analyzed for their potential application elsewhere.

Unlike pure research, however, which attempts to substantiate the hypotheses

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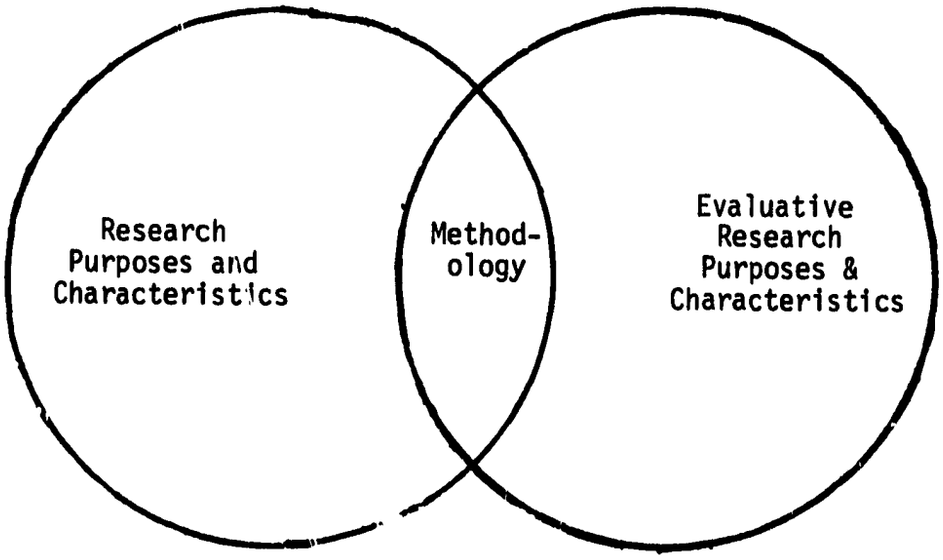
[2] Edward A. Suchman, *Evaluative Research: Principles and Practice in Public Service and Social Action Programs* (New York: Russell Sage Foundation, 1967), p. 75.

used in the construction of the logical framework, evaluative research can be conceptualized as examining the assumptions and linkages between the provision of resources (inputs) to the development of operationally viable projects (outputs), which are designed to improve nutritional status (purpose). It is a search for generalizable information (hence the adjective research) using state-of-the-art knowledge and scientifically proven principles in the field, which characterizes evaluative research. So while research tests the hypotheses that form the theoretical basis of a project, evaluative research seeks insight into the practicality, transferrability and efficacy of a project based on the scientific evidence.

It is worth emphasizing that one possible cause for confusion in distinguishing research from evaluative research is that they demonstrate intersection in methodology; this despite the divergence in purposes (see Figure 9).

Figure 9

Methodological Intersection of Research and Evaluative Research



Regarding the common methodology, view the original papers by Campbell[3] and Campbell and Stanley[4] and the frequent mention of those papers by other authors.

In the review of the literature, it quickly became apparent that the vast portion of the available documentation on nutrition evaluation falls into this category of evaluative research. Documents which describe the Exploratory, Expansive and Intesive Phases of Project Poshak (see abstract, p. 131), the Synectics nutrition education methodology (see abstract, p. 97) and the vitamin A fortification schemes in Guatemala and Java (see abstracts, pp. 150, 152) fall into the domain of evaluative research. Abstracts of these and other similar efforts will be found in Chapter VII. Such documents on evaluative research have been included because they provide important information for planning or initiating similar projects; to disregard them would leave the readers of this review with little information concerning the techniques and experiences in project analysis that have been applied in the field.

One caution is provided to readers in reviewing evaluative research reports. The findings concerning the impact of many of these interventions may well be skewed towards success as more often than not, they examine pilot or demonstration projects in which there has been a greater commitment of resources, including money and personnel, than would be found in an operational project.[6] Therefore, the degree of effectiveness observed in such projects may not necessarily be transferrable to large scale interventions.

C. Operational Program Evaluation

Unlike research and evaluative research, the search for new knowledge by

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[3] Donald T. Campbell, "Reforms as Experiments," American Psychologist, Vol. 24, No. 4, April 1969, pp. 409-429.

[4] Donald T. Campbell, J. C. Stanley, *Experimental and Quasi-Experimental Designs for Research* (Chicago: Rand McNally, 1966).

[5] Reva T. Frankie, Anita T. Owen, *Nutrition in the Community: The Art of Delivering Services* (St. Louis: C. V. Mosby, 1978).

[6] Beaton and Ghassemi, *Supplementary Feeding Programmes for Young Children in Developing Countries.*

the testing of hypotheses, or the viability of a program design are not a primary concern of what we will label operational program evaluation. An operational program precedes operational program evaluation. It is expected that prior to implementation of an operational programs: (1) the scientific principles and hypotheses on which the project is based have been substantiated (the role of research); (2) the applicability and transferrability of this knowledge to the field has been explored elsewhere in an evaluative research mode; and (3) that the functionaries can provide reasonable assurances that with the allotted level of funding, program services can be delivered as planned. It is thus valid to assume that if the service is delivered as planned, the expected outcome will result. If the project planner did not have any fore-knowledge or expectations of outcome, and did not have a good reason to believe that project activities would lead to improved nutritional status, it was irresponsible to initiate the project altogether.

Since the locus of concern of operational program evaluation is the program itself, two distinct roles must be considered. The first role falls in the domain of summative evaluation. Decisions about program expansion, contraction, and continuation often prompt this type of evaluation. Impact data are usually collected, and decisions subsequently made (or supposedly made) on the basis of the findings. These data collection efforts are methodologically analogous to evaluative research.

The other role of operational program evaluation is less concerned with measuring achievement than assuring it; this type of effort falls in the domain of formative evaluation. The basis of formative evaluation strategy is the careful monitoring of the project, concentrating on the collection of selected process and/or impact data. It results in the constant re-adjusting of project services and the delivery system since it is extremely difficult to know in advance both what the optimal intervention strategy is, and how best to assure the delivery of project services.

## VII. REPORT AND DOCUMENT ABSTRACTS

### A. Abstract Outline

This section of the report, as requested by AID/Washington, contains abstracts and commentary to acquaint future contractors with previous literature on evaluation methodologies and experience. We have attempted to provide enough information in the abstracts so that readers do not have to return to the source documents.[1]

The documents abstracted were found in catalogued literature, and obtained directly from multilateral and bilateral development agencies, philanthropic institutions and private voluntary agencies. We did not abstract all the literature, but selected those sources which were indicative of the bulk of the documentation, or were considered most innovative or important in the field. Regardless of who sponsored the program, what its objectives were, or which evaluation methodology was employed, a consistent outline was followed during abstracting.

Initially a description of the project is presented. This includes project name and location, objectives, focus and a discussion of activities which describes the intervention itself. This information is given in as brief and terse a form as possible, since discussion of intervention strategy was not within the boundaries of this literature review.

A description of the evaluation design received the most attention. The abstracts report why the evaluation was undertaken and what its objectives were. Unless stated otherwise, evaluation purposes were those stated by the investigator, not perceived by the abstracter.

Next, the abstracts report information on resources (i.e., time, money, staff, equipment) committed to the evaluation, as well as whether

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[1] For those individuals interested in reviewing an original document in its entirety, copies of some of the documents cited may be obtained from *Nutrition Planning*, P.O. Box 8080, Ann Arbor, Michigan 48107, U.S.A.

evaluation was performed before program initiation, during program operations or after program completion. In addition, when information was available, the abstract states who performed the evaluation (e.g., internal/external).

The actual methodology employed for the evaluation forms the bulk of the abstracts. Also noted are important baseline data, or other data collected, how they were collected and by whom. In turn, the types of measures used or performance indicators employed are noted.

Finally, a minimal amount of information on evaluation results is given. This will hopefully indicate to the reader the range of findings for different program types and evaluation methodologies. In addition, it provides insight into how program conclusions are drawn and to what ends they will be used.

## B. Abstracts of Research

The following examples contain all or many of the characteristics of research as discussed in the previous chapter. The projects studied were all initiated primarily to expand the boundaries of knowledge; there was no initial projection of project effects and the major project purpose was not the improved nutritional status of the target group, but rather the examination of underlying hypotheses. This testing of hypotheses is a pre-requisite to designing programs with expected outcomes and with a purpose of improved nutritional stutus. If hypotheses are not tested, there can be no reasonable expectation of outcomes. Rather than a constructive intervention, we have undirected interference in community affairs.

### INCAP - Maternal Nutrition, Guatemala[2]

One research study which attempts to understand the effect of providing supplementary foods to mothers, infants and children was reported by

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[2]Robert E. Klein et al., "Effects of Maternal Nutrition on Fetal Growth and Infant Development," Bulletin of the Pan American Health Organization, Vol. 10, No. 4, 1976, pp. 301-316.

Klein et al. This followed a series of major research studies in Guatemala concerning the etiology of malnutrition, its causation and control, conducted by Scrimshaw et al.[3] and Mata.[4]

For illustrative purposes, the study by Klein et al. is looked at more closely. From January 1969 to November 30, 1974 a large scale study was conducted in four rural Guatemalan villages to assess the impact of food supplementation on children, their early physical and mental development and the prevalence of infant mortality.

This longitudinal investigation was designed to: (a) determine the existence of a causal relationship between maternal and child chronic moderate malnutrition and growth failure, developmental retardation and infant mortality; and (b) estimate the expected decrease in the prevalence of these conditions by improved nutrition.

Note that the intent of the research is to determine whether or not a causal link between mortality, growth failure and malnutrition exists. A relationship is not assumed, as would need to be the case for this to be considered a project evaluation.

Results from the second part of the study -- estimating the decrease in mortality and growth failure as a result of improved nutrition -- provide a future basis for estimating attainment of project purpose in the planning stages of other nutrition projects, a necessary first step for evaluation design, as discussed below.

In two villages, lactating and pregnant mothers and their infants, or infants to be, received atole (a protein-calorie supplement) while those in two other villages received fresco (a caloric supplement in the form of a cold drink).

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[3] N.S. Scrimshaw et al., "Nutrition and Infection Field Study in Guatemalan Villages, 1959-1964: I. Study Plan and Experimental Design, "Archives of Environmental Health, Vol. 14, p. 657ff.

[4] Leonardo J. Mata, *The Children of Santa Maria Cauque,* International Nutrition Policy Series No. 2, (Cambridge, Massachusetts: MIT Press, 1978).

Data collected from mothers and children included: (a) independent variables such as subject's attendance at feeding center and amount of supplement ingested; (b) dependent variables such as assessment of child's physical growth and mental development; and (c) other information such as mother's obstetric history, details of the delivery, details of clinical examination, family dietary status, maternal morbidity status and family socioeconomic status.

The main variables measured (with the size of the sample in parentheses) were as follows: prevalence of physical growth retardation at birth (405 children), and at 36 months of age (581); psychological test performance at birth (157), six months (472), 15 months (460), 24 months (480) and 36 months (565); and infant mortality (44).

This research design presents an experimental and comparison group format with a range of data collected which might be typical of either research or evaluation.

Statistical tests for analysis of variance and regression were employed in the study of birthweight and growth retardation. Chi-square test was used to measure the degree of correlation between psychological test performance and both food supplementation and socioeconomic status. Physical growth retardation was examined in terms of: (1) caloric supplement ingested during pregnancy and birthweight of the infant; (2) growth (weight, height, head circumference) of the children at 36 months of age compared with the Denver Standard; and (3) maternal measurements and birthweight.

In the first case, the mothers were divided into four groups according to the kind of supplement (atole or fresco) and the amount - either high calorie (over 20,000 calories of supplementation during pregnancy) or low calorie (less than 20,000 calories). Birthweight of infants was studied in relation to these four groups. In the second case, indicators of growth retardation were measured in children at 36 months, grouped according to the amount of supplement received: low (less than 5,000 calories per quarter); or high (more than 10,000 calories per quarter). In the third case, other maternal variables (home diet, body weight and

height, head circumference, morbidity during pregnancy, obstetric characteristic and socioeconomic status) with the potential of affecting infant birthweight were examined.

The impact of food supplementation on mental development over the entire time span, and at discrete segments of child's life, was assessed by various psychological performance tests selected according to theoretical and statistical criteria. Test scores were grouped according to levels of supplement intake (low, medium, high) and correlated with total supplement intake. Also examined were a variety of potential contributing factors such as repeated psychological testing, child morbidity, level of parental cooperation with the project, differences among the four villages, attendance at supplementation centers, family socioeconomic status and children's home diet.

In terms of infant mortality, a comparison of caloric supplementation during pregnancy and lactation with stillbirth or infant death during the first year of life was made.

Among the findings: caloric supplementation during pregnancy was correlated with higher birthweight of the babies, or conversely a decrease in the proportion of low birthweight infants. In addition, better performance in psychological tests, evident at six months of age and continuing up to 36 months, was observed as a result of the food supplement.

While much of the study design and research methodology in this paper are obviously similar to evaluations we cite later, the essential element of testing underlying hypotheses about food supplementation and the failure to have any predetermined goals for program impact, distinguish this as research.

Flexical for Malnourished Infants[5]

Another type of research, supported by AID, involved the "Evaluation of Flexical" to determine its nutritional value in the diet of

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[5]George Graham, *Evaluation of Flexical (3200-BD) in the Diet of Convalescent Malnourished Infants,* (Miraflores, Peru: Instituto de Investigacion Nutricional, 1974).

convalescent malnourished infants in Peru. Three types of product testing are described.

First, short-term comparative studies in three infants were conducted in which the nitrogen balance technique was employed. Flexical was diluted with sucrose and cotton-seed oil to obtain a 6.4% protein-calorie level for comparison with a control diet of casein, cottonseed oil and sucrose. Two infants then received the casein diet for a nine-day period, followed by nine days on Flexical, and nine days on the casein diet. The third infant received a different diet during each nine day period. Urine and stool samples were collected during the last six days of each period for fat and nitrogen determinations. In one child, an additional nine days on full strength Flexical was tested. Serum albumin and body weights were also determined.

Second, the long-term use of undiluted Flexical (8.8% protein calories) was investigated in four female infants in the convalescent phase of recuperation from malnutrition. Flexical was the single source of nourishment for these children for 2-3 months. Weight, height and serum proteins were determined.

Third, undiluted Flexical (8.8% protein calories) was assessed in the initial management of four severely malnourished children (one kwashiorkor, three marasmic kwashiorkor). This product was the only food for the first 25-49 days of hospitalization. Height, weight and serum proteins were determined.

Results indicated that Flexical was of excellent nutritional value in all three situations in which it was tested. Long-term use of undiluted Flexical in the four infants in the convalescent phase of recuperation resulted in significant increases in weight and height and steadily increasing serum albumin concentrations. The four severely malnourished infants initially managed with Flexical as the sole source of protein fared well in terms of improved nitrogen retention and had normal fecal fat values and normal serum albumin levels.

IARI - Opaque-2 Maize, India[6]

Another research project involved a program to test whether opaque-2 maize supplemented with vitamins and minerals could prove to be an inexpensive vehicle expecially useful in preschool feeding programs. This notion was tested by the Indian Agricultural Research Institute, New Delhi with funds from the Food and Nutrition Board, Ministry of Agriculture and Irrigation. This was done by comparing the effects of opaque-2 maize with the effects of skimmed milk and normal maize on the growth rates of children 18-30 months of age.

Two low income colonies were selected on the basis of accessibility to research personnel, amenability of physical structures and adequate numbers of children of the desired age. Children were assigned to one of four groups for 183 days. The three experimental groups received a mid-day supplement based on either skimmed milk (43 children), normal maize (38 children) or opaque-2 maize (42 children). The control group (42 children) received no supplementary food. Supplements were iso-calorie and iso-protein. Nutritional status of children was assessed by anthropometric measures of weight, height, and left mid-arm, head and arm circumference. For the experimental groups, all measures were recorded before supplementation began, following final supplementation, and two months after final supplementation. Height and weight were measured every two weeks while head, chest and arm measures were made at monthly intervals. For the control group, all measurements were made monthly.

Average circumference data, body heights and weights, average change in circumference data, body weights and heights and relative food efficiency (wieght gain/food calories consumed) were figured. Rates of increase in body weight, height and circumference were calculated by regression analysis.

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[6]Indian Agricultural Research Institute, *Nutritive Value of Opaque-2 Maize*, New Delhi, 1977.

Dietary measures (three consecutive 24 hour recalls) were taken on three occasions. Attendance and morbidity measures were also made.

In general, the anthropometric data suggested that the skimmed milk group recorded gains superior to the opaque-2, ordinary maize strain and control groups.

Various limitations to the study are indicated: the amounts of food consumed at home were not controlled; attendance at feeding centers varied considerably among groups; the supplementary feeding experiment would have yielded sharper results if it had been extended another six months.

C. Nutrition Education Programs

Nutrition education projects assume many forms, from pamphlet distribution to radio broadcast; from face-to face counseling encounters to large, impersonal classroom presentations. All are designed with a similar logic: to somehow convince the listener or reader of the value of the message presented. Following this first step, behavioral change is expected,resulting in behavior congruent with the media's message and a lifestyle more salubrious to the listener.

Both Wolf[7] and Zeitlin[8] discuss the evaluation of nutrition education projects in a comprehensive fashion.[9] They agree on the measurement of several characteristics. Zeitlin's KAB (Knowledge, Attitude, Behavior) model and Wolf's statement that "Nutrition education programs will often seek to have learners acquire knowledge, be able to use knowledge ... act in specific ways in various situations, acquire particular habits and attitudes towards foods and diet ..." (p. 7) are remarkably similar in content. Wolf proceeds to describe how to formulate specific educational objectives keeping in mind the need to determine, after some degree of project activity, whether the educational objectives have been attained.

These descriptions will remind the reader of statements made earlier in this document: that evaluation is an integral part of project planning; that the objects or attainments one seeks to measure in the evaluative process are precisely those which one postulated would change as a result of project initiation. Read in Wolf: "Educational objectives should be statements of learner behaviors ... Educational objectives should be stated in terms of observable behaviors of learners"(p.7).

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[7] Richard M. Wolf, *A Guide to the Evaluation of Nutrition Education Programs,* ED-75/WS/87, (Paris: UNESCO, 1975).

[8] Marian Zeitlin, *Directions for the Evaluation of Nutrition Education,* in *Teaching Nutrition in Developing Countries,* ed. Kathryn W. Shack, (Santa Monica, California: Meals for Millions Foundation, 1977), pp. 169-193.

[9] Synectics Corporation also has documented a methodology which is described on page 70.

Wolf continues with a discussion of those measures which may be employed by evaluators to determine whether objective attainment has been achieved, e.g., written tests, oral questionnaries, observation. Wolf describes a testing procedure designed for high efficiency and coverage called multiple matrix sampling. It is described as particularly suited for project evaluation of knowledge and attitude outcome and allows for a reduction of the time spent on data collection. Briefly, each project participant is asked to reply to a series of questions which cover only a small portion of the material covered during project lessons. When individual test questions are aggregated, they cover all material presented by the nutrition education curriculum. This method assumes that in project evaluation, comparisons are not made between individuals but on a larger group basis.

For nutrition projects, however, achieving educational objectives is not sufficient. Sole reliance on measurement of KAB changes places the evaluator in the unfortunate position of relying on the assumption that K, A, or B will necessarily be reflected in a change in nutritional status. This is an assumption of dubious strength; many examples are found in the literature of cases where individuals are able to recount food groups, or identify and explain the virtues of high protein foods but are unable to demonstrate improved nutritional status by any accepted measure.

Zeitlin expands her model to include measurement of an additional variable, Improvement in Nutritional Status (INS), one which ought to be paramount in the evaluation of any nutrition project. "If our education is effective, the results will be reflected in improved nutritional status ... No matter how impressive our successes are in changing reported knowledge, attitudes and behavior ... if these changes do not result in improvements in child-growth, in mortality rates or in other physiological indicators ... we fail to achieve our final objective"(pp.177-178).

Important to note, as most readers will realize, are the overwhelming number of factors besides project intervention which may intervene

during time of project activity. Socioeconomic, seasonal, educational and ethnic variables come to mind immediately and any realistic evaluator must account for the influence of these variables by measuring them and controlling for them where possible.[10]

Manoff International - Radio Education, Philippines and Nicaragua[11]

In the Philippines and Nicaragua, health and nutrition education messages patterned after the"reach and frequency"technique of commercial advertising were broadcast by advertising radio for approximately one year under sponsorship of Manoff International, Inc. with funding from AID. Messages were directed to mothers of infants under 12 months of age in the Philippines, and directions were given for preparing a nutritious weaning food of rice porridge with oil, fish and vegetables. In Nicaragua, the message included recipe instructions for a home made rehydration fluid, "Super Limonada." Directions for its proper use coupled with other advice for dealing with childhood diarrhea were broadcast. The evaluation was designed to measure the impact of the message on the knowledge and attitude of mothers and their methods of feeding infants in the Philippines. The evaluation determined project impact on mothers caring for children with diarrhea in Nicaragua.

Manoff International was responsible for designing and implementing program activities and for developing the survey instrument in the Philippines. The National Media Production Center joined with Manoff for the evaluation. In Nicaragua, Manoff International, Instituto

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[10] Zeitlin (ibid.) lists 24 correlates: family income and wealth; mother's age; employment pattern, educational level and source of child care advice; father's educational level; number of adults living in household; number of children in family; appliances at home; family participation in health services and other community activities; family food purchasing behavior and meal patterns; food beliefs - including weaning food and breast-feeding behavior; morbidity recall; birth intervals between siblings; water supply; cropping patterns and seasonal availability. The choice of variables for study depends upon the specific focus and purposes of the investigation.

[11] Richard K. Manoff; Thomas M. Cooke; Susan T. Romweber, *Radio Nutrition Education - Using the Advertising Technique to Reach Rural Families: Philippines and Nicaragua,* (Washington, D.C.: Manoff International , 1977).

Nutricional de Centro America y Panama (INCAP) and other Nicaraguans designed the survey instrument. Field work and coding were performed by a group of Nicaraguan students and professional interviewers. No indication is given of the cost of the evaluation component.

Initially, a random sample of 14 municipalities from sections of Iloilo and Cebu provinces were selected to serve as test and control areas, respectively. Although similar in most characteristics, groups from test areas had a higher percentage of educated mothers. Three "waves" of evaluation were undertaken. In the first wave 700 individuals from the test area, 300 from the control area and 99 community workers in the test area were sampled prior to the beginning of broadcast to provide baseline data. After six months of broadcast, 674 mothers from the test area (175 from wave I) and 296 from the control area (99 from wave I) groups were interviewed, along with 130 community workers. Finally, in wave III 660 mothers (166 from waves I and II) from the test area, 291 (76 from waves I and II) from the control groups and 99 community workers were interviewed. The questionnaires used in each evaluation wave elicited similar information regarding sociodemographic data, feeding habits, cooking habits and information concerning radio ownership, listening habits and whether any knowledge gained from, and unchanged behavior due to the broadcasts could be reported. Because of lower cost, the emphasis was on "self-reported behavioral changes rather than those verified by observation, anthropometric measures, or clinical records" (p. 16).

