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9. ABSTRACT
 Nutrition education programs have been conducted for many years in many countries, but their actual effectiveness has not been established, partly for want of a simple and effective set of methods for evaluating them. This is why USAID developed an experimental field guide for conducting such evaluations. From 1973 to 1975 the field guide was tested in Brazil on three kinds of nutrition education programs: person-to-person, group teaching, and mass media. The evaluation methodology was applied to three Brazilian programs: Servico Social da Industria (SESI), the Associacao Brasileira de Credito e Assistencia Rural (ABCAR), and the Superintendencia Nacional do Abastecimento (SUNAB). This report discusses that activity and presents conclusions and recommendations based upon it. The revised Field Guide was published in June, 1975. The recommendations deriving from the development work, conferences with a panel of experts, and experiences in the field demonstration are summarized below: Further field applications should be carried out to ensure the utility of the methodology for cost-effectiveness comparisons. The under-five target audience should be given priority, and sites selected should be in countries less developed than Brazil. The users of the guide should be oriented and trained. Further applications of the methodology should determine the need for alternative and less sophisticated methods, and should explore possible techniques. Consideration should be given to developing supplements to the Field Guide to provide procedural models for measures of additional food behaviors such as food acquisition, storage, and preparation. A summary handbook should be developed for program administrators and planners. AID should provide technical assistance to governments and to voluntary and international organizations that may request such help in evaluating their nutrition education programs.

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**APPLICATION OF A FIELD GUIDE
FOR EVALUATION OF NUTRITION EDUCATION
IN THREE PROGRAMS IN BRAZIL**

**AN EXPERIMENTAL APPROACH TO
DETERMINATION OF EFFECTS ON FOOD BEHAVIOR
IN LESSER DEVELOPED COUNTRIES**

MARCH 1976

**Office of Nutrition
Technical Assistance Bureau
Agency for International Development**

The "Field Guide for Evaluation of Nutrition Education: An Experimental Approach to Determination of Effects on Food Behavior in Lesser Developed Countries" was prepared under Contract AID/csd-3358 for the Agency for International Development, and under the technical guidance of Andromache Sismanidis, consultant to the Agency. This report describes the field demonstration conducted in Brazil from 1973 to 1975. The cooperation of USAID/Brazil throughout the field demonstration is gratefully acknowledged. The authors wish especially to express deep appreciation to the following Brazilian agencies and agency directors and to their project teams who faithfully carried out the field demonstrations in Brazil.

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The authors also had the benefit of excellent guidance of an advisory panel of specialists in the fields of nutrition, nutrition education, evaluation and related disciplines. Membership of the advisory panel is identified on the back cover.

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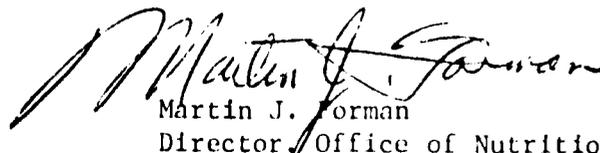
PREFACE

Nutrition education programs have been conducted for many years by local and national governments and by international and voluntary agencies. However, their actual effectiveness has not been documented adequately, partly for want of a simple and effective evaluation methodology.

The Office of Nutrition of the U.S. Agency for International Development (A.I.D.) has attempted to fill this gap by designing an experimental Field Guide for such evaluations. The first step in its development--review of existing literature by the University of Iowa--indicated that nutrition education can be effective under certain conditions in improving food behavior and that no accepted and tried methodology to evaluate such programs yet existed. A.I.D. then contracted with the Synectics Corporation to develop an evaluation methodology which was reviewed by an international expert panel and then field tested in Brazil on three kinds of nutrition education programs--person-to-person, group teaching, and mass media.

This companion to the methodology describes the results of applying those evaluation techniques to three Brazil programs: Serviço Social da Industria (SESI), the Associacao Brasileira de Credito e Assistencia Rural (ABCAR), and the Superintendencia Nacional do Abastecimento (SUNAB).

The Field Guide will now be tested in two additional countries elsewhere in the developing world. The results of those applications will hopefully produce additional refinements in the methodology and will lead to more effective and widespread application.



Martin J. Forman
Director, Office of Nutrition
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SECTION I

INTRODUCTION

Background

The failure, during 1972 and 1973, of the U. S. food and agriculture information systems to predict world food shortages, the resultant disruption of economies, and the impact on developing countries has heightened national and international interest in food policy and nutrition planning. Long before these events, however, the Agency for International Development (AID) was engaged in research and technical assistance to foster national nutrition planning in developing countries. In the developed countries the thrust is in large part a matter of economics. For the developing nations it verges on a matter of survival.

Concurrent with technical assistance in planning, AID, local and national governments, and international and voluntary agencies continue to support a vast number of nutrition education programs in developing countries. These programs represent a substantial investment in funds and human resources. They are a logical component of policy and national nutrition planning. On the other hand, productive consideration of education in overall nutrition strategy is extremely difficult. Little is known about the impact of educational programs. Assessment of effects has either been wholly neglected or has focused primarily on measures of attitude and knowledge. The Agency concluded that if comprehensive planning is to evolve, effective means must be devised for determining the cost-effectiveness of education as it relates to food behavior.

In 1970, Dr. Floy Eugenia Whitehead (Whitehead, 1970), under the sponsorship of AID, completed a thorough literature review which indicated that nutrition education can be effective under certain conditions in improving food behavior and that an accepted and tried methodology to evaluate such programs did not exist. Subsequently, AID selected Synectics Corporation to undertake the development of a "Field Guide" for use in LDCs to evaluate the cost effectiveness of different nutrition education approaches in improving nutrition, and to test the Field Guide in an LDC. A panel of experts in the fields of nutrition, nutrition education, evaluation, and related disciplines was selected by AID to advise and assist in guiding the development and test of the Field Guide.

Review of the draft methodology by the panel of experts resulted in many constructive changes and a preliminary Field Guide (Jones, Munger, and Altman, 1972) was prepared. As might be expected in development of new approaches, there was still a residual of unease. Could program staffs in developing countries, particularly the field staffs, comprehend and apply the techniques of measurement? Would they accept an approach so different from traditional methods of program assessment? These and other issues would best be resolved by field application of the Preliminary Guide.

The country of Brazil was selected by AID as the site for demonstration of the acceptance and utility of the methodology. Preliminary search for programs to participate in the demonstration was done with assistance from the USAID Mission in Brasilia. Three programs were selected, one focusing on classroom education, one using a nonformal education approach, and one using the mass media. The field demonstration was carried out, from planning through reporting phases, during the period from October 1973 through December 1975. Section II of this report describes the participating organizations.

The project to develop a Field Guide was not intended to teach groups what to teach in nutrition education programs. It was intended to help program persons to evaluate the effectiveness and cost effectiveness of their education programs in improving food behavior, and to provide indications as to what are the most cost effective approaches. Provision of such help was one objective of the field application of the Guide. This fact should be borne in mind as the reader peruses Sections II through V of this report which present the evaluations by programs in Brazil. The educational objectives, educational content, evaluation objectives, data instruments and interpretation of results are those of the Brazilian program persons, not those of the contractor, nor of AID.

In the paragraphs which follow, the key methodological issues identified by the panel of experts prior to the field applications are described. Resolutions worked out with the assistance of the panel after the field demonstration are presented. The recommendations of the panel of experts are summarized.

Key Issues in the Field Demonstration

Evaluation research of social change is an evolving technology. Unlike the usual scientific approach--which seeks to discover, understand, or even to produce interesting phenomena--evaluation research typically deals with pervasive and wholly undesirable phenomena. A prime example of such phenomena is the widespread malnutrition in the developing countries. The evaluation research problem is not to find the causal relationships which produce the malnutrition, but to find those which will contribute to the elimination of it. In the instance of this project, the problem was to devise a means for determining causal relationships between educational processes and food behavior, with the purpose of selecting the most cost-effective approach for contributing to the elimination of malnutrition through education. Three basic requirements for the methodology, when taken in combination, compounded an already formidable technical problem:

- ✓ The methodology must reflect scientific techniques, i.e., experimental in the sense that it employs experimental designs containing experimental and control groups.
- ✓ It must focus on food behavior, to the exclusion of measures of knowledge and attitude.

- ✓ It must be generalizable worldwide to different cultures and nutrition objectives, and useful to various levels of program operation and administration.

The Issue of Experimental Design

The requirement for scientific and experimental approaches seeks to ensure maximum attainable validity and reliability of evaluation data. Such an approach holds the best potential for standardization of evaluation information and consistency in data classes--conditions which are essential to facile amalgamation of data at multiproject, multiprogram, or national levels, or for comparison of effects across cultural and national lines. On the other hand, experimental design is a relatively complex art. Skilled experimenters often will not be available for design of local evaluations; even the simplest experimental concepts can cause grave misunderstandings.

The Preliminary Guide sought to lead the user sequentially through a series of designs--from simplest design to designs of increasing complexity. In all, twenty-six designs were discussed, with guidance as to when each is appropriate and how one can best guard against invalid inference. The comprehensive discussion of alternative designs provided for a broad array of applications of the methodology. The issue of concern was the number of designs. Should one present a comprehensive number of alternative designs and chance confusion of the user, or, should one limit the number of designs and chance limitation of the applications of the methodology?

In the field demonstration, only two experimental designs were exercised--the quasi-experimental design using a control group, with one pretreatment and two posttreatment measures; and a case-study, using one baseline measurement and two postbaseline measurements in an ongoing program. The third user did not use an experimental method. Discussion with and observation of the users' planning activity led to the conclusion that the twenty-six designs in the Preliminary Guide exceeded these user needs and added complexity to a "how-to" guide.

The resolution of the issue was to greatly simplify the chapter on study designs by:

- ✓ Reducing the number of designs presented from twenty-six to four basic designs, and providing guidance on how each can be expanded to accommodate more groups and extended to accommodate additional measurements. The basic designs included in the revised Field Guide are shown in Figure 1.
- ✓ Providing additional guidance and concrete examples to help the user select the design which best fits the particular evaluation study needs.

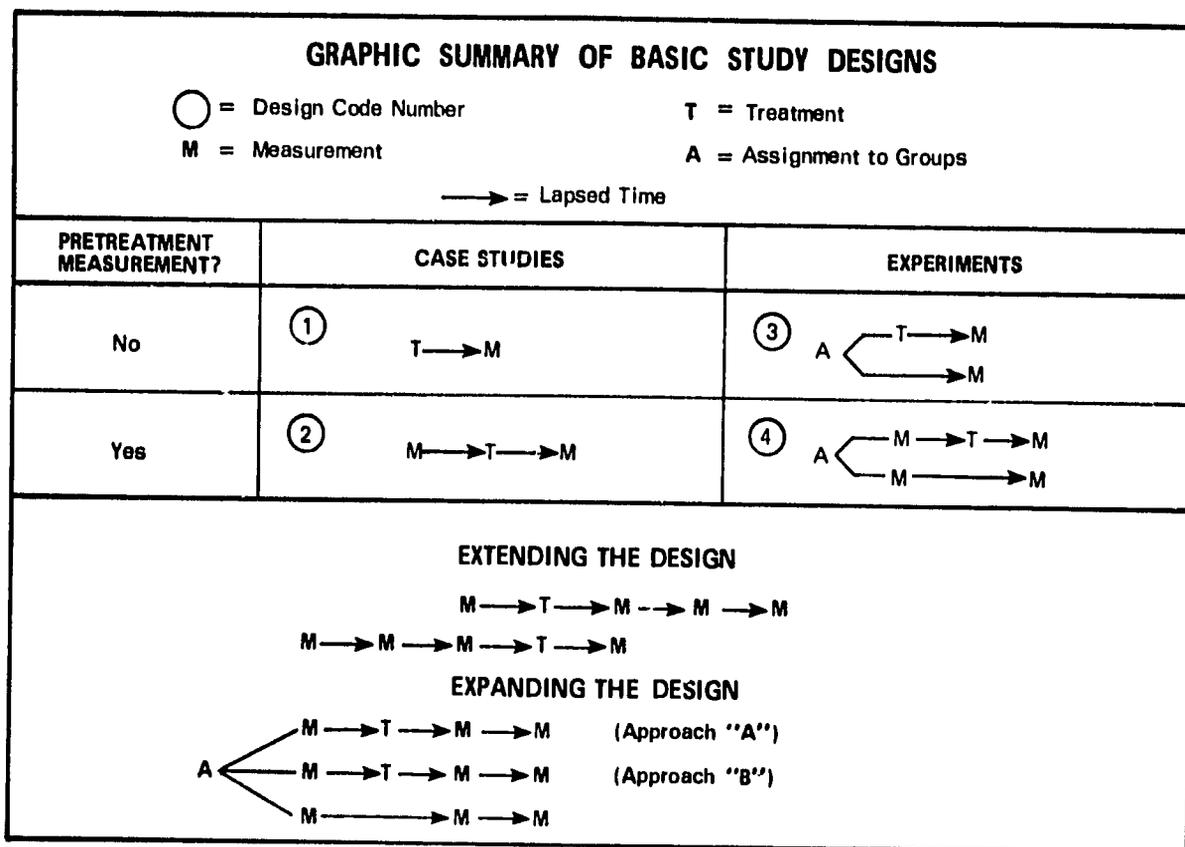


Figure 1. Graphic Summary of Basic Study Designs

The Issue of Which Food Behaviors Should Be Measured

The preliminary methodology described four food behaviors essential to good nutrition, all of which are commonly addressed by nutrition education. Figure 2 illustrates the rationale for inclusion of these four behaviors. Educators seek to bring about cognitive changes which will affect human behaviors and result in reduced morbidity and mortality related to malnutrition. The four food behaviors are interrelated; each has independent importance. One cannot eat an adequate diet unless one acquires food; if the foods are not properly stored and protected, their nutritional value can be lost; if the foods are not properly prepared, their nutritional value can be destroyed; and, given that one has achieved appropriate acquisition, storage and preparation of foods, the foods must be consumed in accordance to the particular nutritional needs of individual family members.

