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9. ABSTRACT

A need exists to improve the methods for economically evaluating the effectiveness of supplemental feeding programs for mothers and children in developing countries. This report presents the design and results of a pilot study conducted to determine whether supplemental feeding programs at five sites in three countries could be effectively assessed by means of a cross-sectional survey. In each of the countries (Colombia, the Philippines, and Kenya), national survey research organizations gathered background information, interviewed participants and nonparticipants in programs conducted at maternal-child health centers and school programs, and measured participating children. The results of the study were too ambiguous to be used as a basis for making judgments concerning the relative effectiveness of the feeding programs examined. Hence the methodology, as tested, cannot be recommended as a proven approach that is clearly superior to other evaluation methodologies currently in use. Emphasis in future studies should be placed on objectively verifiable physical measurements of the nutritional status of children; on determination of the actual ration size served at the site; and on the accurate determination of length of exposure to the program. There also needs to be tested and observable indicators of family and community background; shorter and simpler survey instruments; a larger number of sites in a country; and the incorporation of a longitudinal or time dimension through many site or cohort measurements.

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FINAL REPORT

EVALUATION METHODS FOR CHILD FEEDING PROJECTS IN DEVELOPING COUNTRIES

CHAPTER I

INTRODUCTION AND SUMMARY

A report for the
Office of Nutrition
and the
Office of Development Program Review and Evaluation
U.S. Agency for International Development

CHECCHI AND COMPANY
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Washington, DC, 20036, USA

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PREFACE

This report was funded by the United States Agency for International Development (AID) through a contract with Checchi and Company. The pilot survey research was carried out in collaboration with Consultal, S.A., Bogota, the Institute of Philippine Culture, Manila, and the Research Bureau (East Africa), Ltd., Nairobi.

Previous working papers have specified the research design and procedures for the pilot survey, presented the survey instruments, discussed the individual sites in the three nations, and provided initial analysis of the survey data.

The principal authors of the present report are Dr. Thomas H. Eighmy, Mr. Harvey A. Lerner, and Mr. Robert P. Manly. Dr. Eighmy carried out the pilot survey data analysis. He wrote Chapter Four, presenting results of that analysis. Mr. Lerner was responsible for project management. He was principal author of Chapter Two on evaluation perspectives. Mr. Manly was co-investigator with Dr. Eighmy for the data analysis. Mr. Manly's work led to the derivation of Weight Dispersion Measures (WDM) and to the development of the Tables in Appendix A of Chapter Three. Mr. Manly also prepared the cost analysis presented in Appendix B. Chapter One and Chapter Three were collaborative efforts.

The authors wish to express their appreciation for valuable assistance and comments provided by Mrs. Patricia McPhelim, Mr. Harry Carr, and Mrs. Vicki MacDonald. The authors also wish to express their appreciation to Mr. Cae Johnston who typed the manuscript, prepared the exhibits, and was responsible for report production.

CHAPTER ONE

INTRODUCTION AND SUMMARY

CHAPTER ONE

INTRODUCTION AND SUMMARY

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CHAPTER ONE

INTRODUCTION AND SUMMARY

A. APPROACH AND PRINCIPAL FINDINGS

This report develops an approach to the evaluation of supplementary feeding programs for mothers and children in developing countries. Many of the recommendations are based upon data analysis and lessons learned from a pilot study carried out in Colombia, the Philippines and Kenya. In each of these countries national survey research organizations conducted a cross sectional (one time) survey to gather background information, interview mothers and measure children who participated in feeding programs at five Maternal Child Health (MCH) centers. A group of mothers with children who did not participate in the feeding program were also interviewed and measured in the same communities. In a similar manner, children participating in five school feeding programs in each country, usually in the same community as the MCH center, were also interviewed along with a group of school children from schools which did not conduct supplementary feeding programs. For purposes of identification we speak of "MCH Program" or "MCH Non-Program" and "School Program" or "School Non-Program" children, understanding that each of these four categories refers to five sites in each of three countries.

The principal concern of the pilot study was an attempt to depict differences in nutritional status among children which could logically and plausibly be linked to feeding program participation. These differences in the children's nutritional status were analyzed for children within feeding programs and between "Program" and "Non-Program" children. Differences in average nutritional status between sites were also analyzed.