In Nicaragua, no control group was created since radio messages effectively reached the nation's entire population. Data were collected from individuals during 30 minute interviews at three points in time: wave I-- prior to broadcast, wave II -- six months following broadcast and wave III -- ten months post-broadcast. Respondents provided sociodemographic information and were queried about their media habits, their treatment of diarrhea and their knowledge of its effects, their familiarity with Super Limonada and availability of the rehydration fluid's ingredients. All of these were topics for radio broadcasts. In addition, mothers

were asked to report their reactions and behavioral changes in response to broadcast advice. Doctors and other community workers were also interviewed to substantiate information received on the self reporting of knowledge, attitude and behavior change. Data were compared over the three waves.

Segments of 20-30 households, "clearly defined by physical limits such as rivers, roads, fences, etc." served as the basis for sample selection. The sample universe contained approximately 6600 rural segments. From this pool 330 segments were initially drawn and 110 were drawn at each wave for questioning. Mothers who had children less than five years of age with recent diarrhea were questioned. "All interviews were recorded on tape cassettes for use in providing feedback to individual interviewers, in verifying the accuracy of completed questionnaires, and in coding"(p. 43).

Moderate success is reported by the authors with the use of this media technique. Degree of achievement varied but generally improved over the year of broadcast.

Caribbean Food and Nutrition Institute - Breastfeeding, Trinidad[12]

A six week media campaign with the more limited purpose of promoting breastfeeding was undertaken in 1974 by the Housewives' Association of Trinidad and Tobago, a group of private advisers. It included the publication of five different posters in daily newspapers (18 issues), a once daily television message, and a 15-20 second radio advertisement broadcast four times a day on two local stations.

The evaluation of the project was aimed at determining the proportion of the target population reached, the improvement in knowledge about breastfeeding, and the effectiveness in reducing early introduction of

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[12]Miguel Gueri; Peter Jutsum; Alison White, "Evaluation of a Breast-Feeding Campaign in Trinidad," Bulletin of the Pan American Health Organization, Vol. 12, No. 2, 1978, pp. 112-115.

bottle feeding. The Caribbean Food and Nutrition Institute carried out the evaluation with specially trained registered nurses performing the interviews.

The sample consisted of all women who delivered infants at the two largest public hospitals over a six week period immediately following the media campaign. No true control was utilized. Mothers were interviewed twice: first in the hospital within two days of delivery and again four months later at home. In the first interview, knowledge about breastfeeding was assessed and questions were designed to determine exposure to media. At the time of the second interview, respondents were asked to recall whether they had heard or seen media announcements, and whether they agreed with the message. Scoring systems were developed to measure knowledge and exposure at the first and second interviews respectively, however, the exact nature of the system is not reported.

A higher percentage of women recognized at least one of the messages broadcast by radio than messages offered via other media. The authors suggest a relationship between knowledge of breastfeeding and media exposure but were unable to demonstrate any significant relationship "between the age at which bottle feeding began and mothers' recognition of media advertisements."

Synectic Nutrition Education Field Guide[13]

A comprehensive review of literature pertaining to nutrition education activities prepared for the Office of Nutrition, AID, in 1970 revealed that measurement of results had focused primarily on cognitive changes among project beneficiaries rather than on changes in food consumption or improvements in nutritional status.

Consequently, under contract to AID, Synectics Corporation developed a field guide to measure the behavioral effects of nutrition education

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[13] Floy Eugenia Whitehead, *Nutrition Education Research Project: Report of Phase I,* (Washington, D.C.: U.S. Agency for International Development, 1970).

projects.[14] The methodology was designed to provide direct feedback for program planning purposes as evidenced by its concern with cost effectiveness determination and the use of this type of information to compare project desirability.

Collection of baseline data to describe the condition of the experimental population prior to intervention was considered crucial. In addition, it was recommended that considerable energy be focused on the definition of project objectives and selection of indices by which such progress could be measured.

Although an approach utilizing an experimental and control group was considered most desirable, quasi-experimental designs (e.g., a single measurement of an experimental group following treatment or before-after measurement of an experimental group) were also suggested when assignment of individuals to a control group or identification of a suitable comparative group is unrealistic. In addition, choice of experimental sample from total population should be made randomly.

Numerous other recommendations were made. Data collected should describe the individual, the family to which she/he belongs and the resources available to the family for the purpose of buying food. The individual's data set would include, for example, identification data (name, address), individual characteristics (age, sex, health status), participation data (number of clinic visits, classes attended) a 24-hour recall (foods consumed), and data on reporting conditions (who provided information, possible problems with data). At least two or three attempts at data collection should be made over a six to eighteen month period following program activities. Trained interviewers are suggested to ensure standardized, complete and accurate data.

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[14]Edna M. Jones; Sara J. Munger; James W. Altman, *A Field Guide for Evaluation of Nutrition Education: An Experimental Approach to Determination of Effects on Food Behavior in Lesser Developed Countries,* (Allison Park, Pennsylvania: Synectics Corporation, 1975).

Quantification and analysis of data can be performed manually utilizing sums of cases and percentage distribution to describe the numbers, proportion and characteristics of individuals in experimental and control groups. Use of the Chi-square test of difference to compare changes in behavior or dietary status in test groups is explained.

For cost-effectiveness analysis, all relevant costs for each program are collected and summed in a consistent fashion. The following formula is used to calculate the unit measure of cost effectiveness (UMCE):

$$\text{UMCE} = \frac{\text{Cost of program operation}}{N(-)\rightarrow(+) - N(+)\rightarrow(-)}$$

where $N_{(-)\rightarrow(+)}$ represents those individuals whose nutritional status improved over the life of the project and $N_{(+)\rightarrow(-)}$ those individuals whose nutritional status had deteriorated.

This calculation is possible only where prior definition of project success makes determination of project impact, in either a positive or negative direction, possible. It fails to account, however, for any distinctions of magnitude since the nature of the classification is dichotomous.

Care must be taken when costs are being figured to include the value of voluntary services or capital donations. Formats, worksheets, reference tables and instructions for their use are provided.

Furthermore the calculations and the denominator presuppose that changes in status can be attributed to project outputs, and this is often difficult to do. For instance in regions where malnutrition is rampant, children are found to be at greatest nutritional risk at approximately age two when the effect of weaning and lack of food become manifest. Under the Synectics scheme children brought to health centers or identified as likely candidates for intervention at this age would be classified as negative (-). After the age of two, nutritional status tends to improve as growth

slows, nutrient need declines and the digestive system will allow the ingestion of a larger quantity of less nutrient dense foods. Consequently nutritional status begins to improve among those who survive. As time passes these children would be classified as positive (+). During the time of evaluation these individuals would be counted among the $N_{(-)\rightarrow(+)}$ group, biasing the denominator and cost-effectiveness quotient. The contrasting situation, $(+\rightarrow-)$ may also be miscounted since children who are brought in for follow-up measurement at age two are likely to be in worse nutritional condition than they were at the time of first measurement.

Synectics - Testing Field Guide, Brazil[15]

Development of the Field Guide was followed by testing of its methodology at three project sites in Brazil: Servico Sovaldo Industria (SESI), Associacao Brasileirade Credito Assistance Rural (ABCAR) and Superintendencia Nacional do Abastecimento, Departmento de Assistencia Educatao Alimentar (SUNAB-DEAL).

SESI

The Servico Social de Industria (SESI), an education program supported by industry, served homemakers residing in urban industrial areas. Participants were generally literate, of average to below average income who consumed inadequate quantities of meat, milk, eggs, garden vegetables and fruits. The curriculum at SESI was designed to impart basic nutrition knowledge to homemakers and change food habits of participants and their families to conform more closely with nutritional standards. All types of audiovisual teaching aids and classroom format were exploited.

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[15]Edna M. Jones; Sara J. Munger, *Application of a Field Guide for Evaluation of Nutrition Education in Three Programs in Brazil,* (Allison Park, Pennsylvania: Synectics Corporation, 1976).

The evaluation was designed "to determine ... if persons participating in the SESI classes demonstrate greater improvement in diets with respect to measured consumption of milk, meat, vegetables, and fruits than do persons from similar backgrounds who do not participate in the SESI classes" (p. 19). Resources for the study included a team of local nutritionists who had access to the field guide, consultants from Synectics Corporation and a local subcontractor hired to train interviewers and aid with data collection.

The experimental group contained 152 participants selected at random from 224 new SESI enrollees. A control group of the same size was selected randomly from housewives residing in the Greater Sao Paulo community. Data were collected as classes began, again at the completion of the course and finally six months after courses ended. The experiment suffered a 77.6% attrition rate in the combined experimental and control groups.

Decisions on individual progress were resolved in a categorical fashion based on whether dietary intake criteria were achieved, i.e., two portions from each of four basic food groups (milk, meat, vegetables, and fruit) were consumed.

The methodology was found suitable for use by local project professionals. "Cost effectiveness analysis indicated that the customary manner of thinking of costs of education is deceiving ... It demonstrated that, with the educational methods used, the cost of having a positive effect was four and one-half times that of just having the student in the class" (p. 35).

ABCAR

The Associacao Brasileira de Credito Assistencia Rural (ABCAR) provided social, educational and agricultural services to rural areas through ACARES (the local cooperative arm of ABCAR) in the state of Espirito Santo, a rural, mountainous, predominantly agricultural region.

Program activities included lectures, group discussions, demonstrations and practical experience. Comparison of diets consumed in this area with a "model" diet found the population to be consuming only 25-30% of the required vegetables and only 50% of the required fruits and animal products. Project objectives included nutrition consciousness-raising, especially among youths and pregnant and nursing women, as well as improved food consumption.

An evaluation team from ABCAR/ACARES conducted the research project with the assistance of an independent subcontractor and consultation from evaluation specialists of Synectics Corporation. The team hoped "to determine if youths between the ages of 15 and 25, participating in youth groups ... are eating significantly more fruits and vegetables than are youth of the same ages and backgrounds who have not participated in the ACARES program" (p. 42).

Assembly of background information, preparation of format, decisions regarding data collection instruments, training of interviewers, quantification and analysis of data followed the procedure described in the Synectics Corporation field guide.

An experimental group of 155 youths was selected from the total of 224 youths enrolled in the project. A control group of 155 youths was selected from a community without an ACARES project. Dietary adequacy was calculated from 24 hour recalls with the aid of a scoring system which awarded points for differing levels of consumption of desirable food groups.

Three measurements were taken at six month intervals, but, as reported, none could validly be considered a pre-test measure since the project was already in operation at the time of the experiment. The experimental group experienced an attrition rate of approximately 75% contrasted with an approximate rate of 40% in the control.

The methodology was found suitable for use and forced re-examination of the activities provided in the on-going project, although program personnel experienced difficulty obtaining and defining relevant cost data for cost-effectiveness quantification.

SUNAB-DEAL

The Sunab-Deal project was an aborted attempt to evaluate the effectiveness of a mass-media campaign which employed TV and radio messages, newspaper articles and billboards to improve nutritional status through better shopping practice, consumption of nutrient dense foods and elimination of food taboos.

The evaluation plan called for comparision and measurement of cognitive changes in a state which provided an outlet for media messages with measurement in a state without media access. This evaluation was not carried out due to administrative, logistical and personnel difficulties which are discussed in detail. The effort reflects the degree to which the best mentioned efforts must conform to the political and cultural context of the project environment.

Synectics - Testing Field Guide, Philippines[16]

A second test of the Field Manual was conducted at two projects in the Philippines. According to Jones and Munger the initial test in Brazil demonstrated the applicability and practicality of the Manual's design. Field workers were able to conduct an evaluation with a minimal amount of supervision. Studies in Brazil were aimed specifically at determining whether cost-effectiveness data could be derived according to the formula defined above and whether inter-country project comparisons as well as intra-country project comparisions could be made via this common index.

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[16] Edna M. Jones; Sara J. Munger, *Applications of a Field Guide for Evaluation of Nutrition Education to Programs in the Philippines,* (Allison Park, Pennsylvania: Synectics Corporation, 1978).

MPP

Two projects were selected for this study, the Malnutrition Prevention Project (MPP) of the Bureau of Agricultural Extension Home Economics Division (BAEx) and the Mothercraft Nutrition Centers (MNC).

The Bureau's Malnutrition Prevention Project (MPP) directed its attention to infants 1-18 months of age, and their mothers. The National Nutrition Council, National Economic Development Authority, USAID and UNICEF sponsored MPP activities. In January 1977, 525 barangays in 34 provinces of the Philippines were served utilizing the services of 1,975 home management technicians.

Prevention of malnutrition is the ultimate program objective and specific objectives included:

> "For infants to maintain a progressive and satisfactory weight gain; for homemakers to introduce adequate supplementary foods to infants at the age of five months or earlier, using locally grown foods; for families to be encouraged to establish home food production projects ... for mothers to be motivated to practice family planning" (p. 11).

Homemaking classes were the primary activity.

The evaluation methodology was designed to determine: (1) whether MPP prevented a regression in nutritional status during an infant's first year and a half of life; (2) whether MPP mothers introduced supplementary foods to their infants at an early age; (3) whether the variety of foods included in the diets of participating mothers increased; and (4) cost-effectiveness of activities prompting dietary change.

Resources for the evaluation included the project manager and a home economist. Members of provincial and central MPP staffs aided in the planning, design and pretest of the study, training of data collectors, data collection, scoring and analysis. Employees of Synectics Corporation consulted for a total of 20 days over an 18 month period. Twenty-five data collectors were employed. The initial budget estimate for

the evaluation totalled U.S. $6,438 of which $3,214 was allocated for personnel, $944 for data collectors, $1,110 for travel and per diem, $901 for supplies, and $269 for field workers. Final project costs are understated.

"The subjects for the experimental group were the mothers and their infants enrolled in the Homemaker Classes set up by MPP. The experimental group consisted of 250 mother-infant combinations, 10 drawn randomly from each of the Homemakers Classes in the 25 randomly selected barangays" (p. 15). The control group was selected from neighboring barangays where an MPP was not extant.

Child nutritional status was classified (for purposes of evaluation) as either positive or negative. Dichotomization was based on percentage of standard weight-for-age, such that all children below 81% of standard were considered to have an "inappropriate" or negative nutrition status.

Determination of improved feeding practices was made on the basis of any introduction of supplemental food into the infant's diet since the first baseline measure. Appropriate maternal diet contained animal or vegetable protein, fats and leafy green or yellow vegetables.

Baseline measures were taken. Two additional measures followed at six months and one year after baseline. Data were analyzed according to the format described previously, except that the cost-effectiveness formula was altered slightly to correspond to the definition of project success which counted children whose nutritional status had remained satisfactory as well as those whose status had improved in the positive (+) category.

$$\text{UMCE} = \frac{\text{Cost of program operation}}{N_{(+)\rightarrow(+)} + N_{(-)\rightarrow(+)} - N_{(+)\rightarrow(-)}}$$

(net number of babies positively affected by the program)

$N_{(+)\rightarrow(+)}$ equals the number of babies who were healthy at baseline and remained healthy after a year; $N_{(-)\rightarrow(+)}$ is the number of babies who were malnourished at baseline but shifted to healthy status over a year; and $N_{(+)\rightarrow(-)}$ equals the number of babies who were healthy at baseline but became malnourished by study's end.

Not all barangays achieved the same level of success with regard to achievement of objectives but the evaluation methodology and cost-effectiveness formula were demonstrated to be practical and manageable under field conditions.

MNC

Mothercraft Nutrition Centers (MNC) provide nutrition rehabilitation and maternal education in predominantly rural areas of the Philippines. The program received its funding from the national government. In 1976, 64 primary centers provided services to 60,930 mothers. Nutrition education objectives included helping mothers to understand the relationship between food and health and training participants to plan meals, purchase, prepare and store foods in ways which would conserve natural nutrients and retard spoilage.

The evaluation was to be designed to determine whether: (1) children of mothers exposed to program activities showed improved nutritional status; (2) MNC mothers fed their children more balanced diets over time after exposure to MNC activities; (3) MNC mothers prepared meals with less expensive but equally nutritious foods as a result of MNC activities; and (4) residents of the general community are influenced by MNC activities.

The evaluation director had considerable work experience in the MNC program, and was assigned on a part-time basis to the project. Volunteers were recruited to score and tabulate field data. Recently graduated dietary nutritionists were employed to collect data. Partial study costs were estimated at U.S. $3,757, with 60% contributed by the

National Nutrition Service. Personnel time was to account for $1,258; training and payment for data collectors for $735; materials and supplies $180; travel and per diem, $1,096; and for miscellaneous expenditures $488. With two-thirds of the project completed, the estimate of project costs was revised upwards to $4,256.

Only an experimental group was selected since evaluators were interested in changes over time. A single baseline measurement was taken, and following exposure to program activities, two additional measures were made: the first, three months following exposure and the second, six months after exposure. Numerous threats to the validity of such an experimental design are evident. Since no comparison group was used, attribution of changes in the studied group to project activities was difficult. The project director attempted to control for some intervening variables. For instance, distribution of supplemental foods was restricted during the study period. Socioeconomic conditions in the study communities appear not to have changed over the course of the study.

Five criteria determined whether program objectives had been met. Weight-for-age of an infant was compared to Philippine standards and assessed as either appropriate, if at least 81% of the standard, or inappropriate, if less than 81% of standard. Successful supplemental feeding was characterized as appropriate if protein, fat and leafy green and yellow vegetables were present in the diet. Presence of meat substitutes and rice extenders or leafy green or yellow vegetables in the diet indicated appropriate substitution of inexpensive, nutrient rich foods in the diet.

Data were drawn from several forms already in clinical use: a nutrition assessment survey; a household survey; a daily food intake record and growth chart as well as semi-monthly weight summaries and nutrient intake summaries of clinic children. In addition, two forms were prepared especially for the evaluation: a family profile and resource form and an infant-mother form which questioned infant and maternal feeding and food preparation practices.

One MNC site in each of 5 geographically dispersed provinces was randomly selected for study. All children between the ages of six months and six years, and their mothers who resided in an MNC community participated in the baseline survey (829 individuals). The first post treatment measure was made on all 122 children who had attended the MNC. Eighty-seven children were assessed at the time of second post treatment measurement to determine whether the MNC had any affect on non-participants. A subsample of 171 individuals who had been measured at baseline but not participated in MNC, was chosen at the time of second post treatment measurement. Chi-square statistics were used to test for the significance of changes thought to be associated with project activities. Cost-effectiveness was calculated using the formula found in the Field Guide.

Interpretation of effectiveness and consequently, cost-effectiveness, was difficult since participants were not randomly selected to attend MNC and no true comparison group was identified before initiation of the program; therefore changes in nutritional status and dietary behavior could not accurately be attributed to program activities. In the face of these uncertainties, secondary analysis was undertaken to compare baseline measures with second post treatment measures of MNC and non-MNC participants.

Synectics - Mass Media and Nonformal Education, Tunisia[17]

Synectics Corporation participated in the design and implementation of an evaluation of still another nutrition education field project in Tunisia with assistance from the Tunisian Institut National de Nutrition et de Technologie Alimentaire and the Tunisian Institute El Amouri de Psychologie Applique.

The project was based on a communications model comprised of educational, communication, behavioral and evaluation domains. Maternal Child Health

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[17]Sara J. Munger, *Mass Media and Nonformal Nutrition Education - Final Study Report,* (Allison Park, Pennsylvania: Synectics Corporation, 1975).

centers (MCHC) were selected as the program site. Educational objectives included increasing consumption of fruits and vegetables, legumineuses, and eggs; improving child feeding practices with specific attention paid to encouraging breastfeeding; and encouraging exposure of infants to sun light. Implementation of the communication domain involved selection of media type, preparation, test, revision and implementation of media. Thirty-seven short spot announcements were produced and two to three announcements per day (not exceeding 60 seconds) were broadcast by radio over a period of four months.

Four questions were addressed in the evaluation: (1) to what extent were knowledge, attitude and diet changed; (2) did the combination of radio and non-formal nutrition-education have a greater impact on changing knowledge, attitudes and behaviors (KAB) than either of the two alone; (3) what factors contributed to heightened impact of the program; and (4) to what extent did mothers attribute changes in KAB to the program.

Data were collected only once following program intervention. From a total of 92 MCHC operating in Tunisia, 16 were chosen: eight designated as experimental and eight as control. Radio messages were broadcast and received throughout the experimental and control areas; however, health workers in the experimental MCHC received special training and were encouraged to provide nutrition education to MCHC patients.

Through a variety of procedures each of the 16 centers compiled a list of mother-child combinations to be interviewed. For this group, number and type of visits to MCHC and the amount and type of exposure to nutrition education sessions were recorded. Most additional information was collected with the aid of a pre-tested, pre-coded questionnaire. The questionnaire was pre-tested over a two week period in one urban and one rural site not part of the study sample. Pre-testing identified ambiguous questions, provided additional responses for questions, changed questionnaire language from French to Arabic and indicated a need for interviewer training requirements.

Food consumption data for mothers and children were collected by 24 recall during home visit by direct questioning of mothers. Dietary adequacy, rated on the basis of a five point scale, was determined by Nutrition Institute members. Maternal nutrition-related knowledge and attitude were assessed. Researchers hoped, in addition, to ascertain exposure to and impact of the educational content of radio messages. The questionnaire addressed changes in knowledge and attitude and the reasons for change.

Economic status was determined by the interviewer, based on such factors as size of home, number of windows and husband's occupation, but no attempt was made to standardize evaluations of economic status due to regional variation. Income data was not collected.

Only females were ultimately selected to conduct interviews since males would not be allowed in homes. Interviewers passed a general intelligence test, had attended at least five years of secondary school and attended three days of group training. Interviews were conducted in slightly over a month. Fifteen percent of the data collected was validated to demonstrate accuracy.

Routine descriptive statistics such as frequency distribution, means, standard deviation, and ranges were performed to compare experimental and control groups and compare individuals exposed to radio messages to those unexposed.

Ex post facto analysis of the relationships among exposure to nutrition education and radio messages, mother's education level, highest level of education in the family, proximity of MCHC to Tunis and participant diet rating was undertaken as well.

Results of the demonstration include observations about the process of implementation, comments and reactions to the resultant radio program and demonstration of effects using questionnaire data.

With regard to the implementation process, Munger concludes that in-country residence of the evaluation team during the evaluation process has many advantages over field-visit administration. The participation of capable, interested, indigenous sub-contractors is also essential to project completion.

Radio messages were well received by the target audience - low income, illiterate and semi-literate malnourished families with young children - but the same was not true of the urban upper-middle class.

Effects due to program activities were difficult to demonstrate because no baseline data were collected on experimental variables; program activities at control and experimental MCHC were not sufficiently different; and exposure to radio messages was uncontrolled.

Most participants did not report changes in KAB.

University of Ghana - Effectiveness of Maternal Education[18]

For three or more years several types of nutrition education programs were offered to pregnant and nursing women in the Bawkee district in the Upper Region of Ghana. Projects were undertaken by a hospital child welfare clinic and a nutrition rehabilitation ward, mobile health services, social welfare services and church groups. Nutrition information was delivered by means of posters, nutrition talks and cooking demonstrations.

The following concepts were emphasized in nutrition programs presented by various health services: (1) the importance of foods high in protein for body building and health of young children; (2) introduction of supplementary food for infants between 4 to 5 months of age;

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[18] Gillian Mary Gordon, *An Evaluation of Nutrition Education Given to Pregnant and Nursing Women in Six Communities in the Upper Region of Ghana,* (M.S. Thesis, University of Ghana, [1972?]).