The Preliminary Field Guide provided for measurement of all four behaviors shown in Figure 2, on the assumption that if evaluation demonstrated failure to achieve desired food consumption, one or more of the other measures could be examined for evidence diagnostic of the strengths and weaknesses of the educational approach. Each additional measure, however, adds an inordinate complexity to the data handling. The issue was whether one should impose so complex a data handling task as to chance abortion of good evaluation projects, or reduce the number of dimensions of measurement at the expense of diagnostic information.

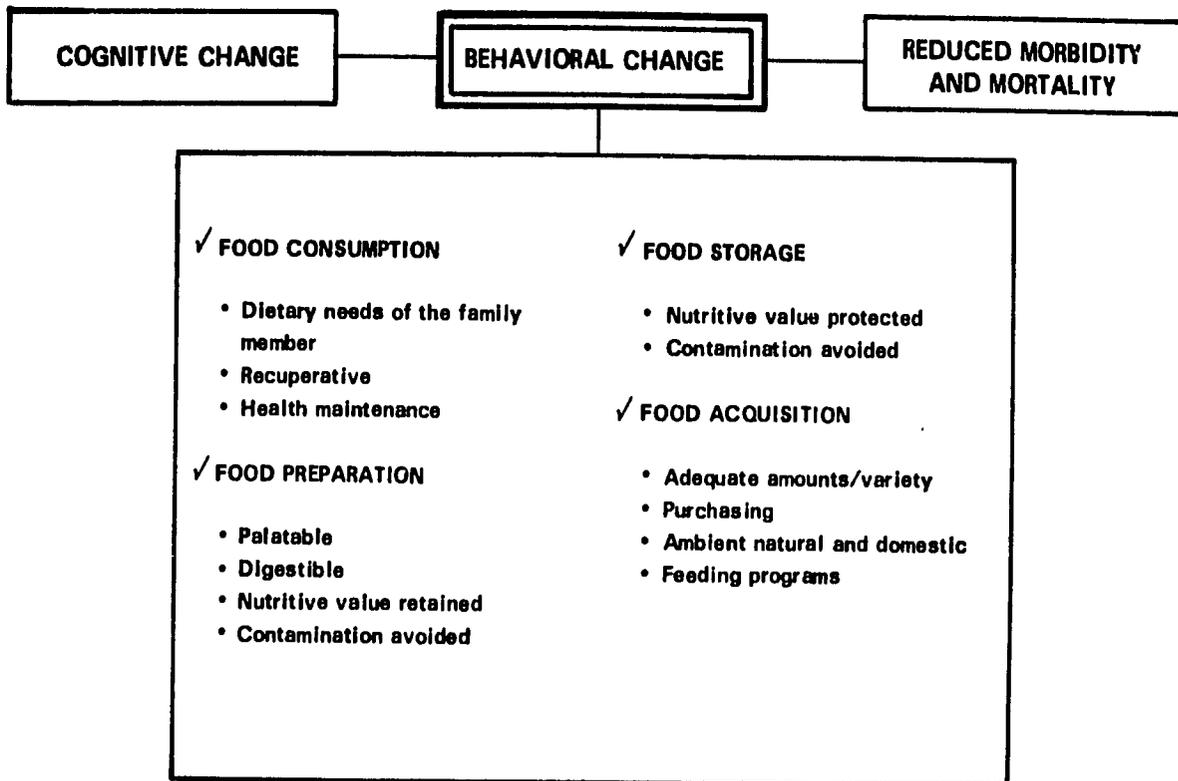


Figure 2. Behavioral Measures Covered by the Preliminary Field Guide

Experiences in the demonstration were inconclusive on this issue. Only the measure of food consumption was used. During the data handling, scoring and analyzing that measure appeared to be a fulltime job for the small demonstration teams.¹ But, when it came to the interpretation of results and to questions of what corrective actions should be taken in the education program, the nutritionists all expressed need for more diagnostic information.

The issue was resolved in several ways:

- ✓ The structure of the revised Field Guide supports the sequential decisions the user must make about evaluation, as illustrated in Figure 3. In the discussion of what to measure, emphasis is placed on the importance of food consumption as a primary measure. The bulk of the Field Guide is in the form of a model which leads the user through planning and preparation and presents concrete examples of field work, data handling, and interpretation of results. The sequential steps are graphically summarized in Figure 4.

¹The complexity of data handling was greatly increased in this demonstration by the particular criteria set by the nutritionists, as shall be seen in the discussions in Sections III and IV.

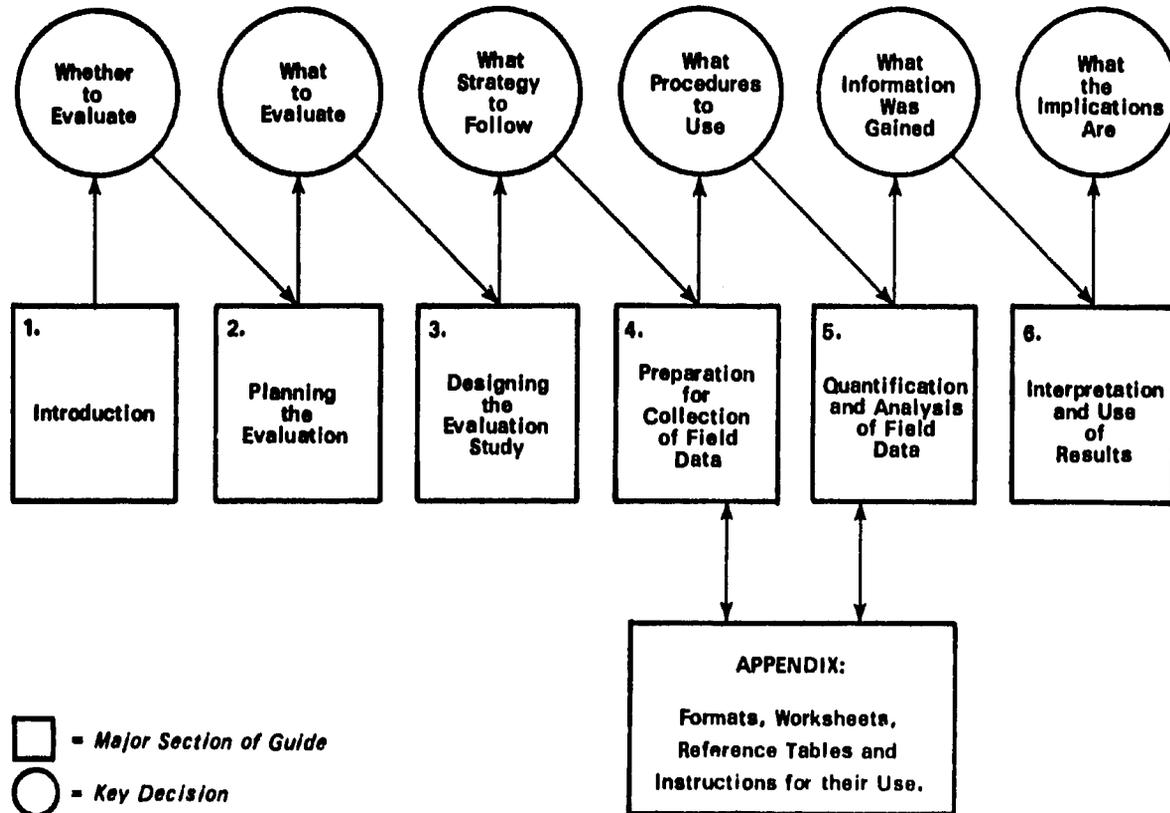


Figure 3. Organization of the Field Guide

✓ A comprehensive package of tools--reference tables, worksheets, and instructions--is presented in the Appendix. Suggestions are made for the use of subsamples for collection and analysis of measures other than food consumption for diagnostic purposes. The tools of evaluation presented in the Appendix are readily adapted to such measurement.

In addition to these steps, the panel of experts advising the developmental project recommended that AID give consideration to the development of supplements to the basic Field Guide, to provide models for evaluation of the behaviors of food acquisition, storage and preservation, and preparation.

The Issue of Quantification by Frequency versus Amount

The methodology uses the 24-hour food recall as a source of information on food consumption. It was the consensus of the panel of experts that this technique is the best available approach. It is within the capability of the human resources expected to be available at the local level; it provides adequate information for assessment of the effects of education; training and supervision of field workers can help avoid the common pitfalls associated with the technique. There were, however, marked differences of opinion as to

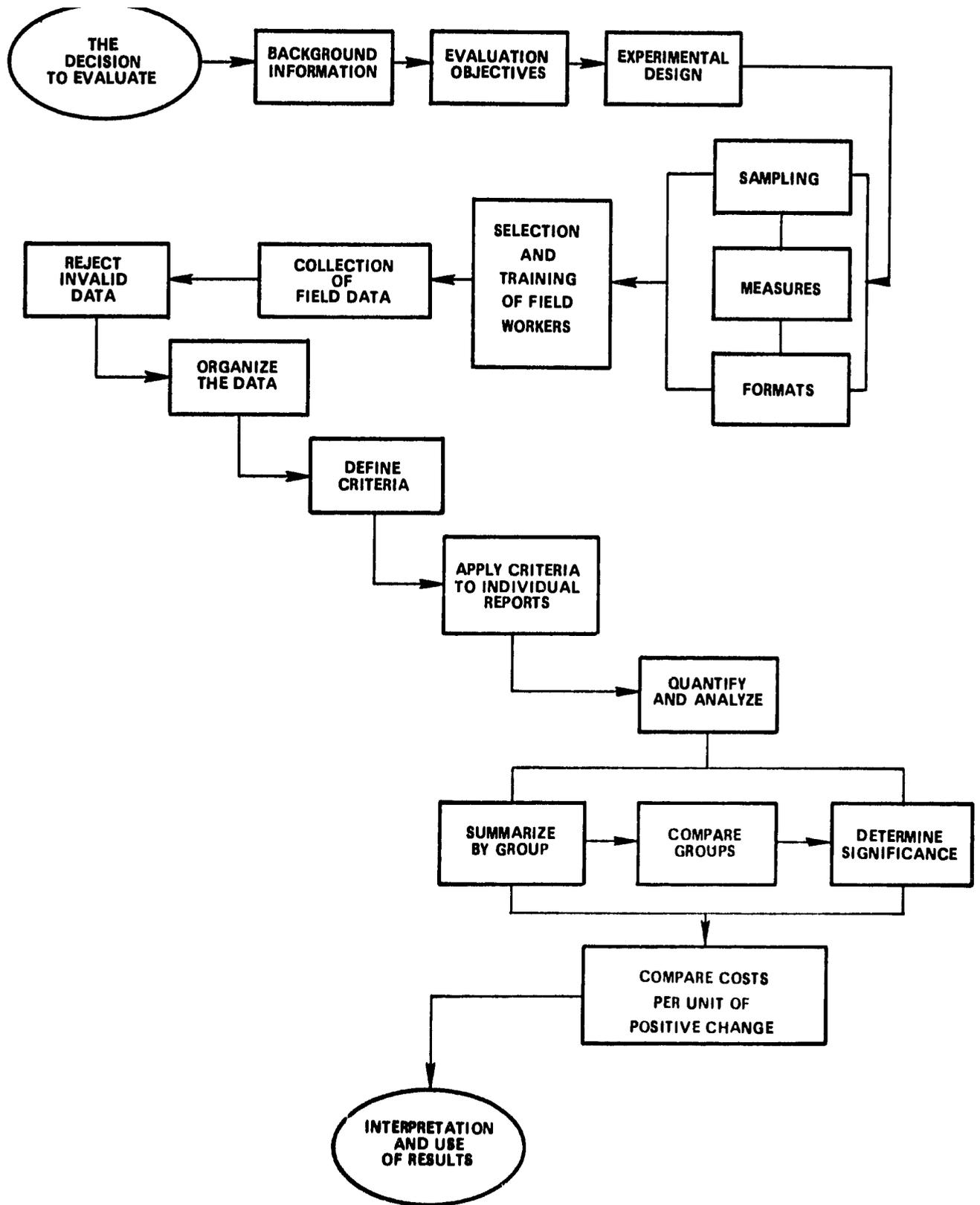


Figure 4. Sequential Steps of Evaluation Described in the Field Guide

whether quantification of food recalls should be in terms of the frequency with which each food was consumed, or in terms of the amount of food consumed. Quantification of amounts is inherently more difficult; the task could exceed the capabilities of many of the expected users of the Field Guide. Nutritionists and medical personnel, trained in precise quantification, might consider simple frequency counts an inadequate measure. The Preliminary Field Guide was open-ended on this issue, allowing the user to choose either measure.

Experiences in the field demonstration heightened concern over the complexity of quantifying by amounts. One team established such rigid rules and detailed measures as to end up quantifying by fractions as small as 1/26th and 1/52nd of a portion. Conversion to grams-weight presented a horrendous task. The procedure was so burdensome as to lead the director of that demonstration team to undertake a parallel analysis, using a subset of the data, to compare quantification by amounts with quantification by frequency.² She found no differences in the results of the two methods. Her conclusion was that frequency, the less costly and simpler method, is adequate for purposes of evaluation of nutrition education.

On the other hand, and as some members of the panel of experts pointed out, there are situations in which measures of amounts are critical to the evaluation. Examples might be in areas where types and amounts are very scarce and the educational concern is with sufficient amounts to sustain life, or, where fortified foods are introduced and the concern is with how much of the fortified food is consumed.