The General Research Design approved for this project specifically ruled out a longitudinal approach as too time consuming and costly. It was anticipated that the cross sectional survey research approach could be incorporated in a methodology handbook recommended for adoption by those responsible for evaluation of child feeding programs. In fact, the analysis of survey data did not yield results which were sufficiently unambiguous to enjoy a level of confidence necessary to make program

evaluation decisions. Hence, the methodology, as tested, cannot be recommended as a proven, standard approach clearly superior to other evaluation methodologies currently in use. However, the survey results and lessons learned were instructive in themselves and were indicative of the path that future evaluation research can take.

The very rich and adaptive diversity of supplementary nutrition programs at once almost defies comparison and standardization, while simultaneously requiring them, if evaluation procedures are to yield useful results. You *can* compare "apples" and "oranges" but to do so you may have to reduce each to its nutritional components. The survey research focused first on a wide range of survey questions reflecting the diversity of child feeding programs and on family and community background. Subsequently it focused on a limited number of key general measures which are common to all feeding programs including supplementary ration size and content (calories and protein) on a daily equivalent basis, length of program participation, and the reported number of people sharing the distributed ration. Many diverse background factors are difficult to measure or control. These include community and home environments, genetic characteristics and what the child eats outside the feeding program. The most reliable indicator appears to be observable counts of household possessions or a tested, culturally relevant indicator of household socio-economic status. The measures of program impact include height-weight indicators of nutritional status and other secondary indicators such as nutritional knowledge and habits or school attendance and performance. By secondary indicators, we imply that the primary indicator of feeding program impact is the nutritional status of the intended recipients, and that the primary purpose of supplementary feeding programs is an increase in, or at least the maintenance of, nutritional status over time.

The scope of work as defined by the research design called for a single survey, without "before, during and after exposure" measurements of nutritional status. Retrospective survey questions, supplemented by site records where possible, were to substitute for time dimension.

Finally, our approach takes the position that evaluation is not a one-time judgment on the merit or apparent effectiveness of a particular project based upon retrospective survey data of varying accuracy subjected to exploratory analytical techniques. 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.

The principal findings in this report are as follows:

With respect to the results of an analysis of data gathered at 60 program and non-program sites in Colombia, Kenya and the Philippines:

1. An *aggregate*, or *site level*, analysis found some evidence that size of ration, length of exposure, family socio-economic status, and the number of people eating the ration are correlated and, presumably, causative agents in explaining the variability of children's average nutritional status indicators among MCH centers. No such relationships among school sites were found.

2. Results of the analysis of the pilot study data using the *individual child* as a unit of observation were generally inconclusive. Non-program sites were treated in two ways: as statistical "controls" on background variables, which frequently they were not; and as though they were "before" cases in a classic "before and after" treatment. The latter approach casts the analysis in conceptual terms of long-run temporal change. Within the cross-sectional format imposed by the research design, the positive impacts are generally within sampling fluctuations and the normal variability found among individuals in a community.

3. Inconclusive findings at the *individual child* level are believed to be due in part to imprecision in measurement of surrogates for program exposure, defined as size of ration consumed and length of participation in a supplementary feeding program. The measurement problem

was particularly acute with regard to variables needed to test the secondary hypotheses on improvements in nutritional habits and knowledge, or school attendance and performance, associated with feeding program participation. Such measurement problems are characteristic of the cross sectional approach. Retrospective recall data and subjective assessments or judgments should be avoided in future research designed to depict subtle and long-term nutritional and secondary benefits accruing to participants as contrasted with non-participants. Instead, emphasis should be placed on:

a. objectively verifiable physical measures of nutritional status of children;

b. determination of ration size actually served at the site;

c. accurate determination of length of program exposure;

d. tested, culturally relevant, and observable indicators of family and community background;

e. shorter and simpler survey instruments yielding fewer, but more accurately measured variables;

f. a larger number of sites in a country;

g. improvements in, and quality control of, record keeping systems; and

h. the incorporation of a longitudinal or time dimension through repetitive site or cohort measurements.