(3) preparation of special foods by mothers for infants and young children; (4) the importance of fruit in the diet; (5) the regular provision of three meals daily; and (5) the impact of good food on children's growth and appearance.

The range of issues which were the subject of evaluation were broad and included the impact of nutrition education on: nutrition knowledge; dietary practices; the nutritional status of children under five years of age; agricultural production; economic status; infant and child mortality; and the incidence of disease. Financial support for the evaluation project came from the University of Ghana and from the Inter-Universities Council for Higher Education Overseas, London. Technical assistance was provided by the staff of the Bawkee Hospital, the Garu Agricultural Station and the Department of Social Welfare. A secondary student fluent in the main languages of the area served as an interpreter during interviews.

"The study was unable to demonstrate any improvements in nutritional status as a result of the nutrition education" (p. i). There was only very limited success in maintaining adequate growth in pre-school children.

Gordon suggests that the limited success is due to: (1) an inadequate interval of time between the first nutrition lesson and the time when the new idea must be put into practice; (2) ineffective teaching methods; and (3) over-emphasis on expensive protein rich foods. Economic aid, either as food supplements given through clinics, or in agricultural services, would be essential before any improvement in nutritional status could be expected to result from the nutrition education.

Other, sometimes uncontrollable factors may counteract or exaggerate the influence of projects specifically designed to improve nutritional status. A number of these factors in relation to the evaluation of nutrition education are examined for six communities of upper Ghana. Among

these are:

- Demographic considerations such as household composition or tribal affiliation
- Religious persuasion
- Family planning
- Access to medical, social or agricultural services
- Occupation of family members, extent of economic independence of female members
- Agricultural production
- Western or Islamic education

The design of the tool used to collect information also affects the nature and amount of information collected during the course of an evaluation.

Furthermore it is demonstrated how the results of an ostensibly outcome oriented evaluation may be used to improve the method and style of service delivery. Content of some nutrition education lessons in Ghana were revealed to be unsuitable and impossible for mothers to put into practice.

Size of lesson groups and the lack of interaction between teachers and learners was also responsible for the failure to achieve a greater degree of success.

Consideration of tangential and indirect variables which may influence the achievement of purpose or goal is an essential part of evaluation. Ascribing success or failure to project activities is a hollow, valueless gesture unless one is able to demonstrate by evidence or argument that other possible explanations cannot account for the success or failure of the project.

Nutrition Education, Uganda[19]

Nutrition Rehabilitation Centers (NRC's) operating in Uganda during the 1960's and early 1970's were designed to care for children with mild and moderate degrees of malnutrition. Mothers also attended classes with their children, where they received instruction on feeding practices, dietary requirements and child care in general. This document reports on a series of studies designed to evaluate the preventative and curative aspects of NRC's, and the related determinants of malnutrition in the community.

The functional model for evaluating nutrition education programs was summarized by the authors as follows: "The education seeks to alter the mother's knowledge, attitudes, and behavior, either directly or indirectly, and through this influence the child's health. Indicators can measure effects at these stages. None of the indicators is more important than the others; instead each contributes to an understanding of the composite picture" (p. 48). The two major considerations synchronous with this evaluation model are the selection of indices for measurement and identification of what groups should be studied and examined.

The first evaluation study discussed in this report involved randomly selecting mothers who had regularly attended one of three clinics; two were in-patient and one was outpatient. A control group was selected to be characteristically similar on the basis of considerations such as tribe, education, and distance from the center. Although no baseline data were available, care was taken to randomly indentify participants and control for biases resulting from self-selection.

Two indicators of nutritional status were used: weight expressed as a percentage of a standard weight for a given age; and a recovery rate over time, based on an increase in weight. Knowledge was assessed with a series of questions pertaining to the recognition of malnutrition, knowledge of its causes, and the nutritive value of foods. Attitudes were also examined toward particular foods, by choosing between six evaluative word pairs

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[19] Jan Hoorweg; Ian McDowell, *Evaluation of Nutrition Education in Africa; Community Research in Uganda, 1971-1972*, (The Hague, Netherlands: Mouton Publishers, 1979).

(i.e., good-bad; happy-sad; ideal-imperfect; big-small; important-unimportant; rich-poor) and four dynamic word pairs (i.e., strong-weak; brave-cowardly; quick-slow; active-passive). Each judgment is thereafter turned into a rating, which in combination are designed to assess attitudes. In addition, mothers were asked to choose between meals, using a related methodology. Choices were designed to indicate the number of times a high-protein meal was preferred over a low-protein meal.

Findings indicated that indicators other than nutritional status measures are appropriate for evaluating nutrition education programs. However, the use of ratings based on the semantic differential seems least sensitive, since they require extreme changes in attitudes, e.g., from very good to very bad. It was also found that education resulted in desired changes in nutrition knowledge and food preferences, as well as greater recognition of the symptoms of malnutrition. In the outpatient clinics, only differences in the recognition of malnutrition were found between experimental and control groups. Nutritional status also showed improvement, with variations similar to those observed in attitudes and knowledge of the various groups.

In addition to the evaluation described above, four other related studies are examined for both methodological considerations and outcomes. Included is an examination of food and nutrition related knowledge of students at teacher training colleges near Kampala. Other studies attempted to gain insight into how the environment facilitated the recovery of children attending the out-patient clinics. In one study, case records are reviewed; in another, mothers are interviewed. Examination of extraneous variables was emphasized and considered part of the process evaluation. Special attention is given to the distincition between urban and rural cases, and the relations between mother and child. Findings indicate that those factors which are significant in the etiology of malnutrition, do not necessarily impede recovery.

Furthermore, a model of the influences of the social environment on outpatient recovery from malnutrition is presented and tested. Although a limited amount of data constrained the rigorous testing of the model,

results indicated the importance of social, economic and family influences on the recovery of the malnourished child.

In conclusion, the authors stress the need for process evaluation which investigates not only final improvements in health, but why the observed effects occurred.

Nutrition Education, Morocco[19a]

This evaluation assess the impact of the nutrition education component of a P.L. 480 Title II feeding program operated by Catholic Relief Services. The education program involved training of functionaries and the delivery of educational messages about nutrition, sanitation, personal hygiene and treatment of disease to food recipients.

The evaluation assessed whether the education centers had affected nutritional status using weight-for-age as an indicator. Information on nutritional status of participants as well as knowledge, practices and behavior was obtained from existing records. Interviews with program personnel and observation of classes were designed to glean additional information on the nature and quality of program operations. In addition, existing documentation on the program and other evaluation studies were carefully examined before the outside evaluation team traveled to Morocco.

Among the findings were that children receiving the nutrition education component were better nourished, and that food acts not only as a supplement, but an incentive for attendance at the center. In addition, it is noted that the program cost $34.47 per person per year, which was considered comparable to other feeding/education programs in other countries. Food accounts for just over half of the cost. Phasing out of Title II food is considered unrealistic in the short term.

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[19a] Judith W. Gilmore et al., Morocco: Food Aid and Nutrition Education. A.I.D. Project Impact Evaluation Report No. 8 (Washington, D.C.: A.I.D., 1980).

D. Supplementary Feeding Programs

Supplementary feeding programs provide additional nutrients by distributing food in a non-commercial fashion. Most often the targets for this activity are children, and pregnant and lactating women. In some programs, complementary services may be supplied to enhance the effectiveness of the feeding component. Nelson et al.[20] classify these services into the following major groups: (1) health services, including immunization, control of diarrhea, pre- and post-natal care, and curative medicine; (2) day care and pre-school education aimed at socialization, primary school preparation and improved hygiene practices; and (3) father/mother education, including family planning, hygiene and food production and preparation techniques. Abstracts in this section describe evaluations of programs which had as their primary output a feeding component,not construction of infrastructure or education.

Austin et al.[21] describe common formats for supplementary feeding programs, i.e., on site, take-home, and centers for nutrition rehabilitation. In addition, other program characteristics are reviewed: participants' motivation and behavior, food types, quantity, location, facilities, timing, logistics and control, personnel administration and effectiveness. In 1975, the AID Food for Peace Program (P.L. 480) provided the vast majority of food used in supplementary feeding programs. Some groups which supplied food are, in decreasing order of volume: voluntary agencies (CARE, Catholic Relief Service, Church World Services, and others), UN World Food Programme (WFP), UNICEF and government to government programs.

Austin et al. also list measures of costs and effectiveness and argue that although growth data provide the only mechanism for judging program

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[20] David P. Nelson; David E. Sahn; Beatrice Lorge Rogers, *An Evaluation Report of the P.L. 480 Title Program in India,* (Ann Arbor, Michigan: Community Systems Foundation, 1979).

[21] James E. Austin et al., *Nutrition Intervention Assessment and Guidelines,* (Cambridge, Massachusetts: Harvard Institute for International Development, 1978).

effectiveness, it is most often measured on the basis of quantity of food delivered. The use of longitudinal studies to compare growth of control and recipient groups is considered most valuable.

Maxwell[22] expresses surprise at how few empirical studies of impact have been done for supplementary feeding programs. This is especially disconcerting in light of the amount of money allocated to these programs. Although many "descriptive evaluations" have been performed, few measure nutritional status and even fewer set up controls to eliminate sources of bias. Furthermore, Maxwell states that even in those isolated instances where quantitative data is collected and impact isolated, the disagreements about completeness and/or directness of measures of nutricional status, make the findings questionable.

In reviewing the evaluations for this report, findings do confirm the scarcity of these ideal types of evaluations. However many other methodologies have been utilized which are worth reporting. This is especially true in light of the difficulty involved in setting up control and experimental groups in social programs, especially supplementary feeding activities in developing countries.

As is evidenced by the literature, a panoply of methodologies has been employed to evaluate supplementary feeding. All of the methods described by Anderson and Ball[23] have been used (e.g., quasi experimental, systematic expert judgement, case studies, informal testimony).

The most comprehensive search for and testing of an evaluation methodology for supplementary feeding programs was undertaken by Checchi and Co., Washington, D.C. with the collaboration of: Consultal, S.A. Bogota; the Research Bureau (East Africa), Ltd., Nairobi; and the Institute of

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[22] Simon Maxwell, "Food for Supplementary Programmes - An Analysis," Food Policy, Vol. 3, No. 4, November 1978, pp. 289-298.

[23] Scarvia B. Anderson, Samuel Ball, *The Profession and Practice of Program Evaluation*, (San Francisco: Jossey-Bass, 1978).

Philippine Culture, Manila. The study, funded by AID, was performed over a number of years, and produced a series of documents between 1972 and 1977.[24,25,26,27]

Checchi and Co. - Evaluation Methods, Final Report[28]

Checchi developed and analyzed a methodology for evaluating mother and child feeding programs and school feeding programs in developing countries, based on data analysis and pilot studies in Colombia, Kenya and the Philippines. The intention was to provide officials with a tool which would allow them to distinguish among different levels of program effectiveness. Effectiveness was based on changes in a child's nutritional status as a result of food received via the program.

Cross-sectional data on experimental (receiving food) and control groups of children were collected at schools and maternal and child health centers in Colombia, Kenya and the Philippines. Retrospective survey questions and site records were used where possible. A longitudinal approach was rejected as being too expensive and time consuming.

Weight dispersion measurement is used as the primary indicator for assessing nutritional status. A great deal of effort in project reports is placed on advocating and explaining its use. Essentially, it is "a suitably unbalanced or skewed conversion formula reflecting the skewed distribution of the 'real world' children ... in the form of a ratio for

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[24] Checchi and Company, *General Research Design,* (Washington, D.C., 1972).

[25] Checchi and Company, *Child Feeding Programs in Developing Countries: A Comparative Evaluation of Ongoing Programs in Colombia, Kenya, and the Philippines,* and *Annex A,* (Washington, D.C.: 1974).

[26] Richard Ellis et al., *Judging the Merit of Child Feeding: A Development Handbook for Planners, Managers, and Evaluators,* rev. ed., (Washington, D.C.: Checchi and Company, 1975).

[27] H.A. Lerner, R.P. Manley, T.H. Eighmy, *Evaluation Methods for Child Feeding Projects in Developing Countries, Final Report,* (Washington, D.C.: Checchi and Company, 1977).

[28] Ibid.

which the numerator is the difference between observed and reference weights and the denominator is the difference between the reference weight and the associated 25th (under weight) and 75th (over weight) percentile weights"(p.2-24). Detailed methodological information is also included on site selection, interviewing procedure, data collection, record keeping and similar considerations for the pilot studies.

The ambiguity of the study's results did not allow for any firm judgements on the effectiveness of the 30 projects analyzed in the three countries. Furthermore, the anticipated output of the study, a handbook to present the methodology used in this cross-sectional analysis was not published because a viable evaluation strategy was not found. Diversity of supplementary feeding programs and background factors in the environment, differing genetic characteristics, imprecision in measures, and inaccuracy of survey data are some of the reasons for this failure. The overall approach, however, suggests that, "given the state of the art, evaluation of supplementary feeding programs involves monitoring and interactive feedback between sites and program administrators, geared to improving the management and effectiveness of the full nutritional delivery system" (p.1-4). In future evaluations, it is recommended that factors such as verifiable physical measurements, determination of actual ration sizes, shorter and simpler survey instruments and more sites per country should be considered. Furthermore, the use of longitudinal or time dimension data is encouraged.

Checchi and Co. - P.L. 480 Title II Evaluation[29]

Another evaluation methodology which did not involve the actual collection of data, was used by Checchi and Co. in the global evaluation of the AID Food for Peace program (P.L. 480 Title II). This study was also funded by AID.

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[29]Checchi and Company, *Food for Peace, An Evaluation of PL 480 Title II: Volume One - A Global Assessment of Title II,* (Washington, D.C., 1972).

P.L. 480 Title II provides for the donation of agricultural commodities through voluntary agencies, governments, and the World Food Programme to: (1) aid in disaster relief; (2) combat malnutrition; (3) promote economic and community development; and (4) meet various domestic political and economic objectives. These goals are usually met by using the food in Maternal and Child Health (MCH); Food for Work (FFW) and School Feeding (SF) programs.

AID contracted with Checchi with the hope of determining whether Title II foods were being utilized effectively throughout the world. Checchi was also to discover factors responsible for program failure and recommend means for improving program effectiveness. More specifically, AID was interested in prioritizing the different uses of Title II food and assessing the impact of Title II food on nutritional, social, political and economic variables. Previous research on Title II programs was reviewed. Management and communication problems within the program were examined. Also addressed was the question of whether supplemental feeding programs generate dependency on the part of participants.

Eight countries - Ceylon, Colombia, Dominican Republic, Ghana, Indonesia, Malaysia, Morocco and the Philippines - were visited in the first phase of the evaluation. The second phase consisted of an eight week stay in Washington for report preparation.

In the field, documentation from USAID and the voluntary agencies was reviewed. Host country government officials were interviewed as well as local citizens and personnel at project sites. Although the staff had extensive experience in survey research, systems analysis and mathematical modelling, these skills were of little use. The analysis was essentially judgmental, relying on impressions and conclusions of the interviews.

The evaluation concluded that the P.L. 480 Title II Program was essentially a sound, well administered program, making significant impact on the economic and human development of the countries receiving food. With

respect to prioritization of uses for commodities the following project sequence was recommended: MCH first, FFW second, special purpose activities third, and SF last.

Checchi also recommended that allocations be made on a multi-year basis, that voluntary agencies be involved more closely in planning and that increased responsibility be given to host governments.

Community Systems Foundation - P.L. 480 Title II, India[30]

An Evaluation Report of the P.L. 480 Title II Program in India, was recently completed on June 4, 1979 by Community Systems Foundation (CSF) under contract to AID/Washington (AID/W). It relied on expert judgments of program operations and examination of existing data.

The evaluation was designed to assess policies and program practices of AID, the Government of India and the voluntary agencies (volags),and make appropriate policy change recommendations. Program integration with other AID activities, and roles and linkages between concerned agencies were also examined. In addition, CSF was asked to assess the contribution of Title II activities to improved nutrition, economics, and educational and social structures in India. Criteria for reviewing future Title II requests and recommendations for future evaluation activities were also proposed.

Three representatives from CSF, a representative from AID/W and the American Council of Voluntary Agencies, and three highly qualified Indian professionals made up the evaluation team. The team interviewed officials from USAID, the volags, central and State Governments of India and various professional Indian organizations and visited and observed over 200 project sites. Beneficiaries were queried in detail.

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[30] Nelson et al., *An Evaluation Report of the P.L. 480 Title II Program in India.*

The major findings of the evaluation were: (1) much of the controversy surrounding PL 480 Title II arises because the availability of the food resource stimulated program development prior to a clear understanding of objectives. Dissonance over program objectives has fostered continual searching for and revision of program activities. A resolution of these conflicts would improve program efficiency and effectiveness; (2) the purpose of the MCH program - to improve health and nutritional status of mothers and children - is largely not achieved because the series of assumptions and hypotheses between output and purpose (e.g., no sharing or substitution, food is targeted to those in need, food supply matches nutritional deficiency and needs, minimal losses due to poor sanitation) can not be substantiated; (3) on-going program monitoring (measuring inputs to outputs) and periodic evaluation of purposes and goals should be viewed as two functions, with the former being prerequisite to the latter. Each function has different data needs and the two should be combined only when efficient to do so; (4) decisions based on Checchi's ranking for the most effective allocation of Title II food, i.e., MCH first, FFW second and SF third,should be abandoned.

Although findings of the India report are different from many other PL 480 Title II evaluations, and almost in complete contrast to those proposed by Checchi and Co., the methodology employed is almost identical. This methodology is best summarized by the authors of the Checchi and Co. global assessment, when they contend that the major characteristic of this methodology "is that of a search for consistency of findings... Lacking the means for identification and analysis of a scientifically respectable index of Title II program effectiveness, we searched instead for a multiplicity of views and took most seriously those opinions which were held uniformly by AID, voluntary agency, host government, and local citizen respondents."[31,32]

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[31] Checchi, *Food for Peace, An Evaluation of PL 480 Title II* (p. 8).

[32] Personal communications from William D. Drake, Community Systems Foundation, and O. Lynn Deniston, University of Michigan School of Public Health suggest that evaluations which depend on testimonials and opinions, professional observation, and similar techniques often bias the findings of the evaluation since they are likely to reflect the interests of the evaluators and the interests of the individual with whom these evaluators interact.

The evaluation staff on both the Checchi and CSF teams were well versed in survey research, systems analysis, modelling and other similar skills - none of which were employed directly. Rather, the CSF India report described their role as to explore the common characteristics that define program success or failure, and take those common threads to weave a pattern. Checchi and Co. describe it similarily as a "Search for Consistent Findings." No pretense is made about quantifying nutritional effects, which therefore precludes these studies from being truly labeled impact evaluations.

Nathan Associates P.L. 480 Title II Methodology[33]

Besides the Checchi and CSF Title II Evaluation document, a number of similar P.L.480 Title II evaluations have been or are being performed by AID. At present, there exists a methodology, designed by Robert R. Nathan Associates, Inc., which serves as the scope of work.

AID sets no clear nutritional objective for Title II; Washington, the voluntary agencies, the country recipients and others set their own. The Nathan Scope, likewise, does not focus on evaluating the achievement of this purpose or goal. Rather, it is based on a conceptual model of Title II operations. The model describes process at the program, project and recipient levels. Process at the program level comprises decisions made by participating governments and agencies. Projects derive from these decisions. Project processes comprise administrative decisions from which project activities result. Recipients participate in these activities and an impact or outcome is intended.

The Nathan evaluation approach relies on interviews, reports and documents and "...provides for the review and assessment of a broad range of program factors without resort to measurement practices for which there is usually no data base" (p. 1). Questions are posed to elicit information and analyze performance at each level. Information is

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[33]Robert R. Nathan Associates, Inc. *An Evaluation Scope of Work for P.L. 480 Title II Country Programs,* (Washington, D.C., 1978).

obtained by interview and from reports, documents and statistical data. "A scientifically based sample is not required but (observation or study of) a cross-section of activities is desireable" (p. 10).

Seven broad topics are covered by the Nathan Evaluation Scope. First, information is collected on the nutritional setting of the host country.

Second, program structure is addressed by examining "the background and current structure of Title II at the program and project levels, analyzing the role of participating agencies, the quantity and cost of inputs, the range of outputs and the number of recipients actually reached" (p. 12).

The third topic compares "policies of host governments and participating agencies to those of Title II at the program and project levels, testing for congruence and harmony of purposes ..." (p. 13).

Four issues are then examined at the program and project level: regulations and management control, logistics, costs and budgeting, and monitoring and evaluation, in order to determine the relationship between program inputs and output.

Answers to questions regarding program effectiveness are intended to enable an assessment of "the contribution of Title II outputs to the improved nutritional, economic, and/or educational status of target recipient groups" (p. 15).

In the final steps of the evaluation, the relationship between Title II programs and other host country, multilateral or bilateral programs[15] is examined. Finally, all information is aggregated, and summarized and used as the basis for recommendations regarding program design.

<u>Nathan Associates - P.L. 480 Title II, Bolivia, Sri Lanka, Morocco</u>

In 1978, three evaluations were conducted under contract to AID using

this methodology. The first was in Bolivia,[34] where food was provided (1) on a take-home basis only to pregnant or lactating women or those with children under six years of age; (2) for Food for Work activities, designed to supplement the employment of rural and urban workers; and (3) in a school feeding program where breakfast is the main meal supplied.

According to R.R. Nathan Associates, Inc. the purpose of the evaluation was twofold: (1) to test the previously described Scope of Work; and (2) to conduct a comprehensive evaluation of the maternal child health, food for work, and school feeding projects operating in Bolivia. The evaluation team consisted of a RRNA staff member and mission leader, a nutritionist and consultant to RRNA, and the Chief of Policy Review and Evaluation Staff, Office of Food for Peace, AID. The local USAID Food for Peace Officer assisted the team during its visit to Bolivia.

Interviews were conducted with persons in the USAID mission, voluntary agencies, counterpart agencies, Government of Bolivia, Ministries of Public Health, Education and Planning and program participants, (mostly mothers). In all, 14 maternal and child feeding sites, 2 schools and 2 Food for Work activities were visited.

Results of the evaluation indicated that Title II program activities were concentrated in the more "accessible" areas of Bolivia. Logistical constraints such as the lack of a road network and disinterest on the part of the Bolivian government were serious obstacles to extending the program to groups in inaccessible areas. Needs of the population in these areas should be determined as well as the cost effectiveness of including them in the program. The evaluation team concluded, however, that it was unable to determine the nutritional impact of the program. However, it felt that the maternal and child feeding concept is the most successful in responding to participants' needs.

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[34] Robert R. Nathan Associates, Inc., *An Evaluation Report of the P.L. 480 Title II Program in Bolivia,* (Washington, D.C., 1978).

Two other examples of the application of the Nathan methodology are in Sri Lanka[35] and more recently, Morocco.[36] Similar programs were examined and the types of data available were comparable. Limited discussion of nutritional impact is characteristic of the evaluations. The availability of information seems to influence the nature and emphasis of the evaluation results.

CARE - Preschool of Nutrition Project[37,38]

While the previously discussed evaluations do not make any pretense about trying to quantify nutritional impact, or measure whether programs are reaching purposes or goals, a recent evaluation by CARE can be classified as impact evaluation.