The resolution in revising the Field Guide was to emphasize the practicality and utility of quantifying by frequency. Quantification by amounts was treated separately, citing examples of when it is appropriate, and providing guidance to minimize the complexity of the quantification process.

The Issue of Categorized versus Continuous Data Concepts

The methodology uses the Chi Square statistic in analysis of data. It is converted to procedural worksheets which lead the user step-by-step through simple calculation. Its use, however, requires inputs of categorized data--in this instance, dichotomized data. Thus, the user must establish criteria on which to categorize food consumption as appropriate or inappropriate. To persons experienced in evaluation this is a wholly logical requirement; one

²This adjunct to the demonstration resulted in a dissertation "Avaliacao de Alguns Aspectos Qualitativos do Consumo Alimentar de um Grupo de Donas de Casa da Cidade de Santos--Estado de Sao Paulo" (Evaluation of some qualitative aspects of food consumption for a group of homemakers in the city of Santos, State of Sao Paulo) accepted by the Departamento de Nutricao, Centro de Ciencias Medicas da Universidade Federal Fluminense for the advanced degree entitling the nutritionist to Titulo de Livre-Docente.

must establish specific objectives, and given those objectives one must state the premise on which to say they have or have not been achieved.

Experience in the field demonstration indicates that many users of the methodology will have some difficulty thinking of achievement as a "yes" or "no" matter. They have been trained and tend to think in terms of idealized food behavior; achievement is continuous progress toward the ideal. They may, in truth, never expect to attain that ideal in the face of realities, but to set criteria any lower than the ideal is perceived as a compromise of purpose. In addition, they tend to think of measures in relation to scales, scores, percentages, etc. There is, of course, merit in these concepts. But these concepts come headlong into conflict with one of the requirements established for the methodology--sufficient simplicity for generalized use.

The experimental method requires a test of the significance of observed differences. Are they real, or only chance differences? To test significance of difference on multiple-score levels is exceedingly burdensome. The simplest and most direct route is a dichotomy of "yes" or "no." The evaluator is usually seeking information about more than one objective, such as consumption of two or more food groups, and independent tests of significance of difference for each data category and one for the combined categories are required. Procedures for this analysis and a worksheet for the calculation are presented in the Field Guide. But, to test significance of differences for single and multiple categories of data on more than two score levels is judged to present insurmountable difficulty for field users.

In the field demonstration the concept of categorizing the data as appropriate food behavior or inappropriate food behavior was accepted without question by one team. They understood and applied the methodology. The second team made one false start in which data were scored on a five point scale of "poor" to "excellent." Unable to enter the data on the Chi Square worksheet, they then established a cut off point, dichotomized the data, and proceeded without technical difficulty. The third group did not attempt to quantify food behavior.

In review of the results of the field demonstration, it was the consensus of the panel of experts that this aspect of the methodology should not be changed. There was, however, a residual of unease associated with the possibility that the users in Brazil were an exceptional group. The panel recommended that observation should be made in conjunction with future applications of the methodology to determine if simpler techniques are required by some users, and to explore what alternatives are available.

The Issue of Generalizability to Multiple Program Levels

The field demonstration confirmed that, with orientation and modest training in the methodology, field personnel can conduct the evaluation. It was applied to both formal and nonformal programs. It was not exercised in the mass media program. Further, the context of the demonstration did not permit a test of the utility of the methodology for comparison of either effectiveness or cost-effectiveness of different educational approaches--

information essential to policy decisions and national nutrition planning. Such comparisons require commonality of objectives, audiences, and criteria for the different program approaches. In Brazil, one program addressed the general public, another rural youth, and the third urban housewives. One program set criteria at standards of minimum daily requirements; another set them at one half the standard of minimum daily requirements; the third program set no criteria at all. Thus, generalizability of the methodology to different audiences using different educational approaches was proven, but its utility in comparing cost-effectiveness of different approaches was not.

The panel of experts recommended that further applications be carried out, under conditions which would permit comparisons across programs, cultures, and national lines. In addition, every effort should be made to select programs working with the under-five population.

Summary Recommendations

The revised Field Guide was published in June 1975 (Jones, Munger, and Altman, 1975). The recommendations deriving from the developmental work, conferences with the panel of experts, and experiences in the field demonstration are summarized below.

- ✓ Further field applications should be carried out to ensure the utility of the methodology for cost-effectiveness comparisons. The applications should give priority consideration to the under-five target audience and should demonstrate inter-program and intercountry applicability. The sites for further application should be representative of countries less developed than Brazil. Some orientation and training of the users should be provided.
- ✓ An objective of further applications of the methodology should be the determination of need for alternative and less sophisticated methods, and exploration of possible techniques.
- ✓ Consideration should be given to development of supplements to the Field Guide to provide procedural models for measures of additional food behaviors such as food acquisition, storage, and preparation.
- ✓ Consideration should be given to the development of a summary handbook for program administrators and planners to provide orientation to the methodology and management guidelines for multiprogram or national use in relation to policy and national nutrition planning.
- ✓ AID should provide technical assistance to governments and to voluntary and international organizations which may request such help in evaluation of their nutrition education programs.

SECTION II
THE PROGRAMS PARTICIPATING IN
THE FIELD DEMONSTRATION

Serviço Social da Indústria (SESI)
Regional Department of São Paulo

SESI is a national service organization, supported by industry. Within the state of São Paulo it has installations in more than 150 cities. Its activities include social service, medical assistance (hospitals, odontology centers, and food), legal assistance, educational assistance, and recreation programs. The evaluation demonstration was carried out by SESI's Division of Health Improvement, which has as one of its major functions the nutrition education of low income workers and workers' wives.

Of the three programs involved in the demonstration, SESI was the most stable. The project had the full support and involvement of the Director of the Division of Health Improvement. The evaluation team was composed of teaching nutritionists who remained with the project through the demonstration. This central involvement and dedication of personnel who were closely involved in the nutrition education process unquestionably provided the most rigorous test of the methodology.

The Associação Brasileira de Crédito e
Assistência Rural (ABCAR)

At the time of initiation of the demonstration ABCAR was, like SESI, an independent service organization. Headquartered in Rio de Janeiro, it had cooperative organizations in each state in Brazil, providing social, educational, and agricultural services to rural areas. The actual demonstration project was undertaken jointly by the headquarters in Rio de Janeiro and the cooperative organization in the state of Espírito Santo.

During the demonstration project, ABCAR underwent a series of organizational changes which eventually resulted in the dissolution of ABCAR and formation of Empresa Brasileira de Assistência Técnica e Extensão Rural (EMBRATER). EMBRATER is now an arm of the Brazilian Ministry of Agriculture and is headquartered in Brasília. These events did not immediately result in changes in program operations in the field. They did impact on the demonstration project to the extent that evaluation team composition and leadership changed a number of times over the period of the demonstration. The importance which such organizations assign to evaluation is illustrated by the fact that ABCAR was able to carry out the demonstration to completion despite these trying circumstances.

The Superintendencia Nacional do Abastecimento (SUNAB)
Departamento de Assistencia e Educatao Alimentar (DEAL)

The National Superintendency of Provisioning, part of the Ministry of Agriculture in Brazil, monitors the agricultural marketplace. DEAL is the department within SUNAB charged with food assistance and education. Messages are disseminated through the media, including outlets in radio stations and newspapers throughout the country, and massive billboard campaigns.

In fairness to the undertaking of the demonstration project, the director of SUNAB pointed out that, while they are greatly concerned with nutrition and nutrition education, the central focus of the Superintendency is economic. However, the nature of education changes in relation to scarcity and abundance of foods at given points in time. Evaluation concerns are satisfied if marketing information demonstrates that foods in abundance are being consumed and foods in shortage maintain reasonable prices. The Director of the Superintendency is, of course, interested in the effects of education on the eating habits and nutrition of the peoples of Brazil.

On the other hand, staff resources at the Superintendency are very limited. Nutritionists are members of other agencies, such as the Ministry of Health, and are available to the Superintendency on an as-needed basis. Consultants are also used. But resources would not permit the assignment of a SUNAB "team" for conduct of the demonstration. Part-time assistance of a nutritionist could be made available in exchange for the opportunity to assess the effects of the SUNAB education program. Given these conditions, it was agreed that the SUNAB demonstration would be combined with the ABCAR demonstration. The SUNAB nutritionist became a member of the ABCAR demonstration team.

Instituto de Pesquisas de Opiniao e Mercado (IPOM)
The Subcontractor for Data Collection

None of the three participating organizations had sufficient resources to undertake the data collection task. IPOM was chosen as a subcontractor for data collection following interview of a number of potential subcontractors. The organization had extensive experience in data collection in low income areas both urban and rural, employed indigenous workers, and provided special training in techniques of data collection. It was stipulated in the subcontracting agreement that training of the data collectors would be in accordance with the guidelines provided in the evaluation methodology, and that the nutritionists from the respective participating organizations would contribute to the instruction of the data collectors.

Roles of the Participants in
the Demonstration

The field demonstration was carried out by the evaluation teams of the participating organizations. That is, the assembling of background information, the preparation of plans and data collection instruments, the

training of data collectors, the reduction and analysis of the field data, and the preparation of reports to describe results were accomplished by the personnel of the SESI, SUNAB, and ABCAR organizations. The descriptions of the demonstration project as presented in Sections III, IV, and V of this report are essentially drawn from documentation prepared by the evaluation teams.

Technical resources available to the evaluation teams included the *Preliminary Field Guide: Experimental Determination of Alternative Approaches to Nutrition Education in Developing Countries* and two evaluation specialists from Synectics Corporation. The evaluation specialists served as advisors to the demonstration, and as ex-officio members of the respective teams. Over the two-year period of the project, four visits were made to the field sites. During the final visit, an independent analysis of the data by the evaluation specialists served to verify the findings and to gain insights into ways in which the Field Guide might be improved.

SECTION III

THE SESI FIELD DEMONSTRATION

Background

The SESI education program is directed to homemakers in industrial areas of the city of Sao Paulo. Homemakers who participate are mostly literate. They come from less than average or average income homes of the industrial workers. Since they reside in urban areas they have access to many market places providing alternatives in sources of food as well as alternatives in food choices. They are responsible for the purchase and preparation of foods for their families.

Research reveals that the diets of the target population are very poor. There is insufficient consumption of meat, milk, eggs, garden vegetables, and fruits. Carbohydrates dominate family diets. Diets lack variety. Food is poorly distributed among the family members. Sao Paulo is in a temperate climate; food production is good, relatively abundant, and varied. Poor diets in the target population are associated with insufficient or erroneous knowledge about food values and functions of food in the organism, and inappropriate use of the money available for food.

The objective of the education program is to "contribute to the improved health of the target audience by having them adopt favorable attitudes about food consumption in accordance with their individual needs, and to the fullest extent possible given their economic status and the foods available in the community." Specific objectives include:

- ✓ Students will be able to relate nutrients to the four basic food groups and relate varieties of food to each of the basic groups.
- ✓ They should be able to identify food substitutes in the basic food groups.
- ✓ They must be able to identify appropriate ways to store and preserve food without loss of nutritive value.
- ✓ They must be able to identify characteristics of natural and processed foods which are in a good state of conservation.
- ✓ They must be capable of elaborating an appropriate menu for all of the family--considering ages, physiology, health, activities, climate, prices, harvest season, etc.

- ✓ They must be able to indicate the correct technique of preparing foods, considering the conservation of and/or adding to the nutritional value.
- ✓ They must be able to select foods according to nutritional value, state of conservation, price, amount of food value for cost.
- ✓ They must be able to identify common relationships between poor growth and food deficiencies.
- ✓ They must be able to identify illnesses caused by contaminated foods, and ways of avoiding them through good hygiene.
- ✓ They must consume foods and feed their families in accordance with individual needs.

Educational Approach

The Division of Health Improvement operates 38 Centers for Domestic Learning (CADs) in and around the city of Sao Paulo.³ The CADs are fully equipped as education centers, having multiple classrooms, kitchens and dining areas, teaching aids, and food provisions for demonstration and practice in food preparation. Staffing of the CADs includes social assistants, hygienists, nutritionists, home economists, food technicians, and technicians and auxiliary workers in the fields of home economics, food education, and sanitation.

The nutrition education class convenes twice a week for a period of fourteen weeks. Certificates of achievement are awarded upon completion of the course, and a new class of students is recruited. The content of the instruction program is summarized in Table 1. Note that the instruction is equally divided between theory and practice. Methods of instruction include lecture, demonstration, discussion, and practice. Teaching aids include films, slides, texts, journals, graphics, flannelboard exercises, and others. The course is organized in a manner to foster logical learning sequences and progression in development of skill and knowledge.

³The CADs are used for instruction of children, adolescents, and young women as well as homemakers. Since the demonstration project involved only the homemaker audience, only that activity is described in this report.

Table 1
PROGRAM OF COURSES AT SESI
(9 November 1973)

THEORY (14 hours)

A. CONSEQUENCES OF GOOD AND BAD FOOD HABITS (60 minutes)

1. The importance of good meals.

✓Health

- Food and resistance to disease.
- Food and food deficiencies in children and adults.
- Effects of deficiency of vitamins A and C, of iron and calcium, of proteins.

✓A longer life.

✓Physical activity in life (work, relaxation, etc.).

✓Mental activity and muscular, and their importance to productivity and social development.

✓A good physical appearance.

2. Bringing out some aspects of reality.

- ✓Discussion of the students' home life, how and with what they prepare food, their food habits and comparison of food habits among them; understandings about food, and the ability to acquire foods.

B. BASIC GUIDELINES FOR DAILY FOOD CONSUMPTION (60 minutes)

1. Presentation of the four fundamental food groups; additional food groups.

✓Principal contribution of each group in nutrients and their principal function.