4. MCH programs appear in general to be more effective in meeting community nutritional needs than school feeding programs. As expected, MCH programs reach poorer families than school programs and reach mothers and newly-weaned children at times when nutritional needs are highest. However, in achieving their aims, costs per child increase over school feeding costs. Given the prevailing distribution system for MCH rations, there is a high incidence of "leakage" of program food from pregnant and lactating mothers and pre-weaned or immediately post-weaned children to non-targeted consumers. Unlike school supplements, MCH rations appear to be most effective when they are large in size and nutritionally balanced.

5. School feeding programs appear most effective when they provide a high protein supplement to sustain growth. The ration need not necessarily be large in size. It should be consumed by the target child at the distribution site, as is usually the case.

6. A "Weight Dispersion Measure" developed in the study offers advantages over "Percent of Standard Weight-for-Height" as a means of measuring feeding program nutritional impact.

With respect to future evaluations of child feeding programs:

1. Evaluation activities should concentrate on determining whether supplemental rations distributed to recipients actually improve the nutritional status of the children who are intended to consume the rations.

2. A "core evaluation" strategy should include repeated annual measurement of children at sites selected for evaluation. Nutritional status measures should be calculated for each selected site and should be utilized to establish national norms. Sites which appear to be encountering unusual difficulties or registering unusual successes should receive special assessment. An analysis of changes in a site's average nutritional status over time should be employed to help identify sites for special assessments and for quality control purposes.

3. The core evaluation strategy is designed to encourage an active posture on the part of site officials. It places on them a measure of responsibility for achieving improvements (or at least not permitting declines) in the nutritional status of children served by the program.

4. More advanced evaluation strategies should be introduced after the core evaluations show results in terms of better data, more experienced trained personnel, improved record keeping, and a fuller understanding of the total system context in which nutrition programs operate. Such advanced strategies include extension to non-program sites, advanced cohort analysis, and advanced systems analysis.

5. Evaluation activities and the skills required to carry them out should be built up in a gradual and sustained fashion, following a sequential order. This sequential approach, while modest in its initial dimensions, does require commitment to the fundamental continuity of evaluation activities, at least with respect to core evaluations.

B. ORGANIZATION OF THIS REPORT

At AID's request, this report targets three distinct audiences: program officials; evaluators; and specialists in quantitative research. There are, necessarily, differences in approach, style and technical content among these chapters.

Chapter Two is directed to program officials who are contemplating evaluations of supplementary feeding programs or who are asked to review the results of evaluations being carried out by others. The chapter places the methods recommended in this report within a broad classification of evaluation studies. It provides a framework which links the evaluation process to improvement, over time, of nutritional status of recipient children at the program sites. The rationale of Chapter Two is reflected in the procedures and guidelines of Chapter Three, such that evaluation becomes not only a source of information but also an instrument of constructive change.

Chapter Three is directed primarily to program managers, evaluation officers and field team leaders who are charged with the operational responsibility of carrying out program evaluation, program monitoring, and the analysis of program data. It provides procedures, guidelines, and forms for staff guidance.

Clearly, any evaluation strategy must be tailored to the size of the feeding program which is being assessed. If a voluntary agency runs a program in 20 MCH centers, a complete survey of all participants is possible, and desirable. If a national government is running a program in 7,000 schools, a sampling approach must be used (at least initially). Equally

as clear, an evaluation strategy must be tailored to the quality and size of resources which can be devoted to the evaluation effort. Consequently, the approach used in Chapter Three is to:

- Present explicit guidelines, procedures, and forms for dealing with subjects which are central to the recommended evaluation strategy and which can be addressed in specific terms, given a wide range of conditions under which these materials may be applied.

- Identify issues whose precise characteristics cannot be predicted in advance and suggest ways of dealing with these issues.

Finally, Chapter Three recognizes that there are different levels of refinement of evaluation strategies. The approach taken is to provide a sequence of evaluation activities which can be tailored to local conditions. Each activity contains in it seeds which can germinate as more advanced evaluation strategies.

Chapter Four is addressed principally to the survey research and data analysis community which, small as it may be, is an important resource in developing countries. Members of this community are sometimes affiliated with organizations other than those nominally responsible for feeding program evaluation. Thus, intra-organizational cooperation, or outside assistance, may be required in order to deal with technical issues. Such issues of sample design, survey execution and data analysis are treated in some detail in Chapter Four, where the results of the three-nation pilot survey of actual feeding programs are reported.