CARE operates pre-school nutrition programs in 18 countries, which reach 5.5 million beneficiaries. Supplementary feeding (usually with P.L.480 Title II foods) is the major activity. The primary purpose of these on-site and take-home programs, is a positive change in the nutritional status of participants. This particular study was initiated to identify factors essential for high nutritional impact and to develop guidelines for use in CARE's preschool feeding programs.

Initially all of CARE's preschool nutrition programs were reviewed from documentation available at their New York headquarters (Phase I). As a result of this review, five country programs in Colombia, Dominican Republic, Pakistan, Costa Rica and Tamil Nadu, India, were selected for in-depth study, using a consistent method of data collection and analysis (Phase II). Final ongoing activities include pilot programs in Colombia and the Philippines aimed at increasing nutritional impact

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[35] Robert R. Nathan Associates, Inc., *An Evaluation Report of the P.L. 480 Title II Program in Sri Lanka,* (Washington, D.C., 1978).

[36] Robert R. Nathan Associates, Inc., *An Evaluation Report of the P.L. 480 Title II Program in Morocco,* (Washington, D.C., 1979).

[37] CARE, *CARE Preschool Nutrition Project: Phase I Report,* (New York, 1976).

[38] Mary Ann Anderson, *CARE Preschool Nutrition Project: Phase II Report,* (New York: CARE, 1977).

(Phase III). Guidelines for these projects were developed from lessons learned in Phases I and II.

The Phase II evaluation lasted from March to November, 1976. Directed by CARE's Nutrition Advisor, an international survey team was made up of nutritionists, CARE program officers, a field representative or assistant country director, and one or two consultants. Local teams were made up of 10 to 16 surveyors and four to six CARE field inspectors. An average of five weeks was spent in each country. Salter hanging scales, arm tapes, infantometers and metric tapes, CARE vehicles and rented vehicles were used for the evaluation.

In the five countries, 20-30 feeding centers were randomly selected for study. At each center mothers of participating children were interviewed for various socioeconomic and demographic data; their children were measured for weight, height and arm circumference. A comparable control group of non-participants from the same or a nearby community provided similar data.

In-depth surveys in the homes were also conducted with families who participated in centers thought to be the most and least effective. No baseline information was used; instead cross-sectional data collected from participants who had been in the program for varying lengths of time were compared to data collected from non-participants.

To clarify these five country evaluations, it is helpful to review the methodology used in Pakistan[39] since it is indicative of the methodology used in Colombia,[40] Dominican Republic,[41] Costa Rica,[42] and Tamil Nadu, India.[43]

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[39] Mary Ann Anderson et al., *Evaluation of CARE's Preschool Feeding Program in Pakistan: A Working Paper*, (New York: CARE, 1977).

[40] Anderson et al., *Evaluation of CARE's Preschool Feeding Program in Colombia.*

[41] Anderson et al., *Evaluation of CARE's Preschool Feeding Program in Dominican Republic.*

[42] Anderson et al., *Evaluation of Costa Rican Nutrition/Education Centers*

[43] Anderson et al., *Evaluation of CARE's Preschool Feeding Program in Tamil Nadu, India.*

The Pakistan program is co-sponsored by the Ministry of Health, the Aga Khan Health Board, the Population Planning Board and other, smaller sponsors. It provides supplemental foods, Whey Soy Drink Mix (WSDM) and oil to participants through Maternal and Child Health Clinics. The foods are supplied entirely through P.L.480 and are distributed for at-home consumption. At the time of the evaluation almost 24,000 beneficiaries were participating through 152 centers at a cost of $23.51 per child per year, in the provinces of Sind and Baluchistan. The program is also concentrated in urban areas where a health service infrastructure exists. Although the supplemental food is not targeted exclusively to the malnourished, it is believed that there are widespread nutritional deficiencies among the target population.

In the first phase of the evaluation, 794 mothers were interviewed, and weight, height and arm circumference of one child was measured. In addition, various socioeconomic (e.g., income, ethnic group, occupation, education), demographic (e.g., sex, birth order, family size), program (type of center, criteria for beneficiary selection, size of food ration, availability of other services, form of health education) and other (e.g., environmental sanitation, frequency of disease) data were collected.

The second phase of the evaluation involved identifying a subsample of 11 of the 20 centers originally surveyed which were to represent the most and least effective programs. Program efficiency and nutritional impact were the criteria used. Efficiency was measured by factors such as: quality of weight, birth date and attendance records; provision of medical services; existence of safe water supply and sanitary conditions. Nutritional impact in this preliminary screening of centers was measured by the difference between arm circumference of program participants and the non-participants identified in the same or comparison village.

Once the villages for in-depth study were identified, information on dietary intake (24-hour recalls) and other detailed questions on food habits and knowledge were collected.

U.S. National Academy of Sciences (NAS) reference population was used as a standard for assessing nutritional status. Weight for height was considered the best method for assessing nutrition impact of the program since it was argued that supplementary feeding would not greatly increase stunted height, but could be expected to increase weight in proportion to height.

The Waterlow classification of nutrition status[44] which distinguishes between "wasting" (low weight for height) and "stunting" (short for age) was also used. Additionally, data were analyzed according to the Gomez classification.[45]

A nutrition impact score was assigned to each center in order to relate program activities to participant characteristics or rates of malnutrition (using weight-for-height) within the village. Feeding centers were ranked according to their impact. The impact score was reflected in the proportion of malnutrition between recent participants and non-participants minus total proportion of malnutrition between participants and non-participants. Since all the data collected were cross-sectional, the assumption was that "...progress toward reducing the initial rate of malnutrition would be reflected in a lower malnutrition rate for the total program than for the newcomer group." (p. 54)

The comparison of program and non-program groups in Pakistan indicated no significant difference in malnutrition rates except with regard to arm circumference. In the Phase II study which compiles the information from all five countries, the following concluding generalizations are offered.

Food rations did not supply enough calories (except in Costa Rica) but in all countries (except the Dominican Republic) they supplied more than enough protein.

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[44] J.C. Waterlow, I.H.E. Rutishauser, *Malnutrition in Man,* In *Early Malnutrition and Mental Development,* (Stockholm, Sweden: Almquist and Wiksell, 1975).

[45] F. Gomez, R. Galvan, J. Cravioto, S. Frenk. "Malnutrition in Infancy and Childhood, with Special Reference to Kwashiorkor." Advances in Pediatrics, (New York: The Yearbook Publishers, 1955) Vol. 7, p. 131.

Many of the children in the project are not malnourished which cuts down on the impact. Infection also affects the nutritional impact of the program. Priority should be given to children from birth to three years of age and mothers of child bearing age.

No conclusions were drawn on cost-effectiveness of the programs in terms of improved nutritional status. However, a number of factors associated with higher impact (e.g., higher nutrition knowledge, lower incidence of new cases of illness) were identified.

Although a great deal of information about recipient characteristics correlates with malnutrition, "few differences in nutritional status among the various groups within each country are large enough to be significant on any of the measures."[46] This finding indicates that either the evaluation methodology was deficient and measures not sensitive enough to control for confounding variables, or that the program does not reach the purposes for which it is designed.

CARE - Project Poshak[47]

Another CARE endeavor is Project Poshak, an integrated health and nutrition program in Madhya Pradesh, India. The concept of a rural health network was used in Project Poshak to test the feasibility, the efficiency, the impact and the economics of the 'take-home' delivery approach for providing food, medical services and child education, through existing government health infrastructure. The Project lasted from 1971-1975, and consisted of three phases: (1) Exploratory - to provide a "take-off point" for the next phases in which a methodology was developed and expertise in management was gained; (2) Expansive - involving minimal supervision and assessing logistical and operational problems of large-scale programs;

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[46] Anderson, *Care Preschool Nutrition Project: Phase II Report,* p. 51.

[47] Tara Gopaldas et al., *Project Poshak,* Vol. 1, 2, (New Delhi: CARE - India, 1975).

(3) Intensive - which utilized special personnel to do in-depth studies of different facets of an integrated 'take-home'delivery system.

An experimental group which received the food supplement and related services, was compared to a matched control. Improvement was assessed through baseline, mid-term and final evaluations. Detailed information of sampling design is presented in the text. The evaluation model examined how food, child care, education and medical services resulted in changes in clinical and dietary indicators. Efficiency of logistics, delivery of services and participation by the target population were measured.

Among the conclusions and recommendations are specific suggestions concerning program monitoring and evaluation. These functions are seen as an "integral component of health-nutrition programs," without which what transpired cannot be determined and future decisions cannot be made intelligently. Simplification of forms and records for data collection are stressed.

Evaluation criteria should be based on stated purposes.

Weight is proposed as the most sensitive indicator of the child's nutritional status. According to the Poshak experience, clinical signs are difficult to recognize in the field and require highly trained staff. Likewise, morbidity rates and dietary studies present numerous obstacles, and mortality figures are often inaccurate. Birth weights of children could potentially be a very useful indicator. Problems with criteria used for evaluating program impact on the mother are also discussed.

In addition to those evaluations which have been undertaken by AID and CARE, are those conducted by interested academic and government institutions.

National Institute of Nutrition - Special Nutrition Programme, Karnataka[48]

The most recent evaluation of the Special Nutrition Programme was done in the state of Karnataka, where some 1,200 feeding centers reach 250,000 beneficiaries; 20,000 of these participants are in rural tribal development blocks. Milk and bread is distributed on a daily basis at all these centers. In addition, some centers provide beneficiaries with a take-home ration of soya fortified bulgar. The average cost of the food ration was 18 paise per child per day, with 5.5 additional paise spent on transportation of food and administrative cost.

The evaluation, designed to determine the impact of the feeding program, selected beneficiary children and non-beneficiary children living in the same area to serve as experimental and control groups, respectively.

Weight-for-age data were collected and a clinical examination looking for edema, marasmus, angular stomatitis. Bitot's spot and stomatitis was performed on the beneficiary and non-beneficiary groups. Comparisons were then made on the basis of a single cross-sectional survey, to determine nutritional impact. Body weights classified by the Gomez scale were also compared to the surveillance data collected by the National Nutrition Monitoring Bureau in order to gain further insight into the biological impact of the program.

In addition, an array of other data were collected about the beneficiaries and program characteristics. These included: the reaction of the community to, and attitude of functionaries about the program; the regularity of feeding and attendance; how beneficiaries were slected; what related health services were provided; how the functionaries were trained; and how much sharing of the supplement took place.

Among the findings were that despite problems such as widespread sharing of the ration, inadequate logistical and infrastructure support, the program had a beneficial impact on the weight status of the target group. However, it was suggested that due to inadequacies in evaluation design, further studies were needed.

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[48] J. Gowrinath Sastry et al., *Special Nutrition Programme: An Evaluation Study in Karnataka,* (Hyderabad, India: Indian Council of Medical Research, National Institute of Nutrition, 1980).

In response to the suggestion for further study, a complimentary investigation was performed to address three delineated limitations in the previous report: (1) the lack of baseline data; (2) the lack of information on dietary intake; and (3) the possibility that control children might have benefited from the program. Therefore, seven feeding centers from the previous study were selected for in-depth analysis. Eight slum areas without feeding programs were identified to serve as a control. Communities were similar in reference to occupation and residents, and age, location and size of the slum. Once again, body weight and clinical signs were recorded. In addition, food consumption data were collected on a sub-sample of ths study groups.

This follow-up study was considered more reliable; control and treatment groups were not from the same village and data collected could be compared with those collected eight months previously.

Once again, it was concluded that the program had a beneficial effect on body weight, lessened the clinical signs of malnutrition, and that the total amount of calories and protein consumed by the children in the SNP areas was significantly higher.

A. P. Agricultural University - Special Nutrition Program, Andhra Pradesh[49]

The Special Nutrition Programme (SNP), was initiated by the Government of India to improve the nutritional well being of children between 0.6-5 years of age. Most SNP food was supplied by AID and programmed through U.S. voluntary agencies and the World Food Programme. As of April 1, 1974, 87,048 children and 2,397 pregnant or lactating women received food at one of a number of types of feeding centers in the State of Andhra Pradesh. These included schools, Maternal Child Health Centers, Welfare Centers and others. The supplement consisted predominantly of bread, although milk and other foods were also distributed. Feeding was designed to take place 25 days per month and supply between 200-300 calories per day.

An evaluation was undertaken by the faculty of the College of Home Science of the Andhra Pradesh Agricultural University and government officials. It had two major purposes: (1) to determine whether sufficient amounts of the supplement were reaching the children; and (2) to explore whether the food supplement resulted in improved health and nutritional status of beneficiaries.

The sample size for this evaluation was set at 3.5% (2,777 children) of the beneficiaries, and selected from each of the six municipalities where the SNP operated. A total of 14 centers were evaluated. In addition, 2,865 non-fed children, similar to the beneficiaries, were selected from the same or nearby areas to serve as controls.

During a survey of recipients, anthropometric (height, weight, and mid-upper arm circumference) and clinical data were collected. The Harvard standard was used, as well as a local Indian standard for the assessment of nutritional status. A measure, weight/height$^2$ x 100 was considered a useful index to judge prevalence of protein-calorie malnutrition.

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[49] P. Pushpamma, *Evaluation of Special Nutrition Programme in Andhra Pradesh*, (Hyderabad, India: Andhra Pradesh Agricultural University, 1974).

Results indicated, that the impact as measured by this evaluation, was not uniform in the various centers. Socioeconomic status of beneficiaries, supplements provided, organizers, and individual programs all varied greatly; therefore, so did the anthropometric and clinical data collected. Few changes in nutritional status could be attributed to the program.

National Institute of Nutrition - Special Nutrition Program, Andhra Pradesh[50]

Impact evaluation was also undertaken in the tribal areas of Andhra Pradesh, where an SNP program is administered by the Directorate of Tribal Welfare.

The evaluation was designed: "(1) to assess the impact of the feeding program on the nutritional status of the beneficiaries; (2) to determine whether the supplement was a real supplement or had become a replacement for home food; and (3) to assess the administrative problems connected with the feeding program" (p.2).

The evaluation was done by the National Institute of Nutrition, Indian Council of Medical Research. A total of 1,201 children from 51 villages which participated in the program and 707 from 50 villages without an SNP program were compared. All children were from the same tribe and were matched as carefully as possible with respect to other variables.

Five types of measures were then used to meet the objectives of the evaluation:

1. Anthropometric measurement (height and weight);
2. Clinical nutritional status - looking for B-complex deficiencies, hair changes, emaciation, marasmus, moonface and edema;

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[50] D. Hanumantha Rao et al., "Evaluation of the Special Nutrition Programme in the Tribal Areas of Andhra Pradesh," Indian Journal of Medical Research, Vol. 63, No. 5, May 1975, pp. 652-660.

3. Dietary intake - taken at home, using an oral questionnaire method;
4. Attitude of community and acceptability of supplement; and
5. Program administration including - procurement, preparation and distribution of food.

The authors conclude that the program was operating successfully with positive effects on nutrition status, high community acceptability and minimal administrative problems.

School Feeding, India[51]

School feeding activities and their impact on nutritional status were the focus of a third evaluation. The Central and State Governments of India operate a school lunch program for children 5 to 11 years of age which is designed to provide one-third of their daily nutrient requirements. Sri Avinashilingam Junior Basic School, situated in the Sri Avinashilingam Home Science College Campus, was selected to investigate the program's nutritional impact. The school has operated a lunch program since 1962 and has maintained longitudinal records of the nutritional status of children.

The design of the evaluation was as follows: children who had continuously participated in the school lunch program were placed in one of five groups based on the number of years in the program - A (5 years), B (4 years), C (3 years), D (2 years), and E (1 year). For each group a comparable group of children who had never participated in the program was selected as controls.

Criteria used to determine the nutritional impact of the school lunch program included: (1) energy (kilocalories and protein) and nutrient (iron, calcium, ascorbic acid) intake of 25 children randomly selected from each of the experimental and control groups; (2) anthropometric

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[51]Rajammal Devadas, S. Premakumari, "Nutritional Impact of School Lunch Programme on Children Over a Period of Five Years," Indian Journal of Nutrition and Dietetics, Vol. 15, No. 8, August 1978, pp. 257-263.

data (heights and weights) made biannually of all children; (3) biochemical assessments (blood hemoglobin levels) on 25 children randomly selected from each group; (4) clinical assessment for symptoms such as angular stomatitis, bleeding gums, dry eyes, Bitot's spots and anemia of 25 randomly selected children; (5) educational outcomes (percentage school attendance and promotion of all children); and (6) nutritional knowledge of 25 children and their parents randomly selected from each group.

Findings indicated that participation in the school lunch program had a positive impact on nutrition. The children in the school lunch program consumed more nutrients, registered significantly greater increments in height and weight, and had higher blood hemoglobin levels and had fewer and less severe deficiency symptoms. Improvement in the educational outcome was also noteworthy. The school lunch program increased nutritional knowledge and school attendance.

New TransCentury Foundation - School Feeding, Peru[52]

Several factors made evaluation of this program unusually complex: first, it was unclear what the purpose of the program was intended to be; second, exogenous economic variables played an influential role in participant's nutritional status; third, little information was available concerning actual intake of food; fourth, few baseline data were available to serve as a source of comparison for determining program effect.

It was therefore recommended that the limited evaluation resources be used in a concentrated incremental approach. "Evaluation of School Feeding impact will be more useful in Peru if viewed as setting a standard for the future, instead of recording past nutritional accomplishment" (p. 8). A pilot evaluation study was suggested for Puno in which longitudinal data would be collected to serve as a baseline

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[52] James M. Pines, *Evaluation of School Feeding in Peru,* (Washington, D.C.: New TransCentury Foundation, 1977).

for continued data collection. Puno was chosen because it was acknowledged to have a well run program, with regular feeding and other positive attributes. If impact in improving nutritional status could not be demonstrated in Puno, it was unlikely to be found elsewhere.

World Food Program - Evaluation Approach[53]

Like the AID Food-for-Peace Office, the World Food Programme (WFP) distributes commodities to be used in feeding projects around the world.

An Evaluation Service in the Office of the Executive Director, WFP, coordinates evaluation activities with the support and cooperation of other U.N. agencies (e.g., UNESCO, FAO, WHO). However, according to this document, WFP program evaluation is supposed to be undertaken throughout project planning and implementation. It should assess performance "to determine whether the ends and means are still valid or should be modified" (p. 2), and identify factors which positively or negatively effect the project, so as to give guidance on future design and selection.

Four operational steps are prescribed:

1. Performance Monitoring - based on periodic reports by the host government and/or by WFP field officers, these seek to assess progress toward meeting quantitative targets and broad project objectives, and to monitor the utilization of WFP food and feed commodities.

2. Interim Evaluation - undertaken only (a) when a project is to be expanded, (b) at periodic intervals in the case of large projects, or (c) when a project experiences serious operational difficulties.

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[53]World Food Programme/Intergovernmental Committee, *The Approach to Evaluation of WFP Development AID: Participation of FAO,* (Rome, 1974).

the interim evaluations encompass the majority of WFP evaluation work;[54] although a few are based on a "desk" analysis of the performance monitoring reports, most involve dispatching a team (evaluation mission) to the field.

3. Terminal Evaluation - prepared from performance monitoring reports, interim evaluations (if available) and other relevant material, this step focuses on chronicling the uses of WFP aid and analyzing the experiences for the formulation and implementation of future projects.

4. Sectoral Studies and Comparative Project Evaluations - usually undertaken in collaboration with other United Nations agencies (UNESCO, UNICEF, ILO, FAO, WHO), these focus -- as the title implies -- on WFP aid "to selected sectors, and to groups of projects of the same functional type in the same economic or social sector in one or more countries" (p. 4). A number of these studies (pre-1973) are cited briefly in this document.

Interim evaluation missions are usually headed by a WFP officer and staff members or consultants from other U.N. agencies; while host government officials play an important role in supplying available information and frequently accompany the mission on site visits, they are formally not members of the WFP mission. The mission normally spends 2-3 weeks in the field; its purposes: "...to measure the progress of a project towards the achievement of its specific targets or goals and overall objectives ... in quantitative terms" and to

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[54]Examples of these WFP evaluation documents discussed later include: *Interim Evaluation Report, Colombia* (WFP/IGC: 26/11, August 1974); *Interim Evaluation Report, Mexico* (WFP/IGC: 26/11, August 1974); *Interim Evaluation Summary Report, Bangladesh* (WFP/CFA: 6/7,August 1978); *Interim Evaluation Summary Report, India* (WFP/CFA: 7/10, March 1979). In practice, the interim evaluations that we reviewed vary enormously in scope and the degree to which qualitative and quantitative aspects of nutritional impact are addressed. Factors influencing this mix of information seem to include: type and length of program, degree of coordination between WFP and the government, and in-country institutional capabilities for monitoring and evaluation activities. A few examples will be noted briefly.

"give close attention to the qualitative aspects of the project's progress" (p. 6). The latter -- qualitative aspects -- are emphasized, as data gathering and verification are precluded by the short time allocated.

In "assessing the project as a whole," the evaluation mission is directed toward eight project areas:

1. Technical
2. Administrative and organizational
3. Food management
4. Nutrition
5. Economic and social impact
6. Market displacement
7. Arrangements for increasing host government responsibility
8. Arrangements for continuation of project's purposes following termination of WFP aid.

The report also discusses the availability of baseline data and the desirability of cost-benefit analysis. It is recognized that adequate baseline data is desirable "whenever practicable," yet limited funds and the lack of skilled workers are often imposing constraints. Cost-benefit analysis has limited applicability to WFP projects, it is asserted, "since a large proportion of the impact of most WFP projects is social, requiring other types of analysis, and since ... adequate detailed data ... are often lacking" (p. 10). This is particularly true, with respect to nutritional impact and other effects -- such as educational improvement -- in feeding programs. The conclusion on cost-benefit analysis:

> "In general, the degree of complexity, the cost and the effort involved in evaluation need to be kept strictly proportionate to the advantage that can be expected to accrue from [the evaluation effort] ... Usually an assessment of quality of operation, the degree of attainment of stated objectives and continuing relevance is sufficiently informative" (p. 10).

What emerges from the evaluation mission is a report that makes conclusions and recommendations in four categories:

1. summary assessment of project performance and impact, including the benefits and shortcomings of WFP food aid;

2. description and analysis of project implementation as compared with objectives and targets at the outset;

3. recommendations for improvement in any aspect of the project's performance; and

4. valuable experiences encountered during the project that may be applicable to similar/future projects.

The interim evaluation reports submitted by the field missions are influential in two ways: (1) follow-up by WFP and host governments in implementing recommendations for on-going projects, and (2) for incorporating the recommendations in plans for project expansion (several projects are cited briefly). It is felt that a major benefit of the evaluation experience has been more careful, detailed and realistic formulation of project objectives.

Yet, significant problems remain, and these are discussed at some length in the Executive Director's report. These problems revolve around the issues of data and funds; many deal with such operational concerns as the allocation of scarce human and financial resources, while others are related to internal management.

It is stressed in the discussions of problems that the main point of evaluation is feedback to enhance the formulation of project objectives and targets; careful formulation and specification of objectives, including a time-phased work plan, is felt to be crucial in evaluation efforts. Problems are discussed in improving the feedback mechanisms and in arriving at realistic objectives and operational targets.