✓The need to combine and vary foods in meals in order to guarantee quantity and quality of these nutrients.

✓Practice with the menus: identify, classify by group, substitute in groups, etc., to learn which foods make nutritious meals.

2. The milk group (60 minutes)

✓Milk and its derivatives (excepting butter), presented. Recommended daily amounts and principal nutritional contribution of this group.

✓Conservation and storage of milk and milk derivatives in the home.

✓Characteristics of foods in this group, of good when purchased and good states of conservation.

✓Cooking with milk and its derivatives. Various ways to introduce and keep them in the diets of adults and children.

Table 1 (Continued)

THEORY (Continued)

- ✓Comparative study of price and nutritional value between products which need refrigeration and those which are dehydrated.
 - ✓Practice with menus using this food group.
- 3. The meat group and meat substitutes (240 minutes)**
- ✓Presentation of the different food components in this group.
 - ✓Recommended quantities and principal contribution of nutrients for this group.
 - ✓Characteristics of different foods in this group, good appearance and good states of conversation.
 - ✓How to buy, conserve, and store these foods, inclusive of the special cooperative stores provided by industry; warnings about sanitation.
 - ✓Various cuts of beef and their use in cooking. Ways of preparing meat to insure the most nutritional value.
 - ✓Comparative study of nutritional value, costs by seasons for the different components in this food group.
 - ✓Practice with menus using this food group.
- 4. The vegetable and fruit group (120 minutes)**
- ✓Presentation of the different food components in this group.
 - ✓Recommended amounts and principal contribution in terms of nutrients.
 - ✓Classification of vegetables, in greens and legumes. Ways of cooking them which conserve their nutritive value. How to serve vegetables. Importance of hygiene.
 - ✓How to buy, conserve and store vegetables. Comparison within the vegetable group, taking account of prices, seasons and potential losses through cooking.
 - ✓How to buy, conserve and store fruits. How to serve fruits. Importance of hygiene.
 - ✓Comparative study of different fruits in view of price, wastage, nutritional value.
 - ✓Practice with menus using this group.
- 5. The bread and cereal group (60 minutes)**
- ✓Presentation of the cereals and their derivatives. Their principal contributions to nutrition. Recommended quantities.
 - ✓How to buy and store cereals and their derivatives.
 - ✓How to improve their nutritional value with proteins. Cooking breads and cereals.
 - ✓Comparative study of the cereals and their derivatives, among them and in view of prices and nutritional value.
 - ✓Practice with the picture card deck.

Table 1 (Continued)

THEORY (Continued)

6. Additional groups--sugars and fats (60 minutes)

✓Presentation of the percentages of foods which are composed of sugars and fats. The principal contribution of sugar and fat to nutrition. Recommended quantities.

✓Comparative study between butter and margarine, in view of their nutritional value and price.

✓Comparative study of animal and vegetable fats, in view of their nutritional value and price.

✓Use of fats in cooking; dangers.

✓Practice with the menus.

7. Review of the information about food groups (60 minutes)

✓Consequences

- Costs of foods and economical substitutes.
- Costs of snacks.
- Importance of the "Correction Factor" in buying foods.

8. Comparative study of costs of simple rations and more and more sophisticated meals. (120 minutes)

PRACTICE (14 hours)

C. FOOD BUYING --Visits to the markets and observation of food quality and food prices.

D. PRACTICE IN SELECTION OF APPROPRIATE FOODS FOR BREAKFAST OR SNACKS

E. PREPARATION OF MENUS FOR LUNCH AND DINNER--Food groups and costs, forms of usage, food substitutes. Techniques of food preparation to conserve the nutritional value. Simple rules for work in the kitchen,

F. EVALUATION (Final evaluation prior to this project consisted of a written examination testing knowledge of the course materials.)

G. AWARDING OF CERTIFICATES

Summary of the Evaluation Study Design

Evaluation Objective

Evaluation of learning should be continuous; educational activity should be systematically and progressively revised--a developmental process from initiation of the first course to the final course of the program. The test given at the end of the course tests knowledge. The intent of the present demonstration is to test for the behavioral effects of education. Baseline data from other research demonstrated that the Paulista already eats enough bread and cereal. Thus, the specific objective selected for this limited evaluation was as follows:

"To determine the effects of education on the consumption of milk or milk substitutes, meat or meat substitutes, vegetables, and fruits. That is, the specific objective is to determine if persons participating in the SESI classes demonstrate greater improvement in diets with respect to milk, meat, vegetables, and fruits than do persons from similar backgrounds who do not participate in the SESI classes."

Criteria for Evaluation

The SESI nutritionists established the following criteria as a basis for determining whether the participants were attaining the food consumption behaviors intended by the course of instruction:

Each homemaker should consume a minimum of:

- ✓ Two portions of milk or milk substitutes.
- ✓ Two portions of meat or meat substitutes.
- ✓ Two portions of vegetables, one green and one yellow.
- ✓ Two portions of fruit, including at least two different kinds of fruit.

Any diet which included these foods was defined as an appropriate diet; any diet which did not include at least these foods was defined as inappropriate. A table of "portions"--stating the amount of food, by type, which would be acceptable as a portion--was prepared for use by the nutritionists in analyzing the diets.

The Sample

The target audience for SESI classes in nutrition includes children, young women, and housewives. For purposes of demonstration, the nutritionists limited the sample to housewives only on the assumption that if the eating habits of the person who generally procures and prepares food can be changed, the habits of the other members of the household would be changed also.

The Experimental Group. Three new classes were initiated, one in each of the industrial communities of Santos, Santo Andre, and Sao Caetano. The combined enrollment of the three classes was 224 persons. A random sample of 152 participants was drawn, using a table of random numbers.

The Control Group. The control group of 152 homemakers was randomly selected from the population of housewives in similar industrial communities in the Greater Sao Paulo area. Population statistics were studied to identify communities of similar socio-economic background. Analyses were done on the first measure to verify the similarities of the control and experimental groups.

The Data Collection Instrument

The data questionnaire was drafted by the nutritionists and subjected to a pretest using ten randomly selected subjects in a suburban industrial area. Some revisions of wording were made to correct for items which were sometimes misunderstood by the respondents. The resultant content of the questionnaire is shown in Table 2.

Selection and Training of Field Workers

Interviewers were selected by the subcontractor for data collection, and in accordance with the type of respondents to be interviewed. That is, interviewers were female adults with backgrounds similar to those of the housewives to be interviewed. All were experienced at interviewing, having been employed part-time for similar studies undertaken by the subcontractor. Additional training specific to this demonstration project was given by the subcontractor. The SESI nutritionist also provided training for one day to familiarize the interviewers with the names of foods, the table of portions, and the nature of the descriptive data required on the food recall. It should be noted, however, that in the field the interviewers worked under the supervision of a senior member of the interview team. SESI nutritionists did not participate in the field interviews.

Phasing of the Measurement

Three measurements were taken. The first measurement was made prior to initiation of the classes and served as a baseline for the study. The second measurement was made immediately following completion of the course of instruction. The final measurement was made six months following completion of the course.

Table 2

CONTENT OF THE SESI QUESTIONNAIRE

A. CONTROL INFORMATION

Respondent Code, Interviewer Number, Municipality, District, Locality, Name of Respondent, Address (Barrio), Interview Time (Start--Finish--Total Time), Name of Interviewer, Person Verifying the Interview, Supervisor's critique.

B. INTERVIEW

1. Where were you born? (Municipality/State) Where was your father born? Where was your mother born? How long have you lived in this municipality? (Years)
2. Please tell me the sex and age of each of the persons who reside in your house, beginning with the youngest and ending with the oldest.
3. Which person is the head of the family?
- 3a. What is the person's relationship to the head of the family?
4. What is the level of education of each person in the family?
5. Are any of the women pregnant? Who?
6. Are any of the women nursing babies? Who?
7. *(Note who is the respondent.)*
- 8a. Senora, will you please tell me all of the foods you ate and drank yesterday. Begin with when you got up in the morning. *(wait for response)* Was there something more? *(wait for response)* And during the morning? *(wait for response)* And for lunch? *(wait for response)* Between lunch and dinner? *(wait for response)* For dinner? *(wait for response)* And after dinner? *(wait for response)* Did you eat or drink anything else during the day of yesterday? *(wait for response)*

(After all foods and drinks are recorded, ask the homemaker for each food or drink on your list):
How much of _____ did you have for *(occasion)*? *(Examples: a cup, a spoonful, a plateful, etc.) (If any of the foods were mixed dishes, ask the amounts of ingredients in the dish.)*
- 8b. Description of mixed dishes: Name of mixed dish, name and variety or type of each food used, quantity of each ingredient used, total number of units, number of persons served the dish, number of portions estimated to be consumed by the respondent.
9. *(INSTRUCTION TO INTERVIEWER--Indicate below the conditions which might influence the consumption of food by the interviewee for the day before the interview.)* Feast day, pay day, Sunday or holiday, illness of the respondent, birthday, travel, other, nothing.
10. Has the senora participated in a course about food or cooking? Yes, No.
11. In what course? Where was the course given?
12. How many classes?
13. Was the course free or did you pay for it?
14. When did it start?

Table 2 (Continued)

15. When did it end?
16. Socio-economic characteristics of the family. The house where the family resides: rural, urban, owned, cost, mortgaged, rented, squatter.
17. *(INSTRUCTION TO THE INTERVIEWER--Estimate the condition of the house in relation to other houses in the community.)* Superior or above average, average, inferior or below average.
18. Describe any conditions which indicate the house is above or below average.
19. Occupation and income of the family; (a) estimate the total income combined of all the persons in the household, per month, year; (b) is the total amount of income cited in money, or is it money and merchandise combined?
20.
 - a. Which person in the family contributes most in money? *(Enter response by position of person and not by name. For example, the head of the household, or the oldest son, etc.)*
 - b. What is the principal occupation of person who contributes most or person in response to item 20a.
 - c. Identify all persons who receive salaries, indicate type of work or occupation and amount received annually--approximately. *(Continue to use relationship to head of family to identify persons; do not use names.)*

Attrition of the Sample

On the first measurement, none of the sample was lost due to inability of the field workers to contact the respondents. However, a number of the questionnaires were rejected from the sample because the nutritionists judged them to be either nonrepresentative responses, or because the interviewer failed to obtain some of the critical information. In subsequent measures, rejection of questionnaires for persons who had failed to complete at least 75 percent of the course added to the attrition. Criteria established by the nutritionists for rejection of a questionnaire were as follows:

- ✓ The food recall is nonrepresentative of this person's diet.
 - The homemaker was ill the day before the interview and unable to eat as she normally would.
 - It was the homemaker's birthday and they had a feast.
 - It was the birthday or special holiday for some other member of the household and they had a feast.
 - The homemaker had been traveling and did not eat normally.
 - There were guests in the home and special foods were prepared.
 - The homemaker was on a diet or special food regime.
 - Illness or accident in the family interfered with normal food preparation and consumption by the homemaker.
 - Other special conditions, such as: failure of the stove, out of fuel, failure of the water system.
- ✓ Failure of the interviewer to obtain sufficient information on the quantity of food or the ingredients in mixed dishes.
- ✓ The homemaker had completed less than 75 percent of the class work.

Application of these criteria by the nutritionists resulted in attrition of 77 questionnaires for the experimental group and 65 questionnaires for the control group for the first round of data collection. The vast majority of this attrition was the result of failure of the interviewer to obtain complete information about food consumed. Additional instruction was given to the interviewers prior to initiation of measurements two and three. This action greatly reduced the attrition on those measurements. Causes and effects of attrition on the sample are summarized in Table 3.

Table 3
Bases for Rejection of Questionnaires
in the SESI Demonstration

GROUP	INITIAL SAMPLE SIZE	MEASUREMENT	FOOD RECALL IS NOT TYPICAL DIET	INSUFFICIENT DATA TAKEN IN INTERVIEW	NO INTERVIEW OR DROPPED FROM CLASS	TOTAL REJECTED
EXPERIMENTAL	152	First	26	51	0	77
		Second	10	7	20	37
		Third	4	3	1	8
CONTROL	152	First	25	39	1	65
		Second	18	9	9	36
		Third	3	4	6	13
GRAND TOTAL *	304 respondents 912 interviews		86	113	37	236

*Final attrition was 77.6%: 236 respondents lost out of 304; 708 interviews lost out of a possible 912 (304 x 3).

Analysis of the Results of the SESI Demonstration

Comparison of the Experimental and Control Groups on the First Measurement

Comparisons between the experimental and control groups demonstrated similar background characteristics. The experimental group had an average age of 36 years, monthly income per capita averaged Cr\$745, 53 percent had attended primary school. The control group had an average age of 39 years, monthly per capita income averaged Cr\$522, and 62 percent had attended primary school.

Analysis of the food recall data is summarized in Figure 5. The statistical analysis indicates that there is no significant difference between the diets for the experimental and the control groups ($p > 0.10$). The data also reaffirm the need for nutrition education since they demonstrate poor dietary behavior for both the experimental and control groups.

Comparison of the Experimental and Control Groups on the Second Measure

Preliminary review of the questions resulted in acceptance of 38 questionnaires for the experimental group and 51 for the control group. Because of this continuing attrition of the sample, the nutritionists repeated the analysis of the first measurement, using only those subject respondents whose questionnaires were acceptable for both the first and second measurement, to insure that the subsample was still comparable. The results of the analysis are presented in Figure 6. The analysis indicates that there was no difference in the food behavior of the two groups before the educational treatment ($p > 0.10$). With the assurance of pretest comparability for the remaining sample, the nutritionists analyzed the data for the two groups with two measurements.