Chapter Four presents a simple model in which *nutritional status*, for an individual child or a site -- labelled "Y" -- is viewed as the joint result of feeding program characteristics "X" and other characteristics of the child, his family, or community "Z" which are outside direct program control. The evaluation implications of analytical findings in Chapter Four are embodied in the evaluation strategies and techniques presented in Chapters Two and Three.

C. BACKGROUND

This report represents the culmination of a study which had its origin in a widely-voiced need for a set of guidelines for the evaluation of supplementary feeding programs for children in developing countries.

In its earlier phases, the work involved literature searches, meetings and international surveys of existing child feeding programs undertaken by the American School Food Services Association of Denver. Intermediate phases were carried out and their associated preliminary papers were presented by Checchi and Company, as follows:

- Specifications of the procedures to be carried out for the pilot survey by the collaborating research organizations, entitled *General Research Design*, October, 1972 (which included survey interview schedules).

- An early discussion of issues, initial data analysis and site descriptions, entitled *Child Feeding Programs in Developing Countries: A Comparative Evaluation of Ongoing Programs in Colombia, Kenya and the Philippines*, July,1974, and *Annex A*, August 1974.

- A fuller treatment (including interview schedules) of issues, sites and data, entitled *Judging the Merit of Child Feeding: A Development Handbook for Planners, Managers and Evaluators*, June, 1975; revised September, 1975.

The purpose of the study was to improve the evaluation methods applied to supplemental feeding operations serving children and mothers in developing nations. Such operations are large in scale and costly for both the donors of development assistance and the recipient countries. The programs have become complex, involving the processing of special fortified foods, a wide variety of local food delivery systems, and expensive program research. Many observers have sensed that great variations in the effectiveness of the operations might exist from one local site to the next. To improve the management of the child feeding programs, tools are needed that will distinguish more effective feeding operations from less effective ones, helping officials to learn from their successes and to correct or eliminate their deficiencies.

The International Union of Nutrition Societies (IUNS) provided advice concerning study design. The recommendations of this group stressed that the work not be limited to U.S.-sponsored feeding projects, and that it concentrate on the evaluation of mother-child health (MCH) centers serving pre-school children, and on school feeding projects for older recipients.

The research design for this effort was framed as an assessment of the realism of policy assumptions concerning child feeding programs and the creation of a system for providing reliable evidence about particular child feeding operations. By gathering and analyzing data in selected developing countries, the study sought to test four rationales put forward in support of programs intended to deliver supplemental rations to children. Stated as hypotheses, these rationales are:

- Feeding programs improve the health of children.
- Feeding programs are a good vehicle for teaching nutrition education and improving peoples' nutrition behavior.
- Feeding programs improve school attendance.
- Feeding programs improve school performance.

The research design called for the examination of 30 MCH and school feeding program sites and 30 paired non-program comparison groups divided among three countries. The 30 program sites were selected purposively. Comparison groups were selected judgmentally on the basis of available information on local conditions. The research design pointed out that the ideal approach would be to carry out a longitudinal experimental study in a field setting, but that neither sufficient funds nor time were available for a longitudinal study. The design relied, instead, on an approach which made use of retrospective data, cross-sectional comparisons, post hoc control groups, and a system of checks and controls on the quality of the work.

The research design recognized formidable, conceptual, methodological, and practical difficulties of measuring feeding program effects on the health and growth of children, nutrition education and behavior, school attendance, and school performance. It adopted the approach of frankly acknowledging the risks associated with such measurements and emphasized the importance of selecting methods for examining the data which had high analytic potentials. It was anticipated that information gathered during the survey would yield useful insights, that the process of selecting appropriate methods of analysis would produce tangible improvements in techniques for evaluating child feeding programs, and that such improvements would be applied in subsequent evaluations.

As the study progressed, considerable attention was directed to developing an approach which could be well understood by program officials and evaluators and which could be applied in the decision-making process with assurance. In addition, a substantial effort was devoted to selecting suitable methods for measuring the nutritional status of children. Because the latter subject is of great importance in this report, a preliminary word of explanation is in order.