Another recognized weakness is "the incompleteness of up-to-date project records and data" (p. 15). WFP is attempting to upgrade and systematize its recording and retrieval efforts in this area, but it is also

understood that this is partially up to the host government as the project executor. For WFP to collect and process more data leading up to an interim evaluation would put a severe strain on limited financial and human resources, and "would mainly serve scientific rather than operational needs" (p. 15). It is also believed that better recording of project data would improve feedback and better enable WFP to "aggregate and generalize findings about individual projects," and thereby improve the overall formulation and implementation of projects within a sector or region.

WFP - Food Supplementation, Egypt[55]

This program was started in Egypt a number of years ago in connection with a land resettlement program. Through 1977, the accumulated number of households receiving food exceeded 100,000; in 1978 an estimated 7,000 households with over 45,000 members received food in varying quantities.

Food supplements are distributed once a month for three years in gradually decreasing quantities. The food is distributed as rations of wheat flour, butter/vegetable oil, canned meat/fish, coffee/tea, and local white cheese. Data are presented on the weight, energy (calories), protein (grams) and local market value of the rations. As all households in the same yearly cycle receive the same quantity of ration, the relative importance of the food aid within a household varies with the number and age of family members; data are presented on household composition (by number of children and adults) of the surveyed groups, as well as the calculated nutritional value of the food aid to the average requirements by household.

This study was undertaken by a private consulting firm to assess the nutritional effect of WFP food aid. It does not report and analyze all of the survey information but only "those variables likely to give

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[55]Decision Data AB, *Nutritional Effect Survey*, (Lund, Sweden, 1979).

results of practical value" (p. 1). Priority is thus given to measurable changes in nutritional status and dietary habits. Data collection was undertaken from 26 November to 18 December 1978 by two survey teams from the Nutrition Institute in Cairo, assisted by FAO. Data were coded, controlled and registered on computer tape in the field using portable minicomputers.

The sample of households interviewed in this 1978 survey is an extension of a sample survey conducted in October/November 1977 by the Nutrition Institute, Cairo. Both surveys categorized households by the duration of food aid: (1) a 'Pre-aid' group who had not received food aid; (2) a '1976/77' group currently receiving food aid; (3) a '1974' group who had recently ceased receiving food aid; and (4) a '1972' group who had received no food aid since the end of 1975.

In all, 327 housewives (representing their household) were interviewed, and their children from 6-71 months (601) weighed and measured. The interview questionnaire included both objective and subjective questions regarding: household information; household food habits; money spent on food purchases; food distribution, and child nutritional status. Housewives were asked, for example, to assess changes in the frequency of use of 30 specified food items used in the last 7 days, and to provide impressions of child's growth. Much attention was also given to establishing accurate ages for each child.

Anthropometric characteristics (weight/age, height/age and weight/height) of the children were related in a cross-sectional study with the duration of food aid, and compared in a longitudinal study with data from the 1977 survey. Nutritional status of different children within a household and among households with similar food habits was also studied.

Analysis of dietary changes was based largely on housewives' impressions and recollections of the change in frequency with which certain foods were served. Food items were rank ordered by the tendency for increased consumption.

A statistically significant improvement in nutritional status of the children is reported for all groups, as determined by weight/height; height/age results were only slightly less conclusive. Food aid was also determined to have had a positive impact on households as a whole; greatest improvement was recorded in the groups who had not received food aid for one or two years.

World Health Organization - Impact Evaluation Methodology[56]

This World Health Organization (WHO) document proposes a methodology for measuring the nutritional impact of supplementary feeding projects administered by WFP and other organizations. According to this paper, WFP has realized the difficulty of measuring the impact of its food commodity assistance on nutritional status. Therefore, guidelines were developed to: (1) "assist countries receiving food aid and WFP in identifying the presence and/or absence of nutritional changes in selected population groups benefiting from food supplement"; and (2) enable those countries to modify, as necessary, the scope and organization of food aid projects based on the measurements carried out under the first objective."

These guidelines are "specific and limited" to food-assisted projects that have already taken place. They were prepared keeping in mind the limited resources available for evaluation activities and use a minimum number of measurements. The evaluation approach is directed at infants, preschool children and primary school children 6 to 10 years of age; pregnant and lactating women were excluded because of the methodological problems associated with the use of anthropometric indicators. A multi-stage sampling procedure is suggested.

Since protein-energy malnutrition (PEM) is the most "important" nutritional problem, age, weight and height data should be collected. In

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[56] World Health Organization, *Supplementary Feeding of Vulnerable Groups: A Guideline for the Measurement of Nutritional Impact in Projects Assisted by the World Food Programme and Other Agencies,* (Geneva, 1978).

turn, the three indicators - weight-for-age, weight-for-height, and height-for-age are compared with the U.S. National Center for Health Statistics reference population.

Ideally data should be collected four times per year. However, in long term projects of three years or more, biannual measurements will suffice. The use of specially trained personnel to obtain data (including doing measurements) is assumed in the majority of cases.

Prior to evaluating data, specific objectives for the program should be formulated (e.g., reduction in the proportion of newborns weighing less than a specified weight) and measures selected to help quantify the extent of program achievement. Data should be analyzed to identify children with low levels of the indicators selected. Comparison of the distribution of low level indicators between reference and experimental data follows. Finally, interpretation of the results using the nine combinations of indicators--low, normal or high, weight-for-age, height-for-age, and weight-for-height-- would lead to determination of the recipients' nutritional status.

Analysis of impact should provide feedback; positive results indicate program expansion or continuation; negative findings should stimulate efforts for improvement.

We have not uncovered any instances where WFP has employed this methodology.

FAO - Evaluation of WFP[57]

This paper describes an approach to evaluation of WFP projects "which fall within the sphere of FAO's interest, and where FAO specialists participate in WFP evaluation teams..." (p. 2)

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[57]World Food Programme/Intergovernmental Committee, *The Approach to Evaluation of WFP Development Aid: Participation of FAO*. (Rome, 1974).

If resources permit, FAO should direct its evaluation to the following aspects of WFP projects:

1. Economic considerations, to ensure that food was used in accordance with the priorities and development plan of the country. The effects on food production and consumption, as well as employment and the balance of payments of the national economy and/or region should be examined.

2. Market displacement phenomena.

3. Nutrition and health impacts as measured by ration size and utilization, and various indicators of nutritional status.

4. Social factors, which can give a large impact on feeding programs.

There may also be WFP projects designed to achieve specific objectives such as increasing agricultural, fishery and animal production. Issues to address and questions to be asked in evaluating these endeavors are proposed in this document. For example, in a fisheries project one would compare calorie, protein and per caput fish intake prior to and after project implementation. Other factors such as the number of fish ponds per hectare compared to national figures, number of fish fingerlings stocked in ponds, and conversion ratios of feed to fish, should be considered.

Domestic Programs - WIC, School Feeding, Food Stamps, Elderly [58,59,60,61,62,63,64,65]

Since AID does not concern itself with domestic nutrition programs, we have not abstracted documents which describe the evaluation methodologies employed. Various examples exist of evaluations of U.S. federal feeding programs such as the Special Supplementary Feeding Program for Women, Infants and Children (WIC), School Feeding activities, Food Stamps and programs for the elderly.

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[58] Eileen Kennedy et al., *Effect of WIC Supplemental Feeding on Birth Weight*. [1979.] (Forthcoming.)

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[59] Kennedy et al., *Effect of WIC Supplemental Feeding on Hemoglobin and Hematocrit of Prenatal Patients.* [1979.] (Forthcoming.)

[60] U.S. Department of Agriculture, Food and Nutrition Service. *Child Nutrition Review: Evaluation of the Child Nutrition Programs; Evaluation of the Supplememtal Program for Women, Infants and Children (WIC Program),* (Washington, D.C., 1978).

[61] U.S. General Accounting Office, *The National School Lunch Program - Is It Working?* Report of the Comptroller General of the United States, Washington, D.C., July 26, 1977.

[62] U.S.G.A.O., *How Good are School Lunches?* February 3, 1978.

[63] Kenneth W. Clarkson, *Food Stamps and Nutrition,* Evaluative Studies 18, (Washington, D.C.: American Enterprise Institute for Public Policy Research, 1975).

[64] Sylvia Lane, "Food Distribution and Food Stamp Program Effects on Food Consumption and Nutritional 'Achievement' of Low Income Persons in Kern County, California," American Journal of Agricultural Economics, Vol. 60, No. 1, February 1978, pp. 108-116.

[65] Joseph C. Edozien et al., "Medical Evaluation of the Special Supplemental Food Program for Women, Infants, and Children," American Journal of Clinical Nutrition, Vol. 32, No. 3, March 1979, pp. 677-692.

## E. Fortification Programs - Abstracts

The range of techniques available to measure the process and impact of program activities is well illustrated by the literature on agricultural (e.g., high lysine corn), and industrial (i.e., processed foods, infections and oral administration) fortification programs. Programs of this type seek to improve nutritional status first through development, harvest or manufacture and then through delivery of a vehicle engineered to provide a single or multiple nutrient(s) to target populations. Vitamin A, iodine, iron, zinc and amino acids are perhaps the nutrient deficiencies most commonly addressed through fortification.

Process measures - which measure something other than change in nutritional status - are often used by evaluators as proxies to measure impact. Austin et al.,[1] note that measurement of the amount of fortified food produced or the total amount harvested often serves as a proxy for improved nutritional status. From these, average consumption levels may be determined and individual level of nutrient consumed calculated. One critical assumption made is that the food will actually reach individuals and be consumed, however, "usage and acceptability" problems and "commodity-system structure" problems may invalidate such an assumption. Both problems reduce the amount of fortified food consumed - the first directly at the consumer level since foods unpalatable or unrecognizable may not be purchased; the second at the market level since target groups may not participate in commodity marketing structures through which fortified grains are likely to pass.

Other types of proxy measures are also used, e.g., the number of injections given or vitamin capsules consumed. These are a better proxy for impact measures since the vehicles (e.g., shots, tablets) are introduced at a point considerably closer to the end point of the nutrient flow.

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66 James E. Austin et al., *Nutrition Intervention Assessment and Guidelines*, (Cambridge, Massachusetts: Harvard Institute for International Development, 1978).

In the fourth chapter we discussed the distinction between research and evaluation. Although we recognize that most of the documents in this section are more characteristic of research than evaluation we include them here because the methodologies employed are of use to evaluators. Evaluators should review the hypotheses and assumptions made by project planners but should not be faced with the task of substantiating them. We uncovered little literature in the area of fortification which falls exclusively in the domain of evaluation.

INCAP - Vitamin A Program, Guatemala[67]

From 1969 through 1977 INCAP undertook a cycle of activities which began with selection of a suitable fortification vehicle to control hypovitaminosis A in Central America, and ended with an evaluation of a pilot project in Guatemala to test the adequacy, effectiveness, and efficiency of vitamin A fortification of sugar. Objectives of the undertaking included efforts "to increase the intake of vitamin A, and through this improved intake, to raise the body fluid and blood serum levels among the population at large, increasing thereby the supply of retinol to the tissues" (p. 5).

Investigators proposed to study the process by which fortified sugar was delivered to the countryside, and the nutritional effectiveness of sugar fortification. They also proposed to determine the cost of intervention. Thus not only was impact to be addressed but the process of vehicle delivery was to be verified.

Personnel employed by the project were not listed although the document describes the services of a physician for clinical analysis, trained field personnel (high school teachers) for data collection, statisticians, keypunchers and computer operators to analyze cleaned data and laboratory personnel to perform biochemical analysis. The evaluation was funded by AID.

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[67] Institute of Nutrition of Central America and Panama (INCAP), *Evaluation of Sugar Fortification with Vitamin A at the National Level,* (Guatemala City, 1979).

Baseline data were collected by survey in October-November 1975 before sugar fortification began, and was followed by four additional surveys timed to account for seasonal variation in dietary intake: April-May 1976 (dry season), October-November 1976 (rainy season), April-May 1977 and October-November 1977. Dietary, biochemical and clinical data were collected in 12 rural communities of 70-2,000 inhabitants selected at random to be representative of the principal rural ecological areas. Thirty families were selected at random from each community, with sample size chosen based on the desire to be able to determine a 10% change in prevalence of low serum retinol levels.

In addition, 12 villages with 221-500 inhabitants and five villages with 69-220 inhabitants were surveyed once to determine amount of fortified sugar consumed and total amount of white sugar consumed respectively. Smaller villages were selected based on the assumption that if fortified sugar was available in less accessible areas, it would certainly be available in urbanized regions.

Samples of fortified sugar were analyzed at the factory to determine concentration of vitamin A. Samples were collected at the retail and household level at the time of surveys to verify whether fortified sugar reached localities. Estimates were calculated to provide a basis for the calculation of retinol intake from sugar intake.

Nutritional effectiveness was evaluated based on changes in serum retinol levels of children six years of age and in breast milk retinol of women lactating at the time of the survey. Previous dietary studies revealed that young children consumed the least amount of sugar leading investigators to assume that if children consumed adequate levels of fortified sugar other family members would also. Anthropometric (height, recumbent length and weight) and clinical measures were also made at clinic sites. Liver retinol reserves were measured in residents of Guatemala City who died of accidental causes. Dietary studies included 24-hour recall, with food portion sizes determined by direct weighing. Home visits were made to gather this data.

Fortified sugar became the major source of dietary vitamin A, ultimately providing 65-69% of vitamin A. Vitamin A intake tripled as a result of fortification. Of the population sampled, 81% had access to fortified sugar via the usual delivery system. Based on recommended allowances (adjusted for age and sex), 83% of the sample had retinol intakes less than 50% adequate at baseline contrasted with the 83% with intakes greater than 50% adequate at final survey. Serum retinol levels also showed marked improvements over baseline.

A decrease in the percent of breast milk samples classified as "deficient" in retinol and a decline in the proportion of liver samples with 50 mg/gram or less retinol was noted over the course of the study. Clinical and anthropometric measures were not used to determine program effect due to the short term of sugar fortification, however morbidity increased when serum retinol levels dropped below 10 mg/ml.

A.F.O.B. - Vitamin A Program, Java [68]

The objectives of the Vitamin A Deficiency Prevention Pilot Project, in Java, Indonesia, were: (1) to determine the biological effectiveness of biannual administration of 200,000 I.U. of vitamin A and 40 I.U. of vitamin E in preventing xerophthalmia; and (2) to determine the effectiveness and efficiency of project operations and the distribution system.

To achieve the first project objective a sample of 2,812 children from rural and urban areas was selected to receive a baseline opthalmologic examination. Children with xerophthalmia were eliminated from the study.

Children were then divided into control and experimental groups, the former receiving a placebo in this double blind experiment. Six and twelve months later, placebo and vitamin A were re-administered along with another examination.

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[68] American Foundation for Overseas Blind, *An Evaluation of the Vitamin A Deficiency Prevention Pilot Project in Indonesia, 1973-1975,* (New York, 1975).

The interior segment of both eyes was examined, and the results recorded on data forms. Patients with xerophthalmia were treated with the capsule and also followed up to determine effectiveness of treatment.

In order to judge program effectiveness, the proportion of the target population who received their dose was calculated. Efficiency was measured in terms of cost per capsule administered and the number that each worker administered per day.

The evaluation concluded that the use of vitamin A capsules was acceptable to the general population and appropriate and feasible for use under field conditions. The effectiveness of the system was dependent on administrative support - particularly with respect to capsule supplies. Seasonal affects on the vitamin A levels from dietary intake could have affected the results.

National Institute of Nutrition - Vitamin A Program, India[69]

A third methodology was employed in 1978 in a massive dose vitamin A program initiated by the Indian government.

The evaluation was designed and conducted by the National Institute of Nutrition, Indian Council of Medical Research in Hyderabad, India. No indication is given of costs of the evaluation, however senior paramedical personnel were operative and trained to assess age, administer questionnaires and diagnose Bitot's spots. State Nutrition Officers supervised state evaluations.

About 28,500 children 1-5 years of age and 40,800 children 5-10 years of age formed the sample chosen from 58 health sub-centers in eight states. Three aspects of program operation were studied during the evaluation: (1) biological effectiveness; (2) administrative and

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[69] K. Vijayaraghavan, et al., *National Programme for the Prevention of Vitamin A Deficiency: An Evaluation,* (Hyderabad, India: Indian Council of Medical Research, National Institute of Nutrition, 1978).

operational aspects; (3) community awareness and acceptance of the program.

Determination of biological effectiveness made use of the relationship reported by Vijayaraghavan et al., between prevalence of Bitot's spots and age. According to his findings, baseline data are not necessary to determine program effect. Instead, a "regression analysis of prevalence of vitamin A deficiency on age can ... be carried out and if the regression coefficient so calculated is not different from [b = 0.0065] the area may be considered as having been effectively covered by the prophylaxis program."[70] The authors conclude that this techrique worked best in areas of high prevalence of xerophthalmia but was difficult to use in regions with a low prevalence of Bitot's spots.

Several variables were examined in the study of administrative and operational variables. Examiners considered the number of bottles of vitamin A available at the sub-centers in an effort to ascertain whether adequate supplies were available to treat all eligible children - a precondition to attributing achievement of program purpose to program output. Generally, irregular and inadequate supplies were available.

The evaluation tried to examine several hypotheses thought to be responsible for poor coverage: excessive workload on center personnel; failure to turn away ineligible children; and failure of center personnel to conduct sufficient home visits. Workload did not appear to be a factor in low levels of coverage. Poor record keeping hindered the efforts to examine the second two explanations.

Center staff were asked about community reaction to the program. State medical staff (including physicians and auxiliary nurse midwives)

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[70] K. Vijayaraghavan, et al., "A Simple Method to Evaluate the Massive Dose Vitamin A Prophylaxis Program in Preschool Children," American Journal of Clinical Nutrition, Vol. 28, October 1975, p. 1193.

were queried as to their cognizance of program objectives and activities. Most explained the preventive nature of the program but failed to mention the specific target group.

Vitamin A Program, Philippines[71]

Pilot projects often are directed towards answering questions about the likely impact of larger, nationwide projects. This was certainly the case in a study initiated by the National Science Development Board, the Cebu Institute of Medicine and the Cornell University Division of Nutritional Sciences and sponsored by WHO, UNICEF, USAID, the Department of Health, and the Nutrition Center of the Philippines. The three year project was to ascertain the prevalence of vitamin A deficiency, determine its causative factors, assess the effectiveness of several methods of intervention, evaluate the benefits of each method and make recommendations for Philippine national policy.

The authors propose that recommendations be based on answers to the following eight questions:

1. Is there a sufficiently serious problem to justify action?
2. Has there been an examination of possible intervention strategies?
3. Which one, or combination, of these intervention strategies is likely to be most effective?
4. How feasible will it be to introduce such a national strategy?
5. What will the costs be of such an intervention, what is the effectiveness likely to be, and who will benefit?
6. Are there any preliminary investigations that need to be undertaken prior to introducing a national intervention program?
7. What methods should be used to monitor and evaluate the effectiveness of the program?
8. Can the intervention be used to produce benefits, other than on vitamin A deficiency?

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[71] Florantino S. Solon, et al., *Research to Determine the Cost and Effectiveness of Alternate Means of Controlling Vitamin A Deficiency (Xerophthalmia): Final Report,* (Cebu City, Philippines: Cebu Institute of Medicine, 1977).

A total sample of 1,715 children from the ages of 1-16 were randomly selected by a stratified sampling technique from 600 sample families in four representative ecologic zones in Cebu. Clinical, biochemical and anthropometric data were collected from the children and dietary and socioeconomic information was obtained from the households.

Three intervention strategies were tested in each zone, namely, a public health-horticulture intervention (PHI), a massive dosage capsule program, and food fortification. Each strategy took place in a separate area of the zone so that interventions could be run concurrently. No non-treatment control group was employed. All strategies were evaluated based on changes in the incidence of active clinical xerophthalmia, changes in serum vitamin A levels and other measures as noted below.

The PHI involved weekly one-day visits to the area by a health team consisting of one physician, and three paraprofessional health workers (Family Health Aides). Among services provided were: morbidity clinics, deworming, establishment of a village co-operative pharmacy, training of Medical Auxiliary Workers, environmental sanitation with emphasis on water purification and sanitary toilets, horticulture and establishment of a community organization to serve as a channel for education, and monitoring vital events and for program implementation. Process variables were examined as a measure of accomplishment over the 52-week period, e.g., the number of consultations, dewormed children, home gardens, sanitary toilets and families receiving intensive care were counted.

The Massive Dosage Capsule Program involved the distribution of 200,000 I.U. of retinyl palmitate in oil once every six months for oral intake. Four distribution strategies employing respectively the Village Council, School Teacher, Young Groups and Health Team (one physician and three Family Health Aides) were observed for their efficiencies in giving

out the massive dosage capsule of vitamin A. In addition, reactions to the capsule were noted.

The Food Fortification Program first required selection of the most effective carrier for vitamin A (ultimately MSG), then fortification of MSG with 15,000 IU of vitamin A per 2.4 gram packet and finally distribution and use.

Of three interventions, the MSG fortification program produced the best results in terms of improvement in serum vitamin A levels and reduction of active clinical xerophthalmia (77%). MSG fortification was judged to be the most cost effective public health measure. In terms of other interventions, the PHI reduced the prevalence of active clinical xerophthalmia by an average of about 44%. However, the authors state the period of implementation (one year) was too short to allow for valid conclusions to be made regarding the efficacy and efficiency of the PHI.

The massive dosage capsule program reduced active clinical xerophthalmia by about 73%. The health team distribution strategy reached more children per person-day than the other distribution approaches. The strategy using school teachers produced the most reactions to the capsule (vomiting, headache, fever).

INCAP - Corn Fortification, Guatemala [72]

The corn fortification program conducted in Guatemala (like the wheat and rice programs conducted in Tunisia and Thailand to be discussed later), employed the archetypical research design with experiment and control groups. All the projects were funded by AID with the intention of laying to rest the controversy which surrounded food fortification projects - do they achieve their stated purpose of improving the nutritional status of their recipients?

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[72] Juan José Urrutia, *Corn Fortification: A Field Demonstration Model*, (Guatemala City: Institute of Nutrition of Central America and Panama, 1976).

From May 1972 to February 1976, scientists at the Institute of Nutrition of Central America and Panama (INCAP) evaluated the effects of fortified corn fed to pregnant women and their children in Santa Maria Cauqué, Guatemala. Corn was fortified with 7.8% soybean flour, 0.12% L-lysine hydrochloride and thiamin, riboflavin, niacin, vitamin A and ferric orthophosphate.

The project objectives, as listed by the investigator, included the following:

1. To determine the effect of fortification on nutrition of pregnant women and on fetal growth.
2. To determine the effect of fortification on the growth and development of children.
3. To determine the effect of fortification on disease incidence of children and on intestinal infection by Shigella.
4. To study the feasibility (management and economics) of corn fortification at the community level through the addition of a mixture containing protein, lysine, vitamins, and iron.
5. To evolve realistic operational guidelines and economic data applicable to a regional or national program of corn fortification (p. 3).