The worksheet used by the nutritionists to quantify the first measurement was used to quantify the second measurement and differences between the first and second measurement. The process is illustrated in Figure 7 for the experimental group. Checks are entered to indicate for each respondent in the sample whether the food recall demonstrated appropriate or inappropriate dietary behavior, in accordance with the criteria established by the nutritionists. The right half of the worksheet is used to indicate the direction of change in food behavior--from inappropriate to appropriate, appropriate to inappropriate, or no change in behavior. Tally of the checks in each column on the worksheet provided quantification for the statistical analysis to determine whether or not the experimental group demonstrated greater improvement in dietary behavior than did the control group.

Figure 8 presents the statistical comparison of the two groups. Examination of these results permitted the nutritionists to conclude that:

- ✓ The educational treatment has a positive effect on behavior with respect to milk and milk products. The difference between the experimental and control group is significant ($p < 0.05$).
- ✓ There is no significant difference in behavior with respect to the consumption of meat and meat substitutes ($p > 0.10$), indicating that the educational treatment did not affect food behavior in this food group.
- ✓ The value of Chi Square for the vegetable group ($p < 0.01$) indicates a significant difference between the experimental and control group and that the education has had a positive effect.

ANALYSIS FOR TWO GROUPS WITH ONE MEASURE

WORK SHEET NUMBER 2

GROUP 1 SESI Exper. GROUP 2 SESI Control

STEPS	PROCEDURES	DATA CATEGORIES							
		1 Milk and milk products		2 Meat and meat products		3 Vegetables		4 Fruits	
		N	%	N	%	N	%	N	%
a:	(+) Behavior	27	36.0	43	57.3	24	32.0	13	17.3
b:	(-) Behavior	48	64.0	32	42.7	51	68.0	62	82.7
c:	TOTAL (a + b)	75	100.0	75	100.0	75	100.0	75	100.0
d:	(+) Behavior	22	25.3	50	57.5	18	20.7	19	21.8
e:	(-) Behavior	65	74.7	37	42.5	69	79.3	68	78.2
f:	TOTAL (d + e)	87	100.0	87	100.0	87	100.0	87	100.0
g:	a + d	49		93		42		32	
h:	b + e	113		69		120		130	
i:	g + h	162		162		162		162	
j:	$c \times g \div i$	22.69		43.06		19.44		14.81	
k:	$c \times h \div i$	52.31		21.94		55.56		60.19	
l:	$f \times g \div i$	26.31		49.94		22.56		17.19	
m:	$f \times h \div i$	60.69		37.06		64.44		69.81	
n:	$ a - j - .5$	3.81		0		4.06		1.31	
o:	$ b - k - .5$	3.81		0		4.06		1.31	
p:	$ d - l - .5$	3.81		0		4.06		1.31	
q:	$ e - m - .5$	3.81		0		4.06		1.31	
r:	n^2	14.55		0		16.45		1.73	
s:	o^2	14.55		0		16.45		1.73	
t:	p^2	14.55		0		16.45		1.73	
u:	q^2	14.55		0		16.45		1.73	
v:	$r \div j$	0.64		0		0.85		0.12	
w:	$s \div k$	0.28		0		0.30		0.03	
x:	$t \div l$	0.55		0		0.73		0.10	
y:	$u \div m$	0.24		0		0.26		0.02	
z:	Degrees of freedom	1		1		1		1	
A:	Chi Square ($v + w + x + y$)	1.71		0		2.13		0.27	
B:	Significance of difference	0		0		> 0.10		> 0.10	
C:	Degrees of freedom (Sum of row "z" for Categories used)	4		4		4		4	
D:	Chi Square (Sum of row "A" entries)	4.11		4.11		4.11		4.11	
E:	Significance of difference	> 0.10		> 0.10		> 0.10		> 0.10	

Enter the totals from the bottom of Worksheet 1 for Experimental Group

Enter the totals from the bottom of Worksheet 1 for the Control Group

Use the N's in rows a through f and calculate the Chi Squares

NOTE: If any entry in this block is less than 10, see instructions

NOTE: Disregard plus or minus signs of subtraction within

Chi Square for Individual Data Categories

Chi Square for Combined Data Categories

Figure 5. SESI Analysis of First Measure

ANALYSIS FOR TWO GROUPS WITH ONE MEASURE

WORK SHEET NUMBER 2

GROUP 1 SESI Exper GROUP 2 SESI Control

STEPS	PROCEDURES	DATA CATEGORIES							
		1 Milk & Milk Products		2 Meat & Meat Subs		3 Vegetables		4 Fruits	
		N	%	N	%	N	%	N	%
a:	(+) Behavior	12	31.6	20	52.6	11	28.9	7	18.4
b:	(-) Behavior	26	68.4	18	47.4	27	71.1	31	81.6
c:	TOTAL (a + b)	38	100.0	38	100.0	38	100.0	38	100.0
d:	(+) Behavior	12	23.5	30	58.8	9	17.6	10	19.6
e:	(-) Behavior	39	76.5	21	41.2	42	82.4	41	80.4
f:	TOTAL (d + e)	51	100.0	51	100.0	51	100.0	51	100.0
g:	a + d	24		50		20		17	
h:	b + e	65		39		69		72	
i:	g + h	89		89		89		89	
j:	$c \times g \div i$	10.25		21.35		8.54		7.26	
k:	$c \times h \div i$	27.75		16.65		29.46		30.74	
l:	$f \times g \div i$	13.75		28.65		11.46		9.74	
m:	$f \times h \div i$	37.25		22.35		39.54		41.26	
n:	$ a - j - .5$	1.25		0.85		1.96		0	
o:	$ b - k - .5$	1.25		0.85		1.96		0	
p:	$ d - l - .5$	1.25		0.85		1.96		0	
q:	$ e - m - .5$	1.25		0.85		1.96		0	
r:	n^2	1.56		0.72		3.84		0	
s:	o^2	1.56		0.72		3.84		0	
t:	p^2	1.56		0.72		3.84		0	
u:	q^2	1.56		0.72		3.84		0	
v:	$r \div j$	0.15		0.03		0.45		0	
w:	$s \div k$	0.06		0.04		0.13		0	
x:	$t \div l$	0.11		0.03		0.34		0	
y:	$u \div m$	0.04		0.03		0.10		0	
z:	Degrees of freedom	1		1		1		1	
A:	Chi Square (v + w + x + y)	0.36		0.13		1.02		0	
B:	Significance of difference	> 0.10		> 0.10		> 0.10		> 0.10	
C:	Degrees of freedom: (Sum of row "z" for Categories used)					4			
D:	Chi Square (Sum of row "A" entries)					1.51			
E:	Significance of difference					> 0.10			

Enter the totals from the bottom of Worksheet 1 for Experimental Group

Enter the totals from the bottom of Worksheet 1 for the Control Group

Use the N's in rows a through f and calculate the Chi Squares

NOTE: If any entry in this block is less than 10, see instructions

NOTE: Disregard plus or minus signs of subtraction within

Chi Square for Individual Data Categories

Chi Square for Combined Data Categories

Figure 6. SESI Analysis of First Measure for Sample Remaining After Second Measure

SUMMARY SHEET FOR RECORDING SEQUENTIAL MEASURES AND CHANGES IN DIETS FOR INDIVIDUALS IN A GROUP

GROUP: <u>Experimental</u>		DIETARY MEASURES								DIRECTION OF CHANGE IN DIETS OVER TIME							
		FOOD CATEGORIES								FOOD CATEGORIES							
		1		2		3		4		1		2		3		4	
NAMES	Code Numbers	Milk Group		Meat Group		Vegetable Group		Fruit Group		Milk Group		Meat Group		Vegetable Group		Fruit Group	
		Measure 1	Measure 2	Measure 1	Measure 2	Measure 1	Measure 2	Measure 1	Measure 2	Measure 1	Measure 2	Measure 1	Measure 2	Measure 1	Measure 2	Measure 1	Measure 2
		+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
N.M.M.	003	✓	✓		✓	✓		✓	✓		✓			✓			✓
W.C.S.F.B.	004		✓	✓		✓		✓	✓		✓	✓		✓		✓	✓
J.H.M.	021		✓		✓	✓		✓		✓		✓		✓			✓
A.T.G.	035		✓		✓	✓		✓	✓		✓	✓		✓			✓
C.A.R.	040		✓	✓		✓	✓		✓	✓		✓	✓		✓		✓
D.A.C.P.	041	✓			✓	✓		✓	✓		✓		✓		✓		✓
S.M.S.B.	134	✓		✓		✓	✓		✓	✓		✓		✓		✓	
M.A.P.S.	141		✓		✓	✓		✓	✓		✓	✓		✓		✓	✓
V.C.B.	144		✓	✓		✓	✓		✓	✓		✓	✓		✓		✓
L.P.R.	150	✓			✓	✓		✓	✓		✓	✓		✓	✓		✓
T.B.E.L.	152		✓		✓	✓		✓	✓		✓	✓		✓		✓	✓
a. Total Number in each Column		12	26	22	16	20	18	27	11	11	27	16	22	7	31	16	22
b. Total Number of Individuals in Group *		38		38		38		38		38		38		38		38	
c. Percent: (a ÷ b) x 100		31.6	68.4	57.7	42.1	52.6	47.4	71.1	28.9	28.9	71.1	42.1	57.9	18.4	81.6	42.1	57.9

*NOTE: The number of individuals in a group may differ for sequential measures.

Figure 7. SESI Summary of Shift in Food Behavior from the First to the Second Measure

ALTERNATE ANALYSIS FOR TWO GROUPS WITH TWO MEASURES

WORKSHEET NUMBER 3a

GROUP 1 SESI Exper. GROUP 2 SESI Control

STEPS	PROCEDURES	DATA CATEGORIES							
		1 Milk and Milk Products		2 Meat and Meat Products		3 Vegetables		4 Fruits	
		N	%	N	%	N	%	N	%
a:	(-) + (+)	12	31.6	9	23.7	14	36.8	10	26.3
b:	(+) + (-) and (-)+(-)	16	42.1	11	29.0	16	42.1	22	57.9
c:	(+) + (+)	10	26.3	18	47.3	8	21.1	6	15.8
d:	TOTAL (a+b+c)	38	100.0	38	100.0	38	100.0	38	100.0
e:	(-) + (+)	9	17.7	12	23.5	9	17.6	7	13.7
f:	(+) + (-) and (-)+(-)	36	70.6	18	35.3	39	76.5	40	78.4
g:	(+) + (+)	6	11.8	21	41.2	3	5.9	4	7.9
h:	TOTAL (e+f+g)	51	100.0	51	100.0	51	100.0	51	100.0
i:	a + e	21		21		23		17	
j:	b + f	52		29		55		62	
k:	c + g	16		39		11		10	
l:	TOTAL (i+j+k)	89		89		89		89	
m:	(d x i) ÷ l	8.97		8.97		9.82		7.26	
n:	(d x j) ÷ l	22.20		12.38		23.48		26.47	
o:	(d x k) ÷ l	6.83		16.65		4.70		4.27	
p:	(h x i) ÷ l	12.03		12.03		13.18		9.74	
q:	(h x j) ÷ l	29.80		18.62		31.52		35.53	
r:	(h x k) ÷ l	9.17		22.35		6.30		5.73	
s:	a - m ² ÷ m	1.02		0		1.78		1.03	
t:	b - n ² ÷ n	1.73		0.15		2.38		0.75	
u:	c - o ² ÷ o	1.47		0.11		2.32		0.70	
v:	e - p ² ÷ p	0.76		0		1.33		0.77	
w:	f - q ² ÷ q	1.29		0.02		1.78		0.56	
x:	g - r ² ÷ r	1.10		0.08		1.73		0.52	
y:	Degrees of freedom	2		2		2		2	
z:	Chi Square $\frac{(s+t+u+v+w+x)}{y}$	7.37		0.36		11.32		4.33	
A:	Significance of difference	< 0.05		> 0.10		< 0.01		> 0.10	
B:	Degrees of freedom (Sum of row "y" for Categories used)	8							
C:	Chi Square (Sum of row "z" entries)	23.38							
D:	Significance of difference	< 0.01							

Enter the totals from the bottom of Worksheet 1 for Experimental Group

Enter the totals from the bottom of Worksheet 1 for the Control Group

Use the N's in rows a through h and calculate the Chi Squares

NOTE: If any entry in this block is less than 10, see instructions.

NOTE: Disregard plus or minus signs of subtraction within

Chi Square for Individual Data Categories

Chi Square for Combined Data Categories

Figure 8. SESI Analysis of First and Second Measures

- ✓ As with the meat group, there is no significant difference in the consumption of fruits ($p > 0.10$) and the education has not changed behavior with respect to this group.
- ✓ When all of the categories are combined, the data demonstrate that the educational treatment has had an overall positive effect on behavior ($p < 0.01$).

These results were exceedingly gratifying to the nutritionists in view of research data which demonstrated that critical deficiencies in diets in the area were associated with the vegetable and fruit categories. The question remained as to whether the positive effects of the education could be sustained over longer periods of time.

Comparison of the Experimental and Control Groups on the Third Measure

Continuing attrition in the sample resulted in a subsample of 30 in the experimental group and 38 in the control group. Thus, it was again necessary to compare this subsample, using data from the first measurement, to ensure pretreatment comparability of the two groups. The results of this analysis are presented in Figure 9. The results indicate that the two groups are indeed comparable ($p > 0.10$).

The data were quantified on a worksheet similar to that shown in Figure 7, but comparing the behavior on the first measurement, or pretreatment measure, with that on the third measurement taken six months after the course of instruction had been completed. The results of the statistical analysis to compare behaviors of the experimental and control group are shown in Figure 10. These results demonstrate that six months following completion of the course there is no significant difference in the diets of the two groups. The experimental group, which demonstrated significant and positive change in diets immediately following the education course has regressed in their practice of the improved food behavior they had earlier exhibited.