In early work performed on the study, *percent of standard weight for height* ("weight for height") was used as an indicator of the nutritional status of school children and *percent of standard weight for age* ("weight for age") was used as an indicator of the nutritional status of MCH children utilizing a U.S. reference population. Subsequently, weight for height was substituted for weight for age as a means of measuring the MCH group.

The present report replaces the commonly used percent of standard weight for height with indicators called "Weight Dispersion Measures." Explanations of the nature of the "Weight Dispersion Measures (WDM)," the ways in which they may be applied, and the means by which they were derived are contained in Subsection E-3 of Chapter Two, Section B of Chapter Three, and Sections C and G of Chapter Four. The advantages of WDM indicators include the following:

1. WDM provides a preliminary means of identifying children who may be underweight by relating such children to the lowest twenty-five percent of a standard reference population (children with WDM of less than -100).

2. WDM registers the more serious implications of a child being *beneath* the reference weight than one being over the reference weight by adjusting the measurement scale for the "high side skew" in the reference population.

3. WDM has higher variability, is more discriminating, and more responsive to program inputs than percent of standard weight for height.

4. WDM permits better comparisons between boys and girls, because boys and girls have different patterns of dispersion as well as different reference weights.

The lay reader can gain a quick visual impression of the advantages of WDM over percent of standard weight for height by a perusal of Exhibit 1.1 and Exhibit 1.2. Exhibit 1.1 shows "weight for height" and WDM for thirty-four children at the Eldama Ravine School in Kenya. Weight for height is shown in Column 4. Note the greater variation reflected in WDM, which is shown in Column 5. In particular, look at the four children in Box "A." Each of these children is 96 percent of the standard reference weight. WDM allows a clear rank ordering among them. Now look at Box "B." Notice that percentage standard weight places the boy (94%) and the girl (93%) in the wrong order as measured by WDM (-109 and -99 WDM respectively). This phenomenon is particularly important in comparing girls' schools with boys' schools or sites with differing proportions of boys and girls.

Turn to Exhibit 1.2. This Exhibit shows the same Eldama Ravine children listed in rank order according to WDM. The "X's" in Column 4 show the cases where weight for height places children in the wrong order, as discerned by the more sensitive WDM measure. Note that most of the X's occur at the lower (ostensibly nutritionally deprived) end of the scale.

Exhibit 1.1

ELDAMA RAVINE, KENYA, PROGRAM SCHOOL (SITE 351)
CHILDREN ORDERED BY PERCENTAGE STANDARD WEIGHT

	1	2	3	4	5	
	Sex	Height (cm)	Weight (kg)	Percentage Standard Weight	Weight Dispersion Measure	
	Girl	116.0	24.6	121	269	
	Boy	122.0	27.0	117	269	
	Girl	120.5	25.1	114	173	
	Boy	132.0	31.4	112	191	
	Girl	136.0	33.6	111	101	
	Girl	141.5	37.2	109	78	
	Girl	129.5	28.0	106	61	
	Girl	140.5	35.4	106	52	
	Boy	132.5	29.0	103	44	
	Girl	120.5	22.7	103	34	
	Girl	137.0	31.0	100	1	
	Boy	134.5	29.3	100	- 1	
	Girl	120.0	21.7	99	- 16	
	Boy	126.5	24.5	98	- 45	
	Girl	131.0	26.3	97	- 49	
"A"	Girl	125.5	23.6	96	- 60	"A"
	Boy	129.5	25.6	96	- 67	
	Boy	137.0	29.4	96	- 67	
	Boy	114.4	19.3	96	- 80	
	Girl	119.0	20.2	94	- 94	
"B"	Boy	110.5	17.8	94	-109	"B"
	Girl	127.0	23.6	93	- 99	
	Boy	129.5	24.6	92	-131	
	Girl	115.5	18.6	92	-134	
	Boy	115.5	18.8	92	-155	
	Girl	125.0	22.3	91	-148	
	Girl	119.0	19.6	91	-151	
	Boy	120.5	20.3	91	-169	
	Boy	116.0	18.6	90	-188	
	Boy	143.0	30.3	88	-187	
	Girl	137.0	26.9	87	-173	
	Girl	125.5	21.4	87	-198	
	Girl	148.0	33.6	86	-143	
	Girl	128.5	22.3	86	-207	

Column 6 in Exhibit 1.2 shows the reference points WDM +100 and WDM -100. Fifty percent of the *reference population* falls between these two reference points. Twenty-five percent of the *reference population* is above +100 and twenty-five percent of the reference population lies below -100.