The impact of corn (maize) fortified at village mills and consumed in the form of tortillas was determined by comparison with baseline data collected in the same village from 1964 to 1972 and to data collected in nearby Santa Domingo Xenacoj which served as a control. Families were grouped according to their level of fortification (low, medium, high), and the average family fortification index (which was determined weekly from information contained in daily records of attendance at village mills where the corn was fortified). Mothers self-selected to participate in the experimental village.

The effect of corn fortification on fetal growth was determined in 189 newborns, representing 95% of the babies born during the fortification project. This was accomplished by obtaining information on: maternal dietary intake (by three, seven-day dietary surveys corresponding to

each trimester of pregnancy); morbidity during pregnancy; anthropometric measures from 90% of the pregnant women; and weight, height head and chest circumference of the infants at birth.

The health of a subsample of 70 children from 0-3 years, selected at random, was assessed by weekly surveillance of morbidity and dietary intake, and growth was determined by weight, height, chest and head circumference measurements taken biweekly during the first year of life and every four weeks during the second and third year. Weekly fecal cultures were collected for detection of intestinal infection by Shigella in the 70 cohort children. Growth records were available for children (from birth to ten years of age) other than those in the cohort group.

In the control village, anthropometric data were obtained for pregnant women; newborns were examined at birth as outlined above; and growth data from children 0-3 years were secured at three month intervals. Records of natality and mortality kept by INCAP personnel for both villages were used to determine pre-school mortality.

The intervention had no apparent impact on fetal growth (birth weight), postnatal growth or bone development from birth to three years of age. The dietary pattern of the children did not change as a result of the corn fortification, and as such, the caloric deficit of their diets was not corrected. There was, however, a positive tendency for better growth increments in children 3-5 years old and a 50% reduction in infant mortality. No differences in morbidity were found in the three groups of children receiving different levels of fortification during the first year life. Numerous other findings are reported.

Urrutia, the author of the document, comments that future studies would be wise to increase the level of fortification; enforce the fortification of corn to ensure that fortified corn is used on a daily basis; employ a larger sample to more accurately quantify morbidity and mortality effects; and include, as a laboratory technique, a measure of host immune systems.

It is interesting to note that the project's completion date was set by an earthquake which struck Santa Maria Cauqué killing 5% of its population and destroying nearly all homes. Final measures for children were conducted two weeks after the earthquake and four weeks post-earthquake for pregnant women. The hazards associated with experimental design in the field cannot be better illustrated. All variables cannot be controlled despite the best intentions of evaluators.

Harvard - Wheat Fortification, Tunisia[73]

From 1969 through Spring 1975, Harvard's Department of Nutrition directed a wheat fortification study in Southern Tunisia, a non-wheat growing area characterized by poverty, high infant and child mortality rates and a high incidence of iron deficiency anemia. About 81% of the protein and 66% of the energy in their diets was derived from wheat consumption. The children at whom the project was directed were severely stunted in growth.

The nutritional interventions included: (1) wheat fortified with thiamin, riboflavin, niacin; and (2) wheat products fortified with the same vitamin-mineral mix plus 0.3% L-lysine.

The experimental design was as follows: ten villages with a total population of about 16,500 and about 3,000 children under five years of age were divided into three groups. Residents in one group of villages were fed wheat products fortified with thiamin, riboflavin, niacin, vitamins A and D, and iron tricalcium phosphate; the second resident group received wheat products fortified as above with the addition of 0.3% L-lysine; a third group served as the control.

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[73] Fredrick J. Stare, et al., *Final Report of Tunisian Wheat Fortification Study*, (Boston, Massachusetts: Harvard University School of Public Health, [1976?]).

All the pre-school children were examined every six months from fall 1970 to Spring 1975. Baseline data were collected for one year prior to the intervention. Data included a variety of anthropometric measurements including height, sitting height, leg length, weight, arm, chest and head circumferences, four skinfolds, number of erupted teeth, hand-wrist x-rays and biochemical indices, such as hemoglobin, hematocrit, serum proteins and albumin and urinary riboflavin and creatinine.

During the six year study periodic socioeconomic surveys, dietary surveys and food purchasing and consumption surveys were conducted. Birth weights and neonatal mortality were also measured.

Unlike the previous study all wheat shipped to the experimental areas was funneled into project mills for fortification. Project technicians were employed to validate the addition of fortification to wheat flour.

The fortification program had no impact on any of the parameters measured. According to the authors, "it is possible that no nutritional intervention can, in isolation, have any effect without correction of the numerous problems (health, sanitation, population pressure, ignorance, poverty, etc.) which afflict a developing society" (p. 21). Other possible explanations are offered: low caloric intakes; already adequate protein intake; and specific uncorrected nutrient deficiency which obscures the effect of fortification.

Harvard - Rice Fortification, Thailand[74,75]

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[74] Gershoff, Stanley N.et al., "Amino Acid Fortification of Rice Studies in Thailand. I. Background and Baseline Data," American Journal of Clinical Nutrition, Vol. 28, No. 2, February 1975, pp. 170-182.

[75] Gershoff et al., "Nutrition Studies in Thailand. II. Effects of Fortification of Rice with Lysine, Threonine, Thiamin, Riboflavin, Vitamin A, and Iron on Preschool Children," American Journal of Clinical Nutrition, Vol. 30, No. 7, July 1977, pp. 1185-1195.

From January 1971 to July 1975 the health effects of fortifying rice with amino acids and other nutrients were investigated in a large-scale field study by the School of Public Health, Department of Nutrition, Mahidol University, Bangkok, Thailand; the Thai Department of Health; and the Department of Nutrition, School of Public Health, Harvard University in the valley of the Ping River, Thailand. Twenty-nine Chiang Mai villages with a total population of approximately 13,500 participated in the study. About 70-80% of the villagers' calories came from rice, with lysine and threonine the limiting amino acids in the protein. Village children participating in the study were retarded in growth and development compared to Thai middle-class children.

At milling, fortificants were added to rice in the form of artificial rice grains or rice fortification grains (RFG). Three types of RFG were used: (1) one containing lysine, threonine, thiamin, riboflavin, vitamin A and iron; (2) one containing vitamins and iron but no amino acids; and (3) one placebo.

Professional staff supervised the work and conducted and interpreted the physical, X-ray, parasitologic and other examinations. Five persons with a B.A. degree in nutrition from the Thai School of Public Health and several drivers were involved on a full time basis with day-to-day activities. On a part-time basis, laboratory technicians and dietitians from the Thai Division of Nutrition, and public health nurses, sanitarians and midwives of the Chiang Mai Health Department were employed as needed.

A 12-month pilot study was conducted prior to the full-field study of rice fortification in Thailand to determine any methodological problems which might be associated with a full scale study. Participation in the study was on a voluntary basis, and as such, various educational techniques were employed to increase cooperation. These included the distribution of colored brochures describing the nutritional aspects of the study and meetings to outline the project and answer questions.

The full-scale study was designed as follows: 29 villages with a total population of about 13,500 were divided into five groups: (1) control (unfortified rice); (2) placebo control (rice with added artificial rice grain) plus day-care centers for preschool children; (3) RFG with vitamins and iron plus day-care centers; (4) RFG with iron, vitamins and amino acids plus day-care centers; and (5) RFG with iron, vitamins and amino acids without day-care centers. The day care centers for pre-school children were built in some villages as an inducement to villagers to participate in the fortification project. (Use of day care centers by villagers did not appear to the investigators to be much help since villagers in areas without day care centers were generally cooperative. In fact, the centers had some notably deleterious effects as those who used the centers had a higher incidence of infectious disease.) Children who used the centers brought their own food with them.

Baseline data were obtained from 1,265 Chiang Mai village pre-school children and from pre-school middle-class Bangkok children (anthropometric and hand-wrist x-rays on 315 and 261 children respectively). At the end of the study about 2,250 village children ages 1.5-9 years had been in the program from one to four years.

During the course of the intervention information was placed on record cards prior to being transferred to IBM cards. Data collected included (1) census information for each household, listing the names and ages of members; (2) data from biannual physical examinations (January - February and July-August) of the children including short medical histories, anthropometric data (such as reclining lengths, weights, head, arm and chest circumferences, triceps and subscapular skinfold measurement), notations of medical problems (such as nutritional and infectious disease and physical abnormalities), hemoglobin and hematocrit determinations during the winter examination on mothers and children over one year of age, hand-wrist x-rays, and where possible fecal samples for parasite determinations; and (3) data on mortality, morbidity (collected every 15 days) and birth weight (usually weight

was obtained sometime during the first 15 days of life); (4) consumption of fortified rice, during visits made to homes every 15 days, where mothers were asked about their use of RFG. Rice brought by children to day care centers was also examined for RFG.

No benefits in terms of improvement in anthropometric measurements, hemoglobin and hematocrit levels and morbidity were observed in children who consumed fortified rice two-thirds of the time or more, when compared to the population which was not fed fortified rice or consumed it less than 10% of the time.

The results of the study could not be explained by the high prevalence of illness. Suggested explanations for the failure of the study to yield the expected results include: (1) low caloric intakes due to the low caloric density and lack of palatability of diets, (2) limitation of an unsupplemented nutrient such as calcium; or (3) presence of enteric parasitic infestation without illness.

## F. Planning Programs — Abstracts

The purpose of planning programs is to develop "planning and operational infrastructures"[76] to promote activities which will have a positive impact on nutritional status. The chain of events between inputs and improved nutritional status is exceptionally long.[77] Therefore attributing an impact of improved nutritional status to planning activities involves validation of numerous hypotheses and assumptions along the causal chain. Measures associated with both process and impact evaluation are required.

### ATAC-INCAP/ROCAP[78]

In May 1978, a mid-term project evaluation of INCAP (Institute for Nutrition of Central America and Panama)/ROCAP (Regional Office for Central American Programs of USAID) Regional Nutrition Project was performed by American Technical Assistance Corporation under contract to AID.

The intent of this planning project was to develop multisectoral nutrition planning,"as a major element in national development strategy" in countries of Central America and Panama. ROCAP committed $1,610,000 over a four year period; the remainder of the project's $2,822,000 was supplied by the Pan American Health Organization (PAHO), W.K. Kellogg Foundation and INCAP.

INCAP provided experienced staff from its Basic Program staff (Division of Applied Nutrition) and Extended Program Staff (INCAP research divisions) to advise and aid national nutrition agencies and officials.

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[76] U.S. Agency for International Development, *Nutrition Evaluation Project*, DSB/N, (Washington, D.C., February 1978).

[77] Chafkin notes the distinction between planning programs whose outputs are projects and those whose outputs are policies. Programs whose outputs are policies add an extra link to the causal chain. (Sol Chafkin, "Nutrition Policies, Programs and Politics," American Journal of Agricultural Economics, Vol. 60, No. 5, December 1978, pp. 806-809.

[78] William Rusch et al, *INCAP/ROCAP Regional Nutrition Project: Mid-Project Evaluation*, (McLean, Virginia: American Technical Assistance Corporation, 1978).

Professional staff from the Basic Program included: one program director, two country project officers (to be stationed in Honduras and one other country), one development planner, one agricultural economist, two health officers, two nutritionists, one systems analyst and a part-time statistician/epidemiologist.

Program activities were implemented in each country by a full-time nutrition planning group within the national government planning agency which had close linkage to other units of the planning organization and to major government ministries and agencies (in Health, Agriculture, Social Welfare, Education).

The mid-project evaluation was designed to determine the progress that had been made in nutrition programming by the INCAP/ROCAP Regional Nutrition Project in three countries: Honduras, El Salvador and Guatemala. Emphasis was placed on the "success in meeting the institution building purpose of the project" (p. 24). This according to the authors, was "the most appropriate evaluation methodology at the early stages of a project before activities had reached the point that significant impact on the target population [could] have resulted, much less be measured" (p. 24).

Observations were made during a two week field trip to the three countries, and various meetings were held with individuals directly or indirectly involved with program activities (government officials and USAID staff). In addition, a series of small projects being initiated at the local level as a result of the INCAP/ROCAP Regional Project were visited.

The timing of this evaluation presented problems, for "in no cases had national nutrition plans been finalized, most specific projects contemplated under such plans had not been initated, and of course little or nothing in the form of written evaluation data on their results could be had"(p. 24). Furthermore, the authors state that "our comments are necessarily limited to our best perceptions of how the program is engaging the substance of malnutrition in Central America and Panama, and what some of the problems are" (p. 25).

Despite these problems the evaluation team concluded that the project had operated in a direction consistent with its design and significant progress has been made during the first 18 months (November 1976 - May 1978). Examples of the project's success are described in terms of expected outputs and include: (1) an increased recognition of nutrition problems and its socioeconomic implications, and commitment of funds and personnel by national governments in the three regions; (2) establishment of technical-administrative capacity to conduct nutrition planning, project design, implementation and evaluation; (3) considerable progress in analysis of causes of nutritional problems; (4) formulation of goals and strategies for national food and nutrition programs; (5) progress in designing new interventions; and (6) achievement of each of the specific targets of the project.

According to the authors, "the greatest hazard that the project faces is the possibility of over-concentration of efforts on the initial stages of institution building, data gathering and development of analytical tools to improve nutrition, at the neglect of some impressive early action to put some tools to work and show what can be done" (p.7).

Westinghouse - Nutrition System, Morocco[79]

Westinghouse Health Systems, under contract to AID, examined assistance provided by the Research Triangle Institute (RTI) to the Government of Morocco (GOM) to establish and implement a national nutrition strategy over a 30 month period.

A single consultant from Westinghouse spent two weeks in Morocco and one week meeting with representatives of USAID, The World Bank, Catholic Relief Services and the United Nations University. In addition, an extensive review of available documentation was conducted. Emphasis was placed on how well the contractor (RTI) met the needs and priorities

[79] Bidinger, P. et al, *Evaluation of Morocco Nutrition Systems Study Unit,* (Columbia, Maryland: Westinghouse Health Systems, 1978).

of the GOM, for planning, and for development of broad recommendations and alternative assistance options for USAID and the GOM.

The evaluators concluded that the technical assistance being supplied to GOM by the RTI was of little assistance and should be terminated. Problems identified included RTI's poor communication with GOM personnel (including the lack of language capability) and the contractor's inability to deal effectively with the central issues that the government planning agency should presently address.

Philippines Nutrition Program (PNP)[80]

The PNP emphasizes the following nutrition interventions to combat malnutrition: (1) food assistance; (2) health protection; (3) nutrition information and education; (4) food production; and (5) family planning. Support activities are also undertaken: (1) nutrition planning at the local level; (2) locating the malnourished; (3) training; (4) research; and (5) monitoring, surveillance and evaluation.

The performance evaluation of PNP was designed by AID/Washington to provide an information base upon which to make decisions regarding future AID assistance. The six person evaluation team consisted of two people from AID/Washington staff and four outside experts. USAID/Philippines and the Philippine National Nutrition Council assisted the evaluation by providing complete access to program personnel and information.

The evaluation was conducted in a two-week period, February 13-24, 1978. Numerous individuals were interviewed by the evaluation team and program activities were visited in Manila and 11 provinces. Conclusions are based on the team's observations of, extensive dialogue with and feedback from Philippine and USAID counterparts, and review of written materials.

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[80] U.S. Agency for International Development, *Technical Review of the Philippine Nutrition Program,* (Washington, D.C., 1978).

The following topics were addressed: (a) institution building; (b) design of educational and training materials, field implementation structures and community oriented development strategies; (c) impact of interventions on endemic goiter, vitamin A deficiency and iron deficiency; (d) self-sufficiency efforts; (e) development of information and data systems; (f) local planning methods; and (g) nutritional effects of development policies.

Assessment of the program is summarized as follows:

> Excellent progress has been made in identifying malnutrition as a national problem, establishing a sound policy and institutional framework for attacking the problem and initiating imaginative measures for that purpose. Local level commitment to the program appears to be strong. Initially, the program emphasized supplementary feeding to reduce more severe cases of malnutrition but is now placing high priority on local-level planning and preventive, outreach interventions centered in the municipality and village or barrio (barangay). Integration of nutrition concerns into economic and agriculture planning has not yet been achieved.
>
> Notwithstanding the fact that there is much more to be done, the Philippine Nutrition Program stands out as one of the best national nutrition programs with which the team is familiar and AID's support for the program has apparently contributed materially to that success.

These evaluations illustrate how evaluators have for the most part, examined factors other than nutritional impact in the evaluation of nutrition planning projects. Also evident is the anecdotal nature of many evaluations since observation of program activities and conversation with program personnel often form the basis for conclusions about program operation.

Tanzania Nutrition Center[81]

In 1975 the Government of Tanzania set up the Tanzania Food and Nutrition Centre (TFNC) as the advisory and coordinating body in the areas of food and nutrition policy and research. In order to evaluate the activities of TFNC to date, a team was appointed with the following objectives:

> (a) to document and assess the major determinants behind the present food and nutrition situation in Tanzania; (b) to document existing policy in this field and to analyse the feasibility of fulfilling policy objectives; (c) to assess the priority given to TFNC by the Party and Tanzanian Government; (d) to assess the consequences of the present location of TFNC in the Tanzanian Government structure; (e) to document and evaluate the organization of TFNC and its present activities and research.

This report documents their findings.

Initially, the authors describe the principles of the evaluation methodology used: it is "context specific" focusing on the ecological, economic and political situation in Tanzania; findings are based on the values which underlie the country's politically stated objectives. As such, the evaluation is also inextricably linked with the development strategies and political ideologies within the country. Furthermore, the effort is viewed as "interdisciplinary," requiring a combination of approaches, and "generative," as it analyzes the determinants and processes which are responsible for the present food and nutrition situation in order to guide future directions in policy making.

A discussion of key concepts, such as differentiating between nutrition (which covers nutrition science) and the food and nutrition system (consisting of the determinants of the food and nutrition situation) is followed by a review

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[81] Karl Eric Knutsson et al., *Food and Nutrition in National Development: An Evaluation of the Tanzania Food and Nutrition Centre (TFNC)*, (Dar es Salaam, Tanzania: Tanzania Food and Nutrition Centre; Stockholm, Sweden: Swedish International Development Authority, 1979).

of background data on food supply and availability, and nutritional status of the population in Tanzania. The contradictions of food crops vs. cash crops are alluded to, in light of the country's striving for food self-sufficiency.

The policies and strategies which impact on the food and nutrition system are then discussed. These include an analysis of the political, financial, administrative and other constraints on TFNC and the plans which they formulated. The remainder of this evaluation report addresses the following issues:

1. the rationale for the creation of the TFNC;
2. an assessment and evaluation of TFNC's position in the government
3. a description and evaluation of the projects and programs of TFNC;
4. an assessment of the organization and administrative procedures of TFNC;
5. the role of TFNC in the international food and nutrition network.

Among the conclusions of the evaluation team is that no real food and nutrition policy has been developed for Tanzania, and is urgently needed. Among other things, it should clearly delineate the roles of TFNC. Furthermore, a need for a more comprehensive and interdisciplinary staff is required, especially in the area of social analysis. More careful review of the dynamics of village life and the productive and reproductive function of women is advocated.

Organization and administrative issues are also examined, focusing on the dual function of TFNC as a nutrition institute and a national bureau of food technology, and the planning of the Centre's activities. The evaluation team remarks that in general, administrative routines are "well above Tanzanian standards."

Finally, the evaluation team makes specific recommendations concerning TFNC programs and projects. For example, they advise the termination of efforts to promote a commercial weaning food, to speed up the establishment of a nutrition school, and to recommend the hiring of a mass communications expert.

## G. Multisectoral Programs

Often more than one project is operated under a single administrative structure. Different labels are given to such conglomerates. Austin refers to "integrated interventions" as those which include "components having an indirect relationship ... to nutritional status."[82] AID refers to "multisectoral programs as including "a diversity of components ... in a variety of permutations, ranging from health and nutrition to planning/health/education/feeding/food processing."[83]

In this paper we adopt the term multisectoral programs: multisectoral to denote that at least one of the projects within the program is directed towards a sector other than nutrition such as family planning, water sanitation or agriculture; program to describe that more than one project is involved.

Programs containing projects directed exclusively towards improvement of nutritional status such as combinations of feeding and nutrition education, or fortification and planning are categorized elsewhere in this review in a single program class which corresponds to what we perceive as the dominant output of the program.

Despite the synthesis suggested by the title, it may be useful for evaluators to be cognizant of the separate projects which comprise multisectoral interventions. Although individual project activities have some common objectives, it makes sense to measure the degree to which the multisectoral program is contributing to achievement of its specific project purposes and goals (e.g., improved nutritional status, more family planning). Thus, a family planning and nutrition multisectoral program may seek to have an impact on child health status,

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[82] James E. Austin et al., *Nutrition Intervention Assessment and Guidelines*, (Cambridge, Massachusetts: Harvard Institute for International Development, 1978), p. 291.

[83] J.S. Agency for International Development, *Project Evaluation Guidelines*, 3d ed., (Washington, D.C., 1974), p. 6.

and the indicator-child mortality rate is utilized to measure the degree to which program purposes have been met. It seems reasonable to expect the output of the nutritional component (e.g., supplementary feeding) to achieve its purpose, that is a change in nutritional status can be demonstrated.[84] In multisectoral programs whose project components consist of two or more nutrition-related interventions, quantifying the effect of any particular component such as feeding, or nutrition education is further suggested as a means of formulating future design and direction of program activities.

Five multisectoral intervention programs have been evaluated in the recent literature, and abstracts are presented below.

Catholic Relief Services-Preschool Program, Ghana[85]

In 1975, Catholic Relief Services reported an evaluation of the Preschool Health Program in Ghana. Two researchers sought to determine whether children attending the Preschool Program (PP) were maintained at an acceptable growth rate; whether attendees demonstrated more satisfactory growth rates than those children who did not attend; and whether program activities were related to improved growth rates of PP participants.

Started in 1967, the Preschool Program had served 60,000 children 1-5 years of age at 114 centers by 1973. Visiting children were weighed and measured while their mothers observed food demonstrations, received supplemental foods and attended group lectures.

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[84] Other uses for food, besides those related to improvement of nutritional status, are often found in multisectoral programs; e.g., it may serve as an inducement for participation or as a wage or income substitute. In cases such as these, there is no nutrition project per se, nutritional purposes are not intended and the program would not fall in the domain of a multisectoral nutrition program.

[85] F. Jacob; Gill Gordon, *An Evaluation Study of the Preschool Health Program in Ghana,* Field Bulletin No. 24, (Nairobi, Kenya: Catholic Relief Services, 1975).

Seventeen hundred weight charts, the majority of which belonged to presently attending children, were selected by an unspecified process from 17 centers distributed throughout Ghana. The experimental group comprised children who had been attending PP while the control group was formed from children who had recently enrolled. Both groups were stratified by age.

Numbers and percent of children who had acceptable body weights on first attending PP and at yearly intervals of attendance were calculated. Numbers and percent of children whose growth status improved or degenerated were also figured. The range of satisfactory growth rates was plotted using as approximate boundaries for upper and lower limits the Harvard standard and 80% of the Harvard standard respectively.

The most dramatic improvement was identified among those children who started participating soon after birth and maintained attendance for five years. Comparisons between first-time enrollees (control) and regular participants (experimental) were complicated by the failure to record weights of children from clinic register onto patient charts at the initial visit. Consequently, the control sample uses children who have attended PP centers and received food for up to 3 months.