The Cost-Effectiveness Analysis

The centers for domestic education represent only a small part of the SESI program in the Sao Paulo region. Further, the 152 students used in the demonstration project represent only a small fraction of the total number of students who matriculate in the nutrition education programs each year. Cost accounting did not lend itself to easy determination of the actual cost of operating the three centers over the period of a single course. Therefore, the nutritionists conducting the evaluation elected to ask the supervisors and nutritionists at the three centers to provide their best estimate of costs of the course. The information provided by the centers was as follows:

ANALYSIS FOR TWO GROUPS WITH ONE MEASURE

WORKSHEET NUMBER 2

GROUP 1 SESI Exper GROUP 2 SESI Control

STEPS	PROCEDURES	DATA CATEGORIES							
		1 Milk and Milk Products		2 Meat and Meat Substitutes		3 Vegetables		4 Fruits	
		N	%	N	%	N	%	N	%
a:	(+) Behavior	11	36.7	14	46.7	11	36.7	9	30.0
b:	(-) Behavior	19	63.3	16	53.3	19	63.3	21	70.0
c:	TOTAL (a + b)	30	100.0	30	100.0	30	100.0	30	100.0
d:	(+) Behavior	10	26.3	20	52.6	13	34.2	10	26.3
e:	(-) Behavior	28	73.7	18	47.4	25	65.8	28	73.7
f:	TOTAL (d + e)	38	100.0	38	100.0	38	100.0	38	100.0
g:	a + d	21		34		24		19	
h:	b + e	47		34		44		49	
i:	g + h	68		68		68		68	
j:	$c \times g \div i$	9.26		15.00		10.59		8.38	
k:	$c \times h \div i$	20.74		15.00		19.41		21.62	
l:	$f \times g \div i$	11.74		19.00		13.41		10.62	
m:	$f \times h \div i$	26.26		19.00		24.59		27.38	
n:	$ a - i - .5$	1.24		0.50		0		0.12	
o:	$ b - k - .5$	1.24		0.50		0		0.12	
p:	$ d - l - .5$	1.24		0.50		0		0.12	
q:	$ e - m - .5$	1.24		0.50		0		0.12	
r:	n^2	1.53		0.25		0		0.01	
s:	o^2	1.53		0.25		0		0.01	
t:	p^2	1.53		0.25		0		0.01	
u:	q^2	1.53		0.25		0		0.01	
v:	$r \div j$	0.16		0.02		0		0	
w:	$s \div k$	0.07		0.02		0		0	
x:	$t \div l$	0.13		0.01		0		0	
y:	$u \div m$	0.06		0.01		0		0	
z:	Degrees of freedom	1		1		1		1	
A:	Chi Square ($v + w + x + y$)	0.42		0.06		0		0	
B:	Significance of difference:	> 0.10		> 0.10		> 0.10		> 0.10	
C:	Degrees of freedom (Sum of row "z" for Categories used)	4							
D:	Chi Square (Sum of row "A" entries)	0.48							
E:	Significance of difference:	> 0.10							

Enter the totals from the bottom of Worksheet 1 for Experimental Group

Enter the totals from the bottom of Worksheet 1 for the Control Group

Use the N's in rows a through f and calculate the Chi Squares

NOTE: If any entry in this block is less than 10, see instructions

NOTE: Disregard plus or minus signs of subtraction within

Chi Square for Individual Data Categories

Chi Square for Combined Data Categories

Figure 9. SESI Analysis of First Measure for Sample Remaining After Third Measure

ALTERNATE ANALYSIS FOR TWO GROUPS WITH TWO MEASURES

GROUP 1 SESI Exper. GROUP 2 SESI Control

WORKSHEET NUMBER 3a

STEPS	PROCEDURES	DATA CATEGORIES							
		1 Milk and Milk Products		2 Meat and Meat Products		3 Vegetables		4 Fruits	
		N	%	N	%	N	%	N	%
a: (-) → (+)		7	23.3	5	16.7	7	23.3	9	30.0
b: (+) → (-) and (-) → (-)		19	63.3	16	53.3	21	70.0	21	70.0
c: (+) → (+)		4	13.4	9	30.0	2	6.7	-	-
d: TOTAL (a+b+c)		30	100.0	30	100.0	30	100.0	30	100.0
e: (-) → (+)		9	23.7	6	15.8	8	21.1	7	18.4
f: (+) → (-) and (-) → (-)		28	73.7	19	50.0	25	65.8	28	73.7
g: (+) → (+)		1	2.6	13	34.2	5	13.1	3	7.9
h: TOTAL (e+f+g)		38	100.0	38	100.0	38	100.0	38	100.0
i: a + e		16		11		15		16	
j: b + f		47		35		46		49	
k: c + g		5		22		7		3	
l: TOTAL (i+j+k)		68		68		68		68	
m: (d x i) ÷ l		7.06		4.85		6.62		7.06	
n: (d x j) ÷ l		20.74		15.44		20.29		21.62	
o: (d x k) ÷ l		2.21		9.71		3.09		1.32	
p: (h x i) ÷ l		8.94		6.15		8.38		8.94	
q: (h x j) ÷ l		26.26		19.56		25.71		27.38	
r: (h x k) ÷ l		2.79		12.29		3.91		1.68	
s: a - m ² ÷ m		0		0		0.02		0.53	
t: b - n ² ÷ n		0.15		0.02		0.02		0.02	
u: c - o ² ÷ o		1.46		0.05		0.38		1.32	
v: e - p ² ÷ p		0		0		0.02		0.42	
w: f - q ² ÷ q		0.11		0.02		0.02		0.01	
x: g - r ² ÷ r		1.15		0.04		0.30		1.05	
y: Degrees of freedom		2		2		2		2	
z: Chi Square $\frac{(s+t+u+v+w+x)}{w+x}$		2.87		0.13		0.77		3.35	
A: Significance of difference		> 0.10		> 0.10		> 0.10		> 0.10	
B: Degrees of freedom (Sum of row "y" for Categories used)									8
C: Chi Square (Sum of row "z" entries)									7.13
D: Significance of difference									> 0.10

Enter the totals from the bottom of Worksheet 1 for Experimental Group

Enter the totals from the bottom of Worksheet 1 for the Control Group

Use the N's in rows a through h and calculate the Chi Squares

NOTE: If any entry in this block is less than 10, see instructions.

NOTE: Disregard plus or minus signs of subtraction within

Chi Square for Individual Data Categories

Chi Square for Combined Data Categories

Figure 10. SESI Analysis of First and Third Measures

<u>Cost Item</u>	<u>Cr\$</u>
Consumable materials	2,619.00
Cost of fuel	74.00
Salaries of instructors (based on total number of students taught by the instructors)	<u>3,040.00</u>

Total Cr\$5,733.00

Since there were 152 students enrolled in the classes used for the experimental group, the cost per student was calculated to be Cr\$37.71 (Cr\$5,733.00 ÷ 152) or approximately U. S. \$ 4.25.⁴

The critical question, however, is the cost of bringing about positive change in behavior with the particular educational treatment used by the nutritionists. To determine this cost the nutritionists elected to use the data for behavior with respect to only one food category, that of fruits. The analysis is presented in Figure 11. The calculation uses the net number of persons completing the education course, the percent of persons who improved in their consumption of fruits (30%), and the percent of persons who regressed in their consumption of fruits (10%). The net percent of improvement is 20 percent (30 percent improved minus the 10 percent who regressed in behavior). Thus, the "net" number of persons whose behavior improved as a result of the education is 33 participants (20 percent net improvement x 166 or the net number of participants completing the course = 33). In the demonstration, this unit cost was Cr\$173.72. The unit cost was determined by dividing the total estimated cost of the program by the net number of persons whose food behavior was positively affected (Cr\$5,733.00 ÷ 33 = Cr\$173.72, or approximately U. S. \$19.45).

Discussion of the Demonstration by the SESI Nutritionists

The objective of the demonstration to determine if the Field Guide can be applied by nutritionist-teachers was achieved with ease. However, the nutritionist-teachers made a number of suggestions bearing on further applications of the methodology. These are summarized below.

- ✓ In this demonstration the evaluation was accomplished through detailed quantification of food recalls. The procedure proved extremely tedious and time consuming. Since the Field Guide suggested the option of quantifying on frequency only, a separate analysis was conducted by the nutritionists, using a subsample of

⁴An exchange rate of .112 was used in converting Brazilian cruzeiros to United States currency. In other words approximately 9 cruzeiros would equal a dollar in U. S. currency.

COST-EFFECTIVENESS ANALYSIS

WORKSHEET NUMBER 6

GROUP SESI Experimental

I. SEQUENTIAL TIME PERIOD	March to May 1974					
a: Number of new participants	224					
b: Number of dropouts	58					
c: Net number of new participants (a - b)	166					
d: Percent of new participants showing (-) → (+) behavior	30.0 %	%	%	%	%	%
e: Percent of new participants showing (+) → (-) behavior	10.0 %	%	%	%	%	%
f: Net percent positively affected (d - e)	20.0 %	%	%	%	%	%
g: Net number positively affected [(c x f) ÷ 100]	33					
h: Cost of program operation	\$ 5,733.00					

II. CUMULATIVE TIME PERIOD						
i: Net number of participants to date (add all "a" entries)	166					
j: Cumulative number positively affected (add all "g" entries)	33					
k: Net percent positively affected to date [(j ÷ i) x 100]	20.0 %	%	%	%	%	%
l: Cumulative cost of program operation (add all "h" entries)	\$ 5,733.00					

III. UNIT MEASURE OF COST-EFFECTIVENESS, PROGRAM COSTS ONLY (l ÷ j)	\$ 173.72					
---	-----------	--	--	--	--	--

IV. DESCRIPTION OF DONATED SERVICES, MATERIALS, EQUIPMENT:	None					
m: Equivalent monetary value of donated goods and services	-					
n: Program and donated costs (l+m)	-					
o: Cumulative program and donated costs (sum all "n" entries)	-					

V. UNIT MEASURE OF COST-EFFECTIVENESS, INCLUDING PROGRAM AND DONATED COSTS (o ÷ j)	\$ 173.72					
--	-----------	--	--	--	--	--

NOTE: Calculations in rows i, j, and g are made across row entries. All other calculations are made within the column.

Figure 11. SESI Cost-effectiveness Analyses

the data. Comparison of the results using frequency with the results using detailed analysis of quantity of food resulted in no significant difference between the two approaches (Villar, 1975). In future applications the nutritionists would elect to use the less time consuming method of frequency of consumption of different food types.

- ✓ It should be emphasized that quantification of the data is not sufficient for purposes of guiding the nutritionist-teacher. A parallel study of the variety and types of foods consumed is needed to give emphasis in educational programming to those foods which are more abundant in a region but which are not being consumed. For example, careful examination of the questionnaires showed, for the study sample, a low consumption of eggs, viscera, and fish--all foods which are in relative abundance in the area. Had this information been available during the planning of the course, changes in content and emphasis would have resulted in greater effects.
- ✓ The use of subcontractors to collect data is costly and also holds certain dangers. Inquiry by lay people, albeit trained by nutritionists, had deleterious effects in this case--as reflected in the high incidence of questionnaires which had to be voided. Involvement of the nutritionists in all phases of the evaluation is indispensable. If it is necessary to use lay persons in the data collection, more of the training should be by nutritionists than was done in this instance, and, the nutritionist should be involved in the field supervision.
- ✓ The results of the pretest measurement for the experimental group should be in the hands of the nutritionists at the beginning of the instruction course so that the program can be adapted to the needs of the target audience. This condition is fundamental if greatest effects of education are to be achieved. Broad surveys are not sufficient to guide the instruction of a specific class. If possible, the nutritionist-teacher should be responsible for the gathering of data for pretreatment measurement, to assure full understanding of the pertinent problems to be addressed in the instruction course.
- ✓ Written tests of knowledge before and after the course demonstrated that the homemakers acquired the knowledge intended by the course. However, acquisition of knowledge does not signify change in behavior, which is the goal of the nutrition course.
- ✓ The cost-effectiveness analysis indicated that the customary manner of thinking of costs of the education is deceiving. In this instance 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 (Cr\$38.00 versus Cr\$173.22).

- ✓ The group responsible for the demonstration at SESI, faced with the results and the points raised in the above, concluded that they should adjust the educational approach and repeat the evaluation of their nutrition education program.
- ✓ They should apply the same methodology to explore effects of other education programs, particularly education in sanitation.

SECTION IV

THE ABCAR FIELD DEMONSTRATION

Background

The location selected by ABCAR for its demonstration was the interior of the state of Espirito Santo. The area is rural and mountainous; the primary occupation is agriculture, with emphasis on production of coffee beans. A dietary survey of the region by ABCAR nutritionists in 1970 evidenced extremely poor diets. It was determined that only two percent of the diets qualified as excellent, nine percent as good, twenty percent were found to be acceptable for the region, and sixty-nine percent were rated as bad. When compared to a model diet for Brazilians, the population demonstrated only a fourth of the required green and yellow vegetables, a third of other types of vegetables, about half of the required fruits and animal products. Only in the categories of cereals, sugars, roots, and fats did the diets approach adequacy.

The ABCAR nutritionists concluded from the 1970 survey results that the conditions could be associated with: inappropriate food habits, accompanied by a series of taboos, and preconceived notions about food which only permit people to eat the same foods as in the past. To alleviate the problem, ACARES, the cooperative arm of ABCAR in the state of Espirito Santo, established "Project Nutrition" as part of its program of work in rural areas. Project Nutrition is an integral part of the ACARES work with the following entities in Espirito Santo: the Brazilian Legion of Assistance, the Service Clubs (Rotary, Lions, etc.), the Rural Union, the Cattlements Cooperative, the Intensive Preparation Program for Rural Laborers, the National School Feeding Program, and Youth Clubs.