Stated another way, seventy-five percent of the reference population lies *above* WDM -100. At Eldama Ravine School twenty-one of the thirty-four children (62 percent) are above WDM -100 as compared with 75 percent of the reference population which is above this point. Thirteen of the thirty-four (38 percent) are below WDM -100, as compared with 25 percent of the reference population which are below this point. It is thus readily apparent that Eldama Ravine has a considerably higher proportion of its children in the lowest category (below -100) than does the reference population.

We wish to create an indicator that will reflect site status in terms of the proportion of children in that lowest category of nutritional status. At the same time, we want that indicator to improve (increase in positive value) as conditions at the site improve over time. The indicator selected is *WDMPROP*. WDMPROP is simply the proportion, or percentage, of children at the site whose WDM indicators are above -100. In the case of Eldama Ravine this percentage is (as we have seen) 62 percent. In the case of the reference population, it is (as we have seen) 75 percent. The higher the WDMPROP, the better off the site is in terms of the percentage of children in the lowest category. The lower the WDMPROP, the worse off it is in this respect.

In the course of developing WDM measures for purposes of this study, we discovered that a highly pertinent effort of far greater magnitude, conducted by the National Center for Health Statistics (NCHS) in the U.S. Department of Health, Education, and Welfare, was reaching analytical conclusions similar to ours on the basis of a much larger sample of children in the United States. It is believed that the present report, taken together with the NCHS work, represents technical developments of great

Exhibit 1.2

ELDAMA RAVINE, KENYA, PROGRAM SCHOOL (SITE 351)
CHILDREN ORDERED BY WEIGHT DISPERSION MEASURE (WDM)

1	2	3	4	5	6
Sex	Height (cm)	Weight (kg)	Percentage Standard Weight	Weight Dispersion Measure	Reference Population
Girl	116.0	24.6	121	269	25% OF REFERENCE POPULATION
Boy	122.0	27.0	117	269	
Boy	132.0	31.4	112X	191	
Girl	120.5	25.1	114X	173	
Girl	136.0	33.6	111	101	WDM +100
Girl	141.5	37.2	109	78	50% OF REFERENCE POPULATION
Girl	129.5	28.0	106	61	
Girl	140.5	35.4	106	52	
Boy	132.5	29.0	103	44	
Girl	120.5	22.7	103	34	
Girl	137.0	31.0	100	1	
Boy	134.5	29.3	100	- 1	
Girl	120.0	21.7	99	- 16	
Boy	126.5	24.5	98	- 45	
Girl	131.0	26.3	97	- 49	
Girl	125.5	23.6	96	- 60	
Boy	129.5	25.6	96	- 67	
Boy	137.0	29.4	96	- 67	
Boy	114.4	19.3	96	- 80	
Girl	119.0	20.2	94	- 94	
Girl	127.0	23.6	93X	- 99	WDM -100
Boy	110.5	17.8	94X	-109	25% OF REFERENCE POPULATION
Boy	129.5	24.6	92	-131	
Girl	115.5	18.8	92	-134	
Girl	148.0	33.6	86X	-143	
Girl	125.0	22.3	91	-148	
Girl	119.0	19.6	91	-151	
Boy	115.5	18.8	92X	-155	
Boy	120.5	20.3	91X	-169	
Girl	137.0	26.9	87X	-173	
Boy	143.0	30.3	88X	-187	
Boy	116.0	18.6	90X	-188	
Girl	125.5	21.4	87X	-198	
Girl	128.5	22.3	86	-207	
				WDMPROP EQUALS 62	WDMPROP EQUALS 75

potential benefit in evaluating supplemental feeding programs in developing countries. The attention which the present report devotes to WDM indicators reflects a fundamental judgment with respect to the relative emphasis which practical evaluations should give to the various kinds of data commonly available in developing countries: when evaluators are fortunate enough to be able to obtain reliable measurements of phenomena which are central to the purposes of a program, they should refine those reliable measurements and treat them as the fundamental building blocks of their assessments.