Researchers proposed to correlate weight chart results with basic procedures offered at PP. Basic procedures included weighing, recording information on growth charts, explanation of the chart to mothers, food demonstration and food ration activities and attendance. Quality of each activity was rated on a closed end scale of one through three; numbers were associated with the descriptive terms poor, satisfactory and good, respectively. For an unexplained reason the individual ratings are summed and compared to the percent of children whose weight has improved to acceptable status over the course of the program. No prior or subsequent comparison was made. Due to the subjective nature of the rating scale few conclusions can be drawn about the relationship between clinic procedures and growth rates.

Catholic Relief Services - Preschool Program, Rwanda[86]

Another evaluation of a preschool program sponsored by Catholic Relief Services in Rwanda is reported by Jacob. Program objectives were similar to those of the Ghanain program and 34,000 children had been served by 1975. However the objectives of the evaluation differed. Jacob hoped to determine whether PP activities were correlated with the growth of children; whether child mortality rates among PP participants differed from rates in the general population; and whether PP had any affect on its clients' nutritional knowledge and practice.

A sample consisting of 5% of children regularly attending PP were selected and their 1,500 weight charts examined in order to determine whether adequate growth was being maintained. The sample was thought to be geographically, topographically and chronologically representative. Three forms of comparison were drawn:

1. Longitudinal progress of participants was studied over the entire period of attendance. Children were separated into cohorts based on their age at first attendance. These age groups were then divided based on length of program attendance. Number and percent of children with weights greater than 80% of the Harvard Standard were calculated;

2. Progress of PP attendees was then compared with a control group. The control group was selected from children who came to the center for initial enrollment.

3. Growth velocities of attendees were calculated at six month intervals for children who attended PP from age 4-21 months based on percent of standard velocity, and kilograms gained per month. Standard velocity was defined as the growth rate required to maintain the child on the Harvard Standard 100% growth curve. Child

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[86] F. Jacob, *An Evaluation Study on the Preschool Health Program in Rwanda*, Field Bulletin No. 25, (Nairobi, Kenya: Catholic Relief Services, 1975).

mortality information was collected by questioning a sample of mothers who attended PP.

Nutritional knowledge was assessed with the aid of a pre-tested questionnaire. Mothers were asked to explain the usefulness of growth charts and discuss reasons for adequate and inadequate growth rates. Mothers' responses were then correlated by chi-square test with length of attendance and nutritional status of their children.

Generally, results were as follows. At each age a lower percentage of children starting the program had adequate body weight than those who had been in the program for any length of time. Percentage of children with adequate body weight correlated positively with length of time in program. Mothers who understood the weight chart tended to maintain their children at adequate weight levels.

National Institute of Nutrition - Feeding Component of Population Project, India[87]

The Government of the Indian State of Karnataka implemented a large scale supplementary feeding program through 1974-1975 as part of the India Population Project. Objectives of the project were twofold: (1) "to test the assumption that distribution of food supplements to mothers and children through health and family planning centres will benefit family planning efforts as a result of increased contact with eligible mothers;" and (2) "to determine whether a reduction of infant and pre-school child mortality that is likely to be achieved through improved nutritional and general health status can have a favorable influence on the desire of mothers to limit family size" (p. 1).

Food supplements were given on a weekly "take-home" basis to pregnant women during the last trimester, nursing mothers in the first six

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[87] N. Pralhad Rao et al., *Evaluation of the Nutrition Component of India Population Project, Karnataka,* (Hyderabad, India: Indian Council of Medical Research, National Institute of Nutrition, [1975?]).

months of lactation, and children between 6-24 months of age in one Primary Health Center (PHC) in Thalak and Chitadurga district. The supplement, composed of wheat, roasted Bengalgram, groundnut and jaggery fortified with minerals and vitamins in a ready-to-eat form, furnished 400 calories and 14 grams protein to adults and half this amount to child beneficiaries. Distribution was accomplished via 26 distribution centers, each catering to a population of between 4,000-5,000 (4-6 villages).

The evaluation, conducted one year after initiation of the food supplement, under the auspices of the National Institute of Nutrition, Indian Council of Medical Research was designed to determine whether there was any change in the nutritional status of the community as a result of the nutrition program.

Baseline data were collected by survey at the beginning of the food supplement program in September-October, 1974. Three repeat surveys were conducted in January, July and October 1975. Data collection included: (1) clinical examination for nutritional deficiency signs; (2) anthropometry (height, weight, arm circumference, fat fold at triceps); (3) hemoglobin; (4) diet survey (dietary intake by oral questions); and (5) vital statistics.

A minimum of five households in each of 22 villages were randomly selected for nutrition and diet surveys, and hemoglobinometry of children and pregnant and lactating women. Vital statistics (family composition according to age and sex, births, and deaths) were collected for about 6,000 persons by house-to-house visits in a sub-centre area.

The food supplement made no significant impact on the growth status of the beneficiaries in general. However, there was a trend in the improvement of vitamin A deficiency signs (Bitot Spots) and the incidence of anemia in pre-school children. As determined by previous surveys, the feeding program was run efficiently and was

well accepted by the community. Two factors contributing to the lack of impact were: (1) uniform and universal sharing of the supplement by other children; and (2) the nutritional supplement was inadequate to meet the needs of the recipients even if there was no sharing.

The results suggest that the supplement be increased in amounts sufficient to compensate for the sharing that occurs at home. In addition, all children up to 5 or 6 years of age need to be included, not just those 6-24 months of age. Any effort to reduce the numbers of severely malnourished children would certainly depend upon adequate levels of food being available to participants and consumed by them. Interpretation of evaluation findings must consider this program deficiency.

One year was too short a time to note significant changes in vital statistics. The slight rise in mortality rates, particularly among pre-school children was due to epidemics of cholera and fever.

A positive aspect of the intervention was that a small but significant number of mothers were encouraged to introduce solid supplements to their children as early as 6-12 months. The next step would be appropriate nutrition education of the mothers.

This evaluation illustrates the manner in which achievement of nutritional impact may be the focal point for evaluative efforts directed at a multisectoral program even though nutritional impact is not the stated purpose. It illustrates too, the types of confounding variables which make determination of program effects difficult. The unanticipated consequences or "side effects" which any intervention may promote but which may often pass unnoticed are also evident.

Another point of interest highlighted by this program is the need to use an appropriate indicator to demonstrate impact which results from any intervention. Change in mortality rate was obviously an insensitive indicator over the period of time allocated by investigators for the evaluation.

Integrated Health, Nutrition, Family Planning, Bangladesh [88]

Discussion of the Companiganj Project Integral of Health, Nutrition and Family Planning provides another example of the difficulties inherent in determining nutritional outcomes. Nutritional status of children using the food supplement was worse than that of non-users although fewer deaths were recorded in the supplemented group. Nutritional inputs were but a small part of the project's resources and not large enough to provide adequately for nutritional need. In addition they were introduced at a period of time when Bangladesh was experiencing terrible famine making likelihood of any nutritional impact small.

Nutrition and Family Planning Centres, Canada [89]

Developed nations also find multisectoral programs to be of use. Bonds and Powell report the results of a process evaluation whose objectives were to assess the appropriateness of the nutrition services provided in family planning centers and demonstrate how effective the nutrition education project was at meeting clients' needs (as identified by questionnaire and interview). Funding for the project came from a grant from the Family Planning division of National Health and Welfare, Canada.

Little guidance is given the reader as to how participants for the study were selected except that all were clinic users. No control groups are used for comparative purposes although data and processes are examined at several sites. A mass of data and statistics are provided with intent to show that patients: (1) ask for nutrition counseling, or exhibit need for counseling: (2) are referred to the

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[88] Colin McCord, "Integration of Health, Nutrition, and Family Planning: the Companiganj Project in Bangladesh," Food Research Institute Studies, Vol. 16, No. 2, 1977, pp. 91-105.

[89] Charlotte Bonds; Marion Powell, *Evaluation Report of the Nutrition in Family Planning Centres Demonstration Project, Toronto, Ontario, 1975-1977,* (Toronto, Ontario: University of Toronto, 1977).

proper professional for advice; and finally, (3) receive the help they originally requested. Seven services comprise the counseling portion of the nutrition program: normal and therapeutic nutrition counseling, menu planning/budget help, demonstrated exercises, pamphlet distribution, group activities and referrals.

Counseling and educational services provided are described and discussed in relation to the number and type of clients using the service, the reasons for follow-up sessions, and problems encountered. In addition, a selective analysis is made of other data as outlined below. The adequacy of the questionnaire for identifying clients needing nutrition services is evaluated by comparing interest indicated on questionnaries with actual participation in nutrition counseling sessions; the accuracy of the screening and referral system is determined by comparing the distribution of problems and concerns by the category of referral and by comparing the types of nutrition counseling required for the clients referred to the service.

Some outcome or impact evaluation was attempted. Data were available for evaluating the progress made in six nutrition-related areas emphasized in each clinic's program. These included: changes in activity ratings; changes in diet ratings; improvement in menu planning; attendance at group sessions, attendance of weight control groups; and changes in weight status and motivation ratings. Since non-random samples of all participants who had self-selected to participate in Center activities were examined for each of these variables, it is difficult to draw any solid inferences from the analysis. For example individual change in activity ratings were measured by cross tabulating initial activity ratings with ratings given at the second interview.

An end-of-program-assessment was performed by doctors and nurses to ascertain whether medical staff were aware of nutrition services provided and to learn their opinion of the services.

The project evaluation develops a body of information to assist the Family Planning Division in policy decisions regarding the incorporation of nutrition services into existing family planning projects, and to provide information, ideas and evaluation criteria for health professionals who are interested in making nutrition counseling or education a part of their family planning services.

Community Systems Foundation - Promotora Program, Colombia [90]

This report seeks to determine the success and transferability of a Colombian program designed reduce malnutrition in Candelaria, a city of 8,000 near Cali, in the sugar-growing Cauca River valley. The program's name derives from the teams of young paramedical workers ("Promotoras") who visited all of Candelaria's children aged six and under every two months for six years.

The authors analyzed over one-half million "Promotora" health observations of 9,800 children and 1,900 families gathered over a seven year period. In the initial analysis, weight for age measurements and the Gomez standard were used for determining nutrition status. In a later analysis height data was also examined. The relationship between percent malnourishment and years in the program, was one of the principal measures employed for determining program success. Numerous other factors such as children's sex, health, number of siblings, use of birth control and literacy of the parents, and effects of inflation on the family income available for food purchase use were examined in relation to nutritional status.

The principal conclusions were: the Promotora program reduced malnourishment 25% overall, with greater effect among girls, children who enrolled early and those whose diarrheal infections were reduced by the program's health interventions.

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[90] William D. Drake; Luis F. Fajardo, *The Promotora Program in Candelaria: A Colombian Attempt to Control Malnutrition and Disease, 1968-74,* (Ann Arbor, Michigan: Community Systems Foundation, 1976).

## VIII. AGENCIES AND ORGANIZATIONS CONTACTED

We communicated directly with a number of international agencies to learn of their experiences, methodologies and, in particular, of their plans for future evaluation activities. The discussions were frequently related to recent or pending documentation; where possible, this documentation is cited to provide an institutional frame of reference for activities related to the evaluation of nutritional status in their respective programs.

In the sections that follow, we have attempted to accurately report on the activities of and discussion with the following:

A. AAC Sub-Committee on Nutrition
   - H.J.L. Burgess, Secretary
   - W. de Haas, Assistant Secretary

B. CARE
   - M. Vemury, Nutrition Advisor

C. Catholic Relief Services - U.S. Catholic Conference
   - H.W. Bratcher, Nutrition Advisor
   - R.T. Quinlan, Director, Overseas Office - Geneva

D. Food and Agriculture Organization of the United Nations - Food Policy and Nutrition Division
   - P. Lunver, Chief, Food and Nutrition Assessment Service
   - J. McNaughton, Senior Officer, Applied Nutrition Group
   - F. Proja-Ronchi, Senior Nutrition Advisor to the World Food Programme
   - Z.I. Sabry, Director, Food Policy and Nutrition Division
   - G.P. Sevenhuysen, Nutrition Officer
   - R.W. Weisell, Nutrition Officer

E. German Agency for Technical Cooperation
   - R. Korte, Head, Division for Health, Family Planning and Nutrition

F. International Fund for Agricultural Development
   - P. Birnbaum, Vice-President

G. Swedish International Development Authority - Population, Health and Nutrition Division

- E. Wallstam, Nutrition Officer

H. United Nations Children's Fund (UNICEF)

- M.A. Piot, Consultant, Programme Analysis & Evaluation Section
- L.J. Teply, Senior Nutritionist, Office of the Executive Director

I. World Bank

- S. Basta

J. World Food Programme

- A. Dawson, Director of Evaluation and Assistant for Planning to the Executive Director
- D.J. Shaw, Senior Economist, Policy Unit

K. World Health Organization

- M. Béhar, Chief, Nutrition Unit
- W. Keller, Nutrition Officer

A. ACC-Sub-Committee on Nutrition

The U.N. Administrative Committee on Coordination-Sub-Committee on Nutrition (ACC-SCN) was established to replace the Protein-Calorie Advisory Group in 1977. According to an Information Bulletin issued in July 1978, the SCN's mandate is to "serve as a point of convergence in harmonizing the concepts, policies and activities of the U.N. system particularly in accomplishing the objectives of resolution V of the World Food Conference."[1] The SCN also "liaises with bilateral agencies ... to achieve not only an exchange of professional and programme information but to facilitate a commonality of approach which will render more efficient service to countries " (p. 2).

In response to a request from the World Food Council for "a systematic evaluation of the experience gained in the field of nutrition

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[1]United Nations Administrative Committee on Coordination-Sub-Committee on Nutrition, *Information Bulletin,* (Rome: ACC-SCN, 1978), p. 2.

intervention programmes ...",[2] the SCN requested an interim report from the Harvard Institute for International Development. In June 1978 the HIID report, "Nutrition Intervention Assessment and Guidelines,"[3] was presented to the SCN.

Neither the authors nor the SCN view this as a definitive document; rather, it is intended to provide, according to James Austin, the Study Director, "an overview of the major types of programs ... [and] preliminary guidance ... to nutrition planners, administrators, and researchers concerning the assessment and design of interventions" (p. 3). Although the emphasis throughout is on programming considerations (identification, design, selection), some attention is given to evaluation as "a management tool that generates the information needed by national planners to design effective overall strategies and allocate funds efficiently, and by intervention managers to control and operate optimally their ... programs "(p. 15). It is further noted that of 201 nutrition programs surveyed, "only a minority" systematically evaluated for costs or nutritional impact.

With this perspective, the authors present a general approach to evaluation methodology, encompassing the following elements: (1) design the evaluation primarily to aid program managers in decision-making, and secondarily to meet the requirements of the donor agency; (2) specify carefully the users and uses of the evaluation information; (3) do as little data collection and analysis as necessary to comply with the specified needs; (4) collect the appropriate data regularly and compare with program targets;

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[2]World Food Council, 4th Ministerial Session, 12-14th June 1978, *Recommendations of the Administrative Committee on Co-ordination to the World Food Council on Possible Actions by Governments to Improve Nutrition,* (WFC/1978/5/Add. 3), 13 April 1978, p. 7.

[3]James E. Austin et al., *Nutrition Intervention Assessment and Guidelines,* (Cambridge, Massachusetts: Harvard Institute for International Development, 1978).

and (5) design the evaluation, ideally, to allow for a comparison of data (beginning with baseline information) between the target group and a control group.

It is understood that an expanded, more detailed version of this report is in preparation by the Study Director.

Also, the SCN has recently appointed a working group on nutritional surveillance; it can be expected that their work will be of interest in designing and executing evaluations.

B. CARE

CARE is currently in the final phase of a project begun in mid-1975 to generate guidelines for the planning, design and implementation of supplementary feeding programs so as to insure optimum nutritional benefit to the recipients.

Phase I[4] consisted of a worldwide survey of CARE's pre-school nutrition programs from available documentation in their headquarters and a questionnaire sent to their field offices. Program information was used to develop a profile of CARE's activities and recipients and to describe patterns characteristic of its preschool programs. Five countries were selected as typifying the various characteristic patterns that emerged: Tamil Nadu/India; Dominican Republic; Pakistan; Colombia; and Costa Rica.

Phase II,[5] conducted from March-November 1977, was concerned with in-depth "evaluation surveys" of the programs in the selected countries. The focus of the survey was on nutritional impact,

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[4]CARE, *CARE Preschool Nutrition Project: Phase I Report,* (New York, 1976).

[5]Mary Ann Anderson, *CARE Preschool Nutrition Project: Phase II Report,* (New York: CARE, 1977).

although attention was also given to the "cost, history and delivery system of each program" (p. 3). (See p. 98 for an abstract of this document.)

Phase III is designed to field test the "program design hypotheses" and program modifications suggested by the findings in Phase II. The project timetable calls for this Phase to be completed by May 1980 and for the final report to be completed several months thereafter.

CARE has asked that specific findings of Phases I and II not be released pending the completion of Phase III. It is felt that Phases I and II are preliminary in nature and need to be viewed in the context of the outcome of the Phase III field trials. While the final report and guidelines are expected to contain information of interest to other agencies and researchers, it is stressed that its immediate application and impact will be on CARE's worldwide programs.

C. Catholic Relief Services

Catholic Relief Services (CRS) operates supplemental feeding programs in some 89 countries. Food aid contributions come from principally P.L. 480 Title II (Food-for-Peace) and from the World Food Programme.

The institutional frame of reference for evaluation is basically one of decentralization. While a number of assessments and evaluations of CRS field projects have been undertaken, these have usually been either: (1) at the initiative of local or regional CRS staff, or (2) at the initiative of the food donor agency. Two examples of locally-initiated evaluations have been described

for Ghana,[6] Kenya,[7] and Rwanda[8] (see pp. 140 and 142 for abstracts of the Ghana and Rwanda documents). It was expressed that a tested and proven methodology (or guidelines) would be welcomed; however, it cannot be said that the development of a methodology at the institutional level is a priority concern.

Of more immediate interest to CRS is the current field testing of a "Gross Surveillance System" in Tanzania, Lesotho, Ghana and Kenya. Few details are known beyond the fact that the recording of weight and age data forms the basis of the System. It is expected that documentation on the System and the field trials will be released shortly after September 1, 1979.

D. Food and Agriculture Organization

Discussions with Food and Agriculture Organization (FAO) officials in the Food Policy and Nutrition Division will be reported in three areas: (1) nutrition in agriculture; (2) review of evaluation methodologies and guidelines; and (3) participation in the World Food Programme.

1. Nutrition in Agriculture

A January 1979 document, "Nutrition in Agriculture,"[9] was repeatedly cited as signalling an important new trend in FAO. As implied by the title, this document reports on FAO efforts to assess the nutritional impact of agricultural projects and

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[6] F. Jacob; G. Gordon, *An Evaluation Study of the Preschool Health Program in Ghana,* Field Bulletin No. 24, (Nairobi, Kenya: Catholic Relief Services, 1975).

[7] A.A. O'Laughlin, *The Nutrition Intervention Program in the Drought-Affected Areas of Kenya,* (Nairobi, Kenya: Catholic Relief Services, 1976).

[8] F. Jacob, *An Evaluation Study on the Preschool Health Program in Rwanda,* Field Bulletin, No. 25, (Nairobi, Kenya: Catholic Relief Services, 1975).

[9] Food and Agriculture Organization, Committee on Agriculture, 5th Session, 18-27 April 1979, *Nutrition in Agriculture* (COAG 79/6), January 1979.

to insure the inclusion of nutritional considerations in such projects. In essence, solutions to nutritional problems are seen to depend largely on agricultural and rural development.

In connection with this frame of reference, several recent FAO activities are reported:

- desk review to assess the nutritional impact of selected FAO programmes
- in-depth studies of nutritional impact of FAO programmes in Bangladesh and Tunisia
- preparation of guidelines for the introduction of nutritional considerations into agricultural programmes

The desk review assessed the possible impact on nutrition of 39 FAO projects in nine countries. While only eight projects specifically included nutrition among their objectives, 23 were judged as likely to have a positive nutritional impact on their beneficiaries; yet, only nine of the 39 projects appeared to involve the nutritionally poorest sector (small farmers, migrants and the landless). The desk review concluded that target groups were not well defined and that additional data were "seriously lacking" for an analysis of the nutritional impact of projects.

A completed "in-depth" evaluation of three FAO projects in Bangladesh is reported, with similar conclusions. The evaluation first sought to identify nutritional status and socioeconomic factors related to it for groups likely to be at severe nutritional risk; from the nutritional and socioeconomic factors, a "working hypothesis of possible nutritional impact" was developed for the project activities, and probable or actual impact was determined "by relating available data on changes expected or actually occuring to the factors considered to be causally related to malnutrition " (p. 8). Finally, opportunities for project improvement were determined by examining the project's potential for alleviating malnutrition and the related

socioeconomic factors in the groups most at risk. Rural poverty was seen as the major factor precluding any substantial improvement in nutrition.

The document further describes an approach for assessing and optimizing the impact of agricultural projects on nutrition, in order to better answer the questions: who benefits from agricultural development projects?; and, what changes can be expected in the beneficiaries' nutritional status?

In discussions with FAO officials, it was emphasized that the implementation of this approach was only a first step -- albeit a very important one -- to understanding and evaluating nutritional impact from a different, broader and perhaps more appropriate frame of reference: agricultural and rural development.

2. Review of Nutrition Evaluation Methodologies and Guidelines

Very recently, FAO conducted a "desk study" of (a) documentation on nutrition evaluation methodologies and of (b) guidelines for evaluating nutrition activities. Two draft documents were completed in May 1979 "for internal distribution," and thus the findings can only be regarded as tentative and unofficial.

a. The review of published evaluations of nutrition interventions[10] was undertaken to learn about experiences of objective evaluations of the nutritional impact of programmes. It is envisioned that this information will be useful to FAO in formulating its own nutrition programmes and activities.

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[10] G.P. Sevenhuysen, *Review of Published Evaluations of Nutrition Programmes*, (Rome: FAO, Food Policy and Nutrition Division, May 1979 - unpublished draft).

Twenty-seven studies were identified for review; 19 concern the impact of food aid (12 = take-home supplements; 7 = on-the-spot supplements); the remainder deal with nutrition education, health care and applied nutrition activities which do not include food aid. Each study is classified by type of program (take-home, on-the-spot, nutrition education, other) and further subdivided into four categories by type of evaluation and data collected (e.g., "before and after measurements, no control groups"). Separate information sheets outline each project with reference to the four selection criteria, type of program and type of study; a table presents the pertinent details.

This review is accompanied by a brief discussion and tentative analysis of findings, with particular reference to the feeding programs. While these findings are very tentative and/or program-specific, one trend noted was also emphasized in our discussions: "the indicator of child mortality may be a more sensitive one for the evaluation of programme impact than anthropometric indicators" (p. 4).

It is also observed that since few study designs "isolate programme impact from other influences," existing guidelines for evaluation of nutritional impact will be of little use and more explicit ones should be developed; this, in fact, is the conclusion of the review of guidelines.

b. The review of guidelines[11] was undertaken to ascertain what existed and its potential usefulness for FAO-supported nutrition programs. It is limited in scope to guidelines for measuring the nutritional impact of programs; guidelines incorporating socioeconomic indicators were excluded, as

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[11] G.P. Sevenhuysen, *Review of Published Guidelines for Evaluating Nutrition Activities*, (Rome: FAO, Food Policy and Nutrition Division, May 1979 - unpublished draft).

were those focusing on the validation and accuracy of certain field measurements.