The general objective of Project Nutrition is to awaken the consciousness of rural people to the importance of nutrition to their well being; to improve food availability in the region; and to encourage proper habits of food consumption. The specific objectives in the plan for Project Nutrition are:

- ✓ To contribute to the awakening of conscience of vulnerable groups (pregnant and nursing women), especially for the population in laborer communities, as to the importance of a balanced diet and the adoption of correct food practices.
- ✓ To contribute to improved quantitative and qualitative food consumption through improved production and distribution of food, with emphasis on production and increased consumption of foods containing minerals and vitamins.

The project goal initially was to reach at least 25 percent of the worker population with nutrition education messages by year's end. They also sought to cause changes in food behavior of this audience to the following minimum consumption levels for foods rich in vitamins and minerals: two different varieties of vegetables per day--one raw, the other cooked; two varieties of fruit. Finally, they sought by the end of the first three years of operation to have at least 20 percent of the rural schools initiate programs of nutrition education complemented by the teaching of food production. At the time of the demonstration project the ACARES Project Nutrition had been initiated in 18 municipalities, or about one third of the state.

The ABCAR Demonstration Plan

Figure 12 presents the outline of the plan of evaluation prepared by ABCAR. The first step in the plan was the selection of areas in which to conduct the demonstration. The following criteria were established for selection:

- ✓ The site should be relatively near to the Capitol city of Vitoria, the headquarters of ACARES, in order to minimize travel costs.
- ✓ The experimental area should have Project Nutrition in operation, with a permanent ACARES extension worker assigned for at least one year.
- ✓ It must be possible to select a similar community nearby in which Project Nutrition has not yet been initiated. This area would serve as the control area.
- ✓ There must be a means of obtaining lists of possible study participants in the control area.
- ✓ Both the experimental and control areas must be accessible during the rainy season of the year.

Given these guidelines, two municipalities (counties) were selected. The municipality of Conceicao do Castelo lay directly west of Vitoria; the ACARES nutrition project had been in operation there for more than a year. The municipality of Iuna, to the west of Conceicao do Castelo, had similar terrain, economy, and demography. The nutrition project had not yet been initiated in Iuna. The Executive Director of ACARES agreed to delay introduction of the project in Iuna until the demonstration project was completed. The locations of the experimental and control area are shown in Figure 13. Note that there is an intervening municipality between the control and experimental sites. The ACARES program does not yet operate in the intervening municipality. The more distant municipality was selected to minimize contamination from the ongoing program in the experimental area.

STAGES	STAGE I		STAGE II	STAGE III	STAGE IV	STAGE V	STAGE VI
STEPS	PHASE A SELECTION OF THE AREAS	PHASE B SELECTION OF THE SAMPLE	M₁	T	M₂	T	M₃
EXPERIMENTAL GROUP	Select a municipality which has a nutrition education program that works with youths.	List youths from one of the rural communities who belong to a youth group or who have participated in a nutrition education program, and randomly select 150 youths.	Measures of consumption of foods whose introduction and/or increased consumption is planned.	The program continues to assist the youths for a period of six months.	Measures of consumption of foods whose introduction and/or increased consumption is planned.	The program continues to assist the youths for a period of six months.	Measures of consumption of foods for which increased consumption is planned.
CONTROL GROUP	Select a similar municipality, which does not have a nutrition education program.	List youths from one of the rural communities and randomly select 150 youths.	Measures of consumption of foods whose introduction and/or increased consumption is planned.		Measures of foods whose introduction and/or increased consumption is planned.		Measures of consumption of foods for which increased consumption is planned.
PERIOD	OCTOBER 1973	OCTOBER 1973	FEBRUARY 1974	FEBRUARY TO AUGUST 1974	AUGUST 1974	AUGUST 1974 TO FEBRUARY 1975	FEBRUARY 1975

Figure 12. ABCAR Basic Model of the Stages of the Experimental Evaluation

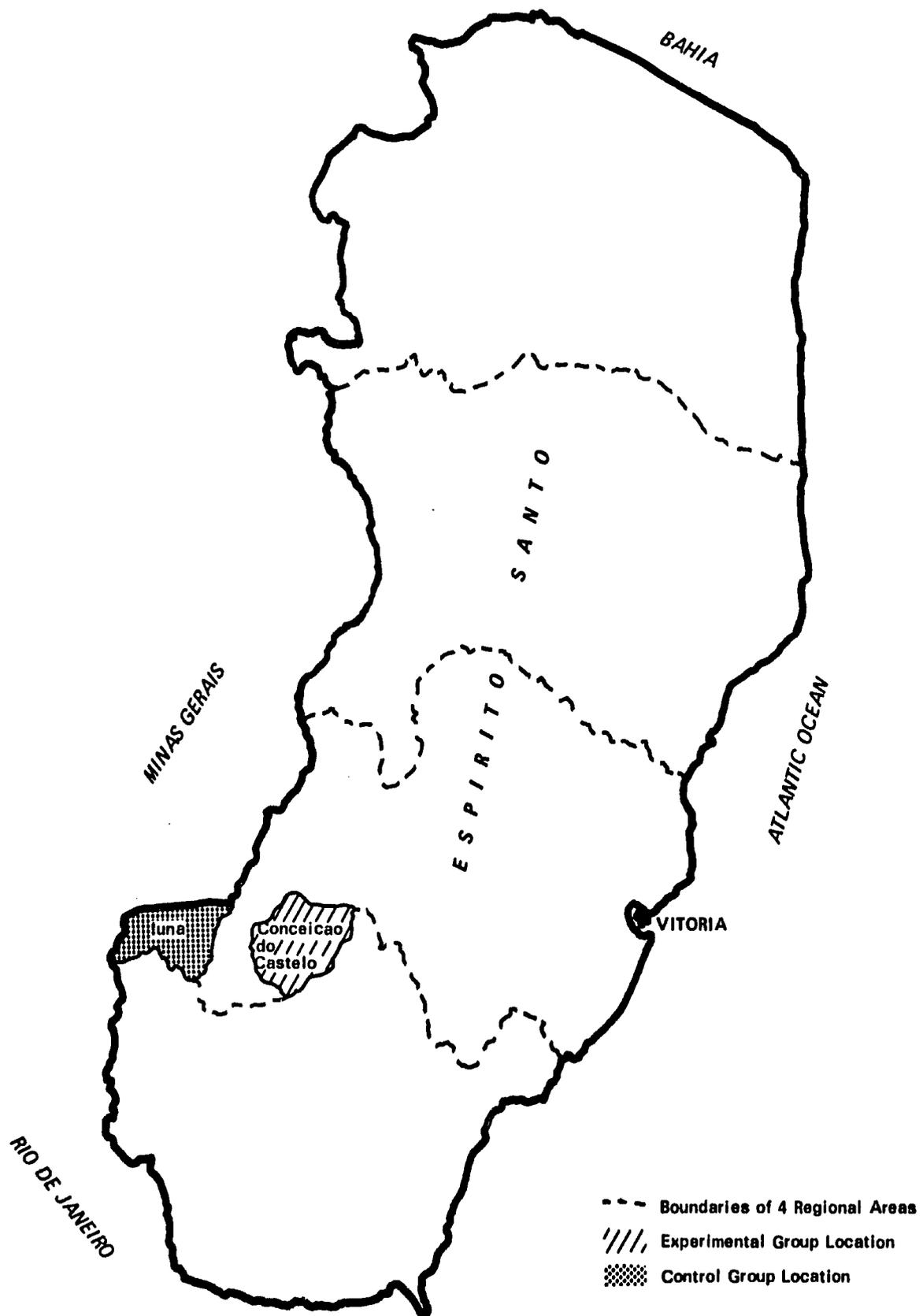


Figure 13. Locations of the ABCAR Experimental and Control Groups

Educational Approach

The ACARES work in the experimental area is addressed to persons of all ages. However, the nutritionists were particularly concerned with the effects of the program on nutritional behavior of youth. Youth were defined as young men and women between ages 15 and 25. This age group represents the parents of tomorrow, and the nutritionists believe that if they can change the food habits of the youth they would also be affecting family food habits in the near future.

There were more than eight active youth organizations in the experimental area, the strongest of which was ACARES own "4-H Clubs." The ACARES community worker served as advisor to these clubs and provided training for leaders in club activities. Leaders, however, are volunteer workers chosen from the community--usually they are parents of club members. Instruction in leadership, teaching materials, and guidance are provided by the ACARES extension worker.

The youth club approach by ACARES strives to develop the whole individual to be a better citizen. Activities for the club members include: visits to stores for consumer education, discussion of food and food preparation, gardening projects, etc. The activities also include social affairs such as dances, community beautification projects, excursions, expositions, and radio projects. To estimate the extent to which nutrition education is emphasized, the nutritionists and club advisors were asked to distribute the club activity time by type of activity. The average distribution from several ratings provided the following estimate:

<u>Activity</u>	<u>Percent of Time</u>	<u>Activity</u>	<u>Percent of Time</u>
Vocations (such as sewing, beautician, agriculture, etc.)	20%	Pamphlets	10%
Health	20%	Lectures	20%
Nutrition	20%	Group Discussion	20%
Civic Projects	5%	Demonstration and Practice	30%
Socio-Recreational	20%	Films	5%
Construction of a Social Center	10%	Projects, such as Fairs	5%
Other	5%	Other	<u>10%</u>
TOTAL	100%	Total	100%

The Evaluation Objective

As defined in their evaluation planning papers, the objective of the ABCAR evaluation was as follows:

"To determine if youth between the ages of 15 and 25, participating in youth groups involved in the ACARES Project Nutrition, are eating significantly more fruits and vegetables than are youth of the same ages and backgrounds who have not participated in the ACARES program."

Criteria for Classification of Diets

The nutritionists established a point system against which to review the diets reported in the 24-hour food recall. A maximum score was 30 points. This maximum score was achievable by consumption of: at least 50 grams of raw green and yellow vegetables, and at least 15 grams of cooked green and yellow vegetables (15 points); at least 50 grams of other raw vegetables and 15 grams of other cooked vegetables (5 points); and at least 3 units of fruit (10 points). The nutritionist used a reference table which had been prepared for and used in the 1970 dietary survey in the region. The table, entitled "Relative Weights of Food" presented the average weight of different amounts of foods common to the region. (Examples: one small tomato = 45 grams, one medium size pimento = 70 grams.)

A cutting point of 50 percent was established for judging whether a reported diet was good or bad. Thus, the following point scale was used for classification of a reported diet:

<u>Food</u>	<u>Inappropriate or "bad" diet</u>	<u>Appropriate or "good" diet</u>
Green and Yellow Vegetables	0.000 to 7.499 points	7.50 points and above
Other Vegetables	0.000 to 2.499 points	2.50 points and above
Fruits	0.000 to 4.999 points	5.00 points and above
All Categories Combined	0.000 to 14.999 points	15.00 points and above

Thus, the review of food recalls was a multistep process. The first step was to identify all fruits and vegetables on the food recall. The second step required conversion of the reported amounts to grams. Next, the nutritionists scored the food recall in terms of the point scale. Finally, the diet was classified as appropriate or inappropriate in accordance with the established criteria.

The ABCAR Sample

At the time of initiation of the demonstration there were 224 youth enrolled in the youth programs in the experimental area. Using the rosters of program enrollment, a random sample of 155 youth was chosen for the experimental group. At the request of the Executive Director of ACARES, local governmental officials in the control community provided a list of names and addresses of families living in the municipality who had one or more youth ages 15 to 25. A random sample of 155 families was drawn for the control group. After the sample was drawn, local government officials also provided assistance to the field workers in locating the residences.

The Data Collection Instrument

The content of the questionnaire prepared by the ABCAR demonstration team is presented in Table 4. It was pretested by the data collectors on a sample of 10 youths with backgrounds similar to those of the study sample. As might be judged by review of the questionnaire, there were some items which presented difficulties. Item 9, for example, was a very difficult question to answer since many persons do not know or tend to misname illnesses they have experienced.⁵ The nutritionists, however, were adamant about deleting or revising the items since they believed that the data might provide insight into food habits.

Selection and Training of Field Workers

The same research firm as was used in the SESI demonstration provided the field workers for collection of field data. The interviewers were young men and women who had grown up in Espirito Santo or comparable areas, and had backgrounds similar to the youth in the study sample. Instruction and practice in the use of the questionnaire was provided by the research firm. Although it was intended that the nutritionist members of the demonstration team would participate in the training of field workers, they were unable to do so because of other commitments. ABCAR was represented in the training activity by an evaluation specialist from their national offices who served as director of the ABCAR demonstration team during a large portion of the study.

⁵The question of what illnesses an individual has experienced in the past is not suggested by the Field Guide. The Field Guide does suggest a determination of current state of well being for the respondent, at least to the extent that illness is observable or reported by the respondent or a family member.

Table 4

CONTENT OF THE ABCAR QUESTIONNAIRE

A. CONTROL INFORMATION

Respondent Code, Interviewer Number, Municipality, District, Locality, Name of Respondent, Address (Barrio), Interview Time (Start--Finish--Total Time), Name of Interviewer, Person Verifying the Interview, Supervisor's critique.