Nineteen publications are considered and categorized "according to the detail of information they provide on how to carry out measurements and sampling procedures relevant to evaluating nutrition activities in the field" (p. 1). The four categories are:

I. Guidelines emphasizing the design, resources management and political implications of evaluations of nutrition programs.

II. Guidelines emphasizing the field measurements, sampling frames and survey techniques ...

III. Guidelines limited to the description of one particular indicator for use in evaluating nutrition programmes.

IV. Guidelines dealing with data collection and interpretation regarding nutrition situations wider than those defined by nutrition program.

Each publication is described in brief by: title, agency/author, date prepared,context, purpose, content, and field testing (if any); briefly noted are special features, possible applications, omissions, etc.

The discussion section identified several apparent trends:

- more recent publications have tended to emphasize indicators for describing impact on health status;
- "much of the advice on data interpretation ... has not taken full advantage of [recent advances] in applied statistics" (p. 12);
- none of the publications comprehensively address "the nuts and bolts" of impact and process evaluation, nor cost-effectiveness calculations.

This latter trend toward limited focus and application is seen as "a reflection of the audience for which the manuals were written." It is concluded that while some combination

of existing guidelines would be relevant to FAO's needs, significant gaps would still remain, particularly with regard to field techniques and to "the design of evaluations that begin to separate programme effects from other effects" (p. 13).

Although these conclusions are unofficial, the discussions with FAO personnel indicated that sufficient need had been established to justify the development of guidelines better suited to FAO's program needs.

3. Participation in the World Food Programme

FAO is the technical advisor to the World Food Programme on food and nutrition aspects; as such, it participates in the formulation and in the evaluation of food aid projects. The role and task areas identified for potential FAO input on evaluation missions to WFP projects are identified in a WFP document entitled, "The Approach to Evaluation of WFP Development Aid: Participation of FAO"[12] (see p.115 for an abstract of this document).

In summary, four areas of WFP projects are identified as being within FAO's sphere of interest: economic considerations; incidence of market displacement; impact on nutrition and health; and, social factors. For the purpose of this report, discussions with appropriate FAO personnel were confined to the evaluation of WFP food aid impact on nutrition and health status. These discussions confirmed WFP's concern over the expense, difficulty and usefulness of conducting more quantitative evaluations. At the same time, it was acknowledged that more quantitative analysis

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[12] World Food Programme/Intergovernmental Committee, *The Approach to Evaluation of WFP Development Aid: Participation of FAO*, (WFP/IGC:25/12 Add. 1). March 1974.

was desirable -- preferrably in connection with a local institution -- and that efforts were underway to implement this approach. Examples were cited of work in Egypt,[13] Colombia,[14] and Bangladesh[15] and, most recently, of the preparations in Lebanon for obtaining baseline data (heights and weights) and food consumption information as a prelude to a school feeding-maternal and infant supplementation project. It was pointed out that FAO-WFP was working closely with a local university in obtaining the initial data and designing continuous monitoring systems. Also discussed was the potential application of findings from the review of evaluation methodologies [16] since 70% of the studies reviewed concerned the impact of food aid.

E. German Agency for Technical Cooperation

The German Agency for Technical Cooperation (GTZ) is a private firm that acts as a "consultant" to the German Ministry of Economic Cooperation. Its primary role is to assist the Ministry in the implementation of various projects. Inasmuch as GTZ's Division of Health, Family Planning and Nutrition was formed three years ago, it has few projects underway; these involve nutritional surveillance, weaning foods and a "basic needs" study. Virtually nothing could be reported with regard to specific evaluation experiences.

However, we were told that criteria were being developed for the inclusion of nutritional considerations in any development project;

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[13] Decision Data AB, *Nutritional Effect Survey,* (Lund, Sweden, 1979).

[14] World Food Programme/Intergovernmental Committee, *Interim Evaluation Report, Colombia 549,* (WFP/IGC: 26/11 Add. A2), August 1974.

[15] World Food Programme/Intergovernmental Committee, *Interim Evaluation Report, Bangaldesh 2226,* (WFP/CFA: 6/7 Add. A11), August 1978.

[16] Sevenhuysen, *Review of Published Evaluations.*

documentation for this is expected to be available in the later part of 1979.

It was also learned that GTZ is planning a project in rural Thailand that will seek to measure -- among other things -- the impact of an irrigation system on nutritional status. As arrangements had not been formalized at the time of our meeting, no documentation could be released.

F. International Fund for Agricultural Development

The International Fund for Agricultural Development (IFAD), a Specialized Agency of the U.N., was organized in December 1977 "to mobilize additional resources to be made available on concessional terms for agricultural development,"[17] particularly, according to the President, "in order to help small farmers to improve their food production and nutrition as well as to increase their incomes and employment."[18]

While projects have been approved or are in stages of preparation in Sri Lanka, Tanzania, Guyana, Haiti, Ecuador, Cape Verde, Thailand, Bangladesh, Nepal and the Philippines, none have actually been implemented. Nevertheless, it was pointed out in our conversation and in the IFAD document on "Lending Policies and Criteria" that nutritional improvement is an important component in agricultural development and that funds will be provided for all projects to collect baseline data on target groups. This data will be utilized in project monitoring and evaluation activities.

According to this documentation, monitoring arrangements will seek to:

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[17] International Fund for Agricultural Development, *Lending Policies and Criteria,* (IFAD/8), May 1978, p. 1.

[18] International Fund for Agricultural Development, *IFAD's Activities in 1978,* (GC 2/L.2), November 1978, p. iv.

(a) identify key indicators of the impact of the project, including changes in: food output; crop-mixes; income, health,caloric intakes and employment of target groups; and institutional arrangements or socioeconomic relations affecting the participation of the rural poor in decision-making;

(b) compare such changing indicators with the project's initial objectives; and

(c) make appropriate recommendations to project management in order to insure realization of maximum benefits from the project.

While these monitoring activities are seen as integral to the planning and implementation of a project up to the time of full development, the evaluation activity will not begin until full project operation is achieved. Evaluation is defined by IFAD as "the assessment ... of the size and distribution of achieved benefits and costs, and of the reasons for any differences from the results expected ..." (p. 14). Operational guidelines for monitoring and evaluation activities are currently being formulated.

It is further expected that IFAD will attempt to strengthen local institutions to enable them to monitor and evaluate projects. Also expressed in the documentation is the desire to share and to codify monitoring and evaluation experiences "with a view to setting up a publicly available data bank."

G. Swedish International Development Authority

Established in 1965, the Swedish International Development Authority (SIDA) describes itself as "the central government agency which prepares and implements Sweden's programme for bilateral development cooperation."[19] Fully one-third of its development assistance

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[19]Swedish International Development Authority, *SIDA's Organization,* (Factsheet, 1A), April 1979, p. 1.

in 1978/79 is earmarked for activities of U.N. specialized agencies and related international programs;[20] indeed, SIDA works closely with such U.N. agencies as UNDP, FAO, WHO, and UNICEF in providing funds and expert personnel for a broad range of development efforts world-wide.

In terms of direct assistance, 5% of the current budget is allocated for the public health and nutrition sector; much of this is directed to public health efforts -- such as the construction of health centres -- in rural areas of selected countries. For the past twenty years SIDA has supported the Ethiopian Nutrition Institute, and more recently the Tanzania Food and Nutrition Centre.

When asked about experiences in evaluating food and nutrition programs, it was pointed out that SIDA's direct involvement in such programs is nil. While it shares the concerns of the specialized agencies of the U.N. for better evaluation methodologies, operationally SIDA has virtually no experiences in program evaluation. What SIDA has done, however, is "evaluate" the Ethiopian Nutrition Institute and the Tanzania Food and Nutrition Centre. The details and documentation for these institutional evaluations were unavailable at the time of this writing. It was also learned that plans are being made to conduct a technical-marketing evaluation of a weaning food factory in Tunisia; this is in the preliminary stages and no further details were available.

## H. United Nations Children's Fund

The focus of UNICEF's activities with regard to evaluation is to strengthen the capabilities of countries to conduct evaluations and to develop their own monitoring systems. It is felt that

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[20] Swedish International Development Authority, *Swedish Development Cooperation - A Summary 1978/79*, 1978, p. 2.

this will provide better information for decision-making in the formulation and implementation of programs. A Programme Analysis and Evaluation Section was established at UNICEF headquarters in New York in 1977 to assist in this effort, but nutrition programs, per se, have not received any attention.

UNICEF's approach is summarized in a 1976 document, "Criteria for programme appraisal, monitoring and evaluation - Note and recommendations by the Executive Director."[21] The document reviews UNICEF's evaluative activities since 1974, discusses problems and experiences in implementing these activities, and proposes an approach to strengthening evaluation activities in 1977-1979.

In 1974, guidelines were established for assessing projects in terms of:

- inputs: material resources, personnel, services
- outputs: e.g., number of health centres built and staffed; number of teachers trained; number of bore-holes dug
- outcomes: e.g., number of children reached with medical services; population served by clean water
- goals: e.g., actual improvement in health status of children reached

Three types of evaluation activities were suggested:

1. prospective appraisal: undertaken prior to the start of a service, or the extension of an existing project, this usually takes the form of a national study or survey to: identify critical needs of children; analyze the extent to which existing national policies and programs are addressed to these needs; propose policies and programs to close the gap between children's needs and the services currently provided. Examples of prospective appraisal activities are provided in

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[21] United Nations Economic and Social Council, UNICEF Programme Committee 1976 session, *Criteria for Programme Appraisal, Monitoring and Evaluation - Note and Recommendations by the Executive Director,* (E/ICEF/P/L.1628), 19 January 1976.

an annex to the document; many of the examples cite UNICEF efforts to strengthen and enable existing institutions to gather and prepare the information and data for the prospective appraisal.

2. monitoring: seeks to provide a continuous information flow for project managers about the progress of the project in meeting its stated objectives. Often, this encompasses a comparison of inputs to outputs to discover whether: (a) what was agreed to be done is being done; (b) individuals responsible for each operation are performing as expected in the work plan; (c) completion times are being met; (d) unforeseen factors make changes advisable. The document provides examples of monitoring activities and acknowledges that "in practice the activity has been limited primarily to administrative reviews and follow-up on ... supplies and equipment" (p. 5).

3. retrospective evaluation: occurs after four to five years of implementation to identify achievements and shortcomings at the input, output and outcome levels. It is noted that the retrospective evaluations usually focus on outputs and outcomes, but are "often insufficiently linked to the decision-making time-tables of programme planners" so that their impact on project modification and future projects is not considered optimal. Country-specific examples of retrospective evaluations are provided.

While these three evaluation activities have been utilized as important information tools for decision-making at different stages in a project, they are supplemented, in practice, by administrative reviews at the country level: "although the day-to-day assessments about a project do not constitute an evaluation in the technical sense, the sum of these judgements forms an important part of UNICEF's work in the field of evaluation" (p. 5). In addition to administrative reviews, the monitoring activity is enhanced by the UNICEF

Internal Audit Service's assessment of project inputs -- particularly the logistic arrangements; global assessments are also carried out "to help determine programme directions, priorities, and desirable changes in assistance policy" (p. 6).

It is noted that the implementation of the evaluation policy has been hampered by a number of factors; among them: (a) insufficient interest or reluctance in government ministries or departments to strengthen their evaluation capabilities; (b) absence of trained nationals to develop and conduct evaluations; (c) insufficient indicators for measuring the outcomes of programs for children; (d) inadequate involvement of project managers in evaluation activities; (e) inadequate UNICEF staffing and financial resources for backstopping and administering evaluation activities.

Four criteria are established for guiding UNICEF evaluative activities in 1977-1979; our discussions confirmed that these will continue to be relevant in the future. The criteria are:

1. increasing ministry or department interest and capabilities in strengthening their evaluation machinery;
2. strengthening the decision-making process, with particular regard to project implementation and formulation of new projects;
3. utilizing human resources available in the country or region; and
4. focusing evaluation activities on projects that absorb substantial government and UNICEF inputs.

The main theme of the proposed policies is to strengthen evaluative capabilities within each country in order to provide "information for planners and administrators that will help them make better decisions about the design and implementation of services" (p. 9). Thus, for example, it is suggested that UNICEF program staff should be less concerned with how to conduct evaluations and more with "how to identify the need for, initiate, monitor, and follow-up on different evaluative activities" (p. 9).

In addition to a number of internal management and administrative recommendations, it is also proposed that UNICEF support the development of "simple and practical indicators for measuring the progress of projects." The emphasis on support for development of continuous monitoring systems was clear in our discussions and in this document, as is the emphasis on including in this effort national personnel in government ministries and departments, research institutes and universities. A long-term UNICEF programme is cited, aimed at helping countries "develop statistical information for planning, monitoring and evaluating services for children and youth, particularly indicators of the situation of children and the outcomes of services" (p. 10).

I. World Bank

Many with whom we communicated referred to the 'World Bank's work,' "Systems for Monitoring and Evaluating Nutritional Interventions," authored by G.J. Deboeck.[22] However, this document contains the following disclaimer: "The views and interpretations in this document are those of the author and should not be attributed to the World Bank."

Notwithstanding this disclaimer and recent reports that the "Systems" may be overly complex for practical implementation, a description of the document is included here because: (1) it was written with specific reference to a Nutrition Research and Development Project (NRDP) undertaken jointly by the Government of Brazil and the World Bank; and (2) as stated in the Forward, "In a field where good operational information is a scarce resource this effort, suitably modified for particular conditions, may be helpful to others confronted with the same kind of problems" (p. 1).

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[22] G.J. Deboeck, *Systems for Monitoring and Evaluating Nutritional Interventions,* (Washington, D.C.: The World Bank, 1978).

In terms of cost, the NRDP in Brazil is reported to be an estimated $72 million. Its main purpose, according to Deboeck, is "to counter malnutrition among preschool age children, pregnant and lactating women of low-income families." Major components of the Project are:

(a) The development of an information base through (i) a national nutrition and food consumption survey and periodic surveillance of nutrition conditions; and (ii) the continuous assessment of nutritional implications of agricultural policies.

(b) The testing of the effectiveness of nutritional interventions through the following delivery systems: (i) rural extension services; (ii) urban and rural health services and commercial markets; and (iii) the school infrastructure.

(c) The development and commercialization of nutritious foods through: (i) a research and development program for low-cost processed foods; (ii) engineering and marketing feasibility studies for industrial scale production of such foods; and (iii) investment credits to stimulate industrial production of low-cost nutritious foods, including the fortification with indigenous materials of processed food staples.

(d) Training program and manpower studies; and

(e) Assistance to the National Food and Nutrition Institute (INAN) to support project planning, management, monitoring and evaluation (p. 5).

Doebeck has developed the monitoring and evaluation systems for component b; detailed operational plans are presented for each of the delivery systems.

Conceptually, the monitoring and evaluation activities are seen as elements of a large management information system; the information system is based, in part, on interrelated systems for generating "internal" and "external" reports on project inputs,

activities and outputs. The monitoring activity is designed to verify measurable project objectives in terms of "outputs," "effects" and "impact"; quick feedback of information to project management is essential. Evaluation is seen as a more analytical activity, undertaken to compare actual project effects and impact against established plans; it may be either "ongoing" or "expost."

While there may be some overlap in the reporting, monitoring and evaluation systems, it is noted that the monitoring and evaluation activities also require additional kinds of information respective to their functions. These functions are summarized as follows: "monitoring ... focuses primarily on 'what' is or is not happening ... while evaluation [ongoing or expost] ... would aim at explaining 'why' project effect and/or impact were or were not achieved" (p. 12).

The author calls for the development of a "hierarchy of objectives" to systematically identify "linkages between project inputs, activities, outputs, and the expected effects and impact resulting from them" (p. 13). Key indicators can then be identified to verify and measure the effects and impact. A table is included for the NRDP that lists objectively verifiable indicators for the "effects and impact objectives" of each major delivery system (rural extension, integrated health services and commercial markets, and school infrastructure).

The monitoring systems for the overall project and for specific project components are described with considerable operational detail, including specific objectives, reporting and liaison requirements, forms used by various personnel and departments for meeting the reporting requirements of each delivery system, lists of objectives and indicators for each delivery system, and summaries of "information flows" for each.

Evaluation systems are described in equally detailed terms, both for the overall project and for each delivery system ("component-specific evaluation"). The distinction between the two types of evaluation is stated as:

- component specific ... is an analysis of the cost-effectiveness of alternative models of interventions through a delivery system.
- overall evaluation is an analysis of results from the component evaluations [emphasizing] comparisons that can be made across components (e.g., by age group); the ultimate objective of the [NRDP] evaluation ... is to provide the Government with information on the relative cost-effectiveness of nutritional interventions through various delivery systems (p. 28).

A discussion is included of various factors and considerations that may influence the compatability and comparability of the evaluation types; a design procedure is diagrammed and a checklist of "questions for the design of an evaluation system" included. Based on these design considerations, each project component evaluation system is described with reference to:

- purposes of evaluation
- specific hypothesis to be tested
- key indicators
- survey and sample characteristics
- questionnaires to be used
- timing and organization of field data gathering
- data tabulation, processing and analysis procedures
- reporting of evaluation results

In effect, each of the sections on the three delivery systems represents a detailed application of the evaluation methodology and implementation plan; for example, copies of the questionnaires for evaluation of the rural extension services component are included as an appendix of 37 pages.

With respect to the overall evaluation of NRDP, the author is much less specific, inasmuch as this appears to be in a planning phase. An approach to the overall evaluation is outlined, consisting of:

- technical support to the component-specific evaluations;
- comparative cost-effectiveness analysis of "micro" intervention evaluations in school feeding, food subsidy, food technology, rural extension, and credit services;
- comparative cost-effectiveness analysis of "macro" policies in such areas as agriculture and manpower training.

No documentation is currently available on the implementation of these monitoring and evaluation systems.

J. World Food Programme

In 1973, the World Food Programme spent an estimated 0.52 percent of its aid resources on evaluation activities. Whether this level of committment is too much or too little, and whether it is in the appropriate form is still the grist for considerable debate in 1979; as the Director of Evaluation frankly admits, "we're still searching for a proper evaluation methodology."

The search has involved the appointment of consultants, special committees, and a spectrum of approaches, ranging from "impressionistic" information gathered by field teams to an extensive statistical analysis of nutritional survey data. In all instances, the same constraints seem to be present: availability of data and availability of funds.

The tenets and experiences of WFP's evaluation activities are contained in a 1974 report by the Executive Director, "The Approach to Evaluation of WFP Development Aid."[23] This document summarizes

[23]World Food Programme/Intergovernmental Committee, *The Approach to Evaluation of WFP Development Aid,* (WFP/IGC:25/12), February 1974.

the evolution of WFP's evaluation activities since its inception, and details the overall focus, operation, methodology, problems and potential solutions (see p. 105 for an abstract of this document). In addition, eight project areas are designated as appropriate for evaluation:

1. Technical
2. Administrative and Organizational
3. Food Management
4. Nutrition
5. Economic and Social Impact
6. Market Displacement
7. Arrangements for Increasing Host Government Responsibility
8. Arrangements for Continuation of Project's Purposes Following Termination of WFP Aid.

Of these, numbers 4, 5 and 6 are discussed in somewhat more detail in another document outlining the potential role of FAO in evaluation of WFP food aid.[24] The outline as presented in this document represents an ideal scope of activities which is understood to be considerably modified by practical constraints on human, financial and institutional resources; it is also emphasized that FAO does not participate in every evaluation mission (see p. 115 for an abstract of this document).

A recent report of a WFP project warrants particular attention for three reasons: (1) it is focused solely on nutritional impact ("effect"); (2) it was mentioned by many persons with whom we spoke; and (3) it was variously described within WFP as "promising," "expensive," "thorough," "complicated," and "inconclusive": "Nutritional Effect Survey" of (Egypt) ARE-535 (commonly referred to as the "Lörstad Report" after the principal investigator, M.H.

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[24] World Food Programme/Intergovernmental Committee, *The Approach to Evaluation of WFP Development Aid: Participation of FAO,* (WFP/IGC:25/12 Add. 1), March 1974.

Lörstad of Decision Data AB, Lund, Sweden)[25] (see p.112 for an abstract of this document).

In speaking with WFP officials, the significance of this report seems to be not so much the specific findings but in the potential this method of data collection and rapid processing has for providing quantitative feedback in a short time span. It was pointed out, however, that the benefits of rapid quantitative feedback had to be weighed against the considerably higher costs.

A final document may also influence future trends in WFP evaluation activities: "Supplementary Feeding of Vulnerable Groups: A Guideline for the Measurement of Nutritional Impact in Projects Assisted by the World Food Programme and Other Agencies."[26] This was prepared in December 1978 by the Nutrition Unit and the Food Aid Programme Unit of the World Health Organization; it is discussed under the activities of WHO. As the title indicates, the emphasis is on the collection of data for determining nutritional impact, and for feedback of this information to project management (see p. 114 for an abstract of this document).

K. World Health Organization

A major objective of the Nutrition Unit has been and will continue to be the development and implementation of nutritional surveillance systems as "a basis for planning and evaluating effective national food and nutrition strategies and specific programmes ..."[27] Work on developing and utilizing simple indicators

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[25] Decision Data AB, *Nutritional Effect Survey,* (Lund, Sweden, 1979).

[26] World Health Organization, *Supplementary Feeding of Vulnerable Groups: A Guideline for the Measurement of Nutritional Impact in Projects Assisted by the World Food Programme and Other Agencies,* (FAP/78.2), December 1978.

[27] World Health Organization, *Proposed Programme Budget for the Financial Period 1980-1981,* Official Records No. 250, 1978.

is underway in a number of countries in collaboration with other U.N. specialized agencies and local institutions.

As previously noted in the preceding section on WFP, the Nutrition Unit and the Food Aid Programmes Unit have collaborated on a document, drafted in December 1978, entitled "Supplementary Feeding of Vulnerable Groups: A Guideline for the Assessment of Nutritional Impact in Projects Assisted by the World Food Programme and Other Agencies."[28] WHO officials emphasized that this document was "purely theoretical" until it had been field tested; at this writing, we are not aware of any field test.

It is stressed that supplemental feeding programs require a unique evaluation approach, and thus the methods presented have "a very specific and limited purpose which is that of verifying that the anticipated nutritional impact of food assisted projects has actually taken place" (p. 4). Excluded specifically are other such feeding programs as food for work and food for emergency relief (see p.114 for an abstract of this document).

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[28]World Health Organization, *Supplementary Feeding of Vulnerable Groups: A Guideline for the Measurement of Nutritional Impact in Projects Assisted by the World Food Programme and Other Agecnies,* (FAP/78.2), December 1978.

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*Note: Many of the papers and documents listed here are available from the Community Systems Foundation's Nutrition Planning Information Service. These are indicated by an asterisk (*), and followed by an order number (NP-___) and prices including packaging, handling and delivery by Surface (SP) or Air Postage (AP). Orders, accompanied by prepayment, should be directed to: Nutrition Planning, P.O. Box 8080, Ann Arbor, Michigan 48107 U.S.A.

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