B. INTERVIEW

1. Please tell me the sex and age of each of the persons who reside in your house, beginning with the youngest and ending with the oldest.
2. Which person is the head of the family?
3. What is the relationship of each person to head of the family?
4. What is the level of education of each person?
5. *(Note who is the respondent)*
6. Where were you born? (Municipality/State) Where was your father born? Where was your mother born? How long have you lived in this municipality? (Years)
7. Senora, will you please tell me all of the foods you ate and drank yesterday. Begin with when you got up in the morning. *(wait for response)* Was there something more? *(wait for response)* And during the morning? *(wait for response)* And for lunch? *(wait for response)* Between lunch and dinner? *(wait for response)* For dinner? *(wait for response)* And after dinner? *(wait for response)* Did you eat or drink anything else during the day of yesterday? *(wait for response)*

(After all foods and drinks are recorded, ask the homemaker for each food or drink on your list):
How much of _____ did you have for *(occasion)*? (Examples: a cup, a spoonful, a plateful, etc.)
8. *(INSTRUCTION TO INTERVIEWER--Indicate below the conditions which might influence the consumption of food by the interviewee for the day before the interview.)*
9. Have you ever had any of the following illnesses, or any other illness: measles, tuberculosis, goiter, typhoid fever, poliomyelitis, amoebic dysentery, small pox, diphtheria, taeniasis, tetanus, whooping cough, other illness? *(Indicate here if respondent is pregnant or nursing.)*
10. Do you belong to a youth group, club, association or union? Yes, No.
11. To which groups have you belonged? Do you hold a position or office in any of these? If yes, what are they?
12. Have you participated in any of the following activities during the period from January 1971 to the present? If yes, tell me for each one when you first attended, when you last attended, and estimate how many times you participated. Conferences, courses, training exercises, commemorative weeks, excursions, campaigns, special days, expositions, meetings, other.
13. Is the house where your family lives rural, urban, owned by your family, rented, tenant farm?
14. *(INSTRUCTION TO INTERVIEWER: Typify the current condition of the house in relation to other houses in the community. Superior to average, average, inferior to average.)*
15. *(Describe conditions which make the house above or below average condition.)*
16. Does your family own the land? Lease it? Sharecrop? Other?
17. How much land does your family have?

Table 4 (Continued)

18. Is the land cultivated? Yes, no. Is there a kitchen garden? Yes, no. What was planted in the garden in the last 12 months? Do you have fruit plants? For each product grown in the past year, how much was sold and how much was consumed by the family? Food item grown, total amount, amount sold, amount consumed.

19. What types of animals do you have? (*List types*) How many of each do you have? For each type of animal, what is for sale and what is for consumption?

	<u>Have</u>	<u>Don't Have</u>	<u>Number</u>	<u>For Consumption</u>	<u>For Sale</u>	<u>Total</u>
Chickens						
Milk Cows						
Goats						
Turkeys						
Other Birds						

Other Animals						

20. How big is the garden, in square meters?

21. a. Which person in the family contributes most in money? (*Enter response by position of person and not by name. For example, the head of the household, or the oldest son, etc.*)

b. What is the principal occupation of person who contributes most or person in response to item 21a.

c. Identify all persons who receive salaries, indicate type of work or occupation and amount received annually--approximately. (*Continue to use relationship to head of family to identify persons; do not use names.*)

22. Occupation and income of the family; (a) estimate the total income combined of all the persons in the household, per month, year; (b) is the total amount of income cited in money, or is it money and merchandise combined?

Phasing of the Measurements

The measurements were conducted in approximately the same schedule as shown in the plan outline in Figure 12. The month of February was avoided however, since much of that month was dedicated to the pre-Lenten holidays in Brazil. Three measurements were made, approximately six months apart. It must be noted, however, that none of the measurements can be assumed to be a pretreatment measurement per se. The ACARES nutrition project was in operation in the experimental area more than a year when the demonstration began. No changes were made in the club activities to emphasize nutrition education during the demonstration project. Thus, the first measurement served as a bench mark for an on-going program. The subsequent measures served to answer the question of whether experiences of program participation were continuously improving the diets of the youth.

Attrition of the Sample

Attrition of the ABCAR sample does not appear to be associated with nonrepresentativeness of the food recalls. Although approximately 9 percent of the sample indicated that the day of food recall was a special day (holiday, birthday, guests in the home, etc.) the diets were judged by the nutritionist to be so similar to other reported diets as to be considered representative, and the questionnaires were retained in the sample. Some attrition resulted from inability of the field workers to contact individuals on the day scheduled for an interview. The effect of this attrition was to reduce the sample for each sequential measure as shown in Table 5.

Table 5

Attrition of the Study Sample Across Measures
in the ABCAR Demonstration

	Experimental Group	Control Group	Total
Respondents for Measurement I	151	155	306
Respondents for Measurement II	144	133	227
Respondents for Measurement III	117	89	206

Analysis of Results of the ABCAR Demonstration

Comparison of the Experimental and Control Groups on the First Measure

Analysis of the data descriptive of the experimental and control groups revealed remarkable similarity on most of the socio-economic indicators measured. There were no significant differences in mean family sizes, education levels, or income levels. The control group, however, contained a number of exceptional occupations of heads of families which were either not represented in the experimental group or were represented by only one or two such occupations. For example, the control group contained two heads of families who were professors, the experimental group contained none; the control group contained eight public officials, the experimental group contained none; the control group contained nine businessmen, the experimental group contained only four.

Figure 14 presents the statistical comparison of the diets for the experimental and control groups. It demonstrates that:

- ✓ The groups do not differ in consumption of green and yellow vegetables ($p > 0.10$).
- ✓ The experimental group consumes more fruits ($p < 0.05$) and more vegetables ($p < 0.01$), other than green and yellow, than the control group.
- ✓ When all three food groups are combined, the experimental group appears to have a significantly better diet than the control group ($p < 0.01$).

The nutritionists concluded that their education program may have resulted in some positive effect in that the experimental group does better in the consumption of vegetables other than green and yellow vegetables and in the consumption of fruits. But it is clear that the education has not resulted in the desired level of effects on food behavior. And, important to the continuing demonstration, the lack of comparability of experimental and control groups posed serious technical problems in experimental determination of effects of education over time.

When experimental and control groups cannot be shown to have comparable diets on the first measure, as was the case of ABCAR's demonstration, statistical comparisons of dietary change are quite sophisticated and replete with potential for misinterpretation by persons unfamiliar with statistics. On the other hand, the cost of selecting a new control group and repeating the field work for the first measurement was, in this case, prohibitive. The Field Guide used for the demonstration suggested that in situations where the experimental and control groups are not comparable, it is generally more practical to abandon the group comparison approach and use a case study method.

ANALYSIS FOR TWO GROUPS WITH ONE MEASURE

WORKSHEET NUMBER 2

GROUP 1 ABCAR Exper GROUP 2 ABCAR Control

STEPS	PROCEDURES	DATA CATEGORIES							
		1 Green and Yellow Vegetables		2 Other Vegetables		3 Fruits		4	
		N	%	N	%	N	%	N	%
a:	(+) Behavior	54	35.8	88	58.3	68	45.0		
b:	(-) Behavior	97	64.2	63	41.7	83	55.0		
c:	TOTAL (a + b)	151	100.0	151	100.0	151	100.0		
d:	(+) Behavior	56	36.1	62	40.0	51	32.9		
e:	(-) Behavior	99	63.9	93	60.0	104	67.1		
f:	TOTAL (d + e)	155	100.0	155	100.0	155	100.0		
g:	a + d	110		150		119			
h:	b + e	196		156		187			
i:	g + h	306		306		306			
j:	$c \times g \div i$	54.28		74.02		58.72			
k:	$c \times h \div i$	96.72		76.98		92.28			
l:	$f \times g \div i$	55.72		75.98		60.28			
m:	$f \times h \div i$	99.28		79.02		94.72			
n:	$ a - j - .5$	0		13.48		8.78			
o:	$ b - k - .5$	0		13.48		8.78			
p:	$ d - l - .5$	0		13.48		8.78			
q:	$ e - m - .5$	0		13.48		8.78			
r:	n^2	0		181.71		77.09			
s:	o^2	0		181.71		77.09			
t:	p^2	0		181.71		77.09			
u:	q^2	0		181.71		77.09			
v:	$r \div j$	0		2.45		1.31			
w:	$s \div k$	0		2.36		0.84			
x:	$t \div l$	0		2.39		1.28			
y:	$u \div m$	0		2.30		0.81			
z:	Degrees of freedom	1		1		1		1	
A:	Chi Square (v + w + x + y)	0		9.50		4.24			
B:	Significance of difference	> 0.10		< 0.01		< 0.05			
C:	Degrees of freedom (Sum of row "z" for Categories used)	3							
D:	Chi Square (Sum of row "A" entries)	13.74							
E:	Significance of difference	< 0.01							

Enter the totals from the bottom of Worksheet 1 for Experimental Group

Enter the totals from the bottom of Worksheet 1 for the Control Group

Use the N's in rows a through f and calculate the Chi Squares

NOTE: If any entry in this block is less than 10, see instructions

NOTE: Disregard plus or minus signs of subtraction within

Chi Square for Individual Data Categories

Chi Square for Combined Data Categories

Figure 14. ABCAR Analysis of First Measure

Since the data were available for both the treatment and nontreatment municipalities, the advisors suggested that case study methods be applied separately to each of the sets of data. The two studies are represented by the following designs:

For the municipality with the ACARES program

T → M₁ → T → M₂ → T → M₃ → T →

For the municipality with no ACARES program

→ M₁ → M₂ → M₃

where T = the educational treatment, → = the passage of time, and M = sequential measurement.

The case study analysis for the ACARES nutrition project group would permit the nutritionists to observe whether or not the diets of youth in their program change over time. Its major limitation is the absence of controls to permit assessment of whether the change is associated with the educational treatment. Case study analysis of the group where no ACARES program is in operation would provide added insight into normal variability in diets--in relation to seasonal change, for example. It would also provide valuable information such as baseline data, for establishing objectives and planning the ACARES program activities which were to be initiated in the municipality of Iuna after completion of the demonstration project.

Comparison Between the First and Second Measures

Figure 15 presents a case study comparison of the first and second measures for the group in the ACARES nutrition project. It demonstrates a significant shift in consumption of both categories of vegetables ($p < 0.001$). However, the shift is dramatically in the wrong direction. Whereas only 5 to 6 percent of the respondents shifted from inappropriate to appropriate consumption of vegetables, 30 to 35 percent shifted from appropriate to inappropriate consumption of vegetables. There was no significant change in the consumption of fruits ($p > 0.10$). But, the regression of diets in the vegetable categories was of such magnitude as to demonstrate overall regression when data for all three food categories were combined ($p < 0.001$).

Figure 16 presents a case study comparison of the first and second measures for the Iuna group where ACARES does not yet have a nutrition education program. The pattern of dietary shift is remarkably similar to that shown in Figure 15. It demonstrates a significant shift in consumption of both categories of vegetables ($p < 0.001$). The shift is again in the wrong direction. Whereas only about 1 to 8 percent shifted from inappropriate to appropriate consumption of vegetables, 33 to 37 percent shifted from appropriate to inappropriate. There was no significant change in the consumption of fruits ($p > 0.10$). Again, the regression of diets in the

ANALYSIS FOR ONE GROUP WITH TWO MEASURES (CASE STUDY)

GROUP ABCAR - Experimental (Nutrition Project)

WORKSHEET NUMBER 4

STEPS	PROCEDURES	DATA CATEGORIES							
		1 Green and Yellow Vegetables		2 Other Vegetables		3 Fruits		4	
		N	%	N	%	N	%	N	%
a: (-) → (+)		7	4.9*	9	6.3*	33	22.9		
b: (+) → (-)		44	30.5*	52	36.1*	30	20.8		
c: (+) → (+)		6	4.2	32	22.2	34	23.6		
d: (-) → (-)		87	60.4	51	35.4	47	32.7		
e: TOTAL (a + b + c + d)		144	100.0	144	100.0	144	100.0		
<p>Enter the totals for dietary change data from the bottom of Worksheet 1</p>									
<p>Use the N's in rows a and b and calculate the Chi Squares</p>									
<p>NOTE: If any entry in this block is less than 10, see instructions</p>									
<p>NOTE: Disregard plus or minus signs of subtraction within</p>									
f: a + b		51		61		63			
g: a - b		37		43		3			
h: g - 1		36		42		2			
i: h ²		1296		1764		4			
j: Degrees of freedom		1		1		1		1	
k: Chi Square = i ÷ f		25.41		28.92		0.06			
l: Significance of difference		< 0.001		< 0.001		> 0.1			
<p>Chi Square for Individual Data Categories</p>									
<p>Chi Square for Combined Data Categories</p>									
m: Degrees of freedom (Sum of row j for Categories used)		3							
n: Chi Square (Sum of row k entries)		54.39							
o: Significance of difference		< 0.001							

* Note that the differences are in the WRONG direction.

Figure 15. ABCAR Analysis of First and Second Measures for the Experimental Group

ANALYSIS FOR ONE GROUP WITH TWO MEASURES (CASE STUDY)

GROUP ABCAR - Control (No Nutrition Project)

WORKSHEET NUMBER 4

STEPS	PROCEDURES	DATA CATEGORIES							
		1 Green and Yellow Vegetables		2 Other Vegetables		3 Fruits		4	
		N	%	N	%	N	%	N	%
a: (-) → (+)		1	0.7*	11	8.3*	18	13.5*		
b: (+) → (-)		49	36.8*	44	33.1*	28	21.1*		
c: (+) → (+)		3	2.3	9	6.7	16	12.0		
d: (-) → (-)		80	60.2	69	51.9	71	53.4		
e: TOTAL (a + b + c + d)		133	100.0	133	100.0	133	100.0		
<p>Enter the totals for dietary change data from the bottom of Worksheet 1</p> <p>Use the N's in rows a and b and calculate the Chi Squares</p> <p>NOTE: If any entry in this block is less than 10, see instructions</p> <p>NOTE: Disregard plus or minus signs of subtraction within</p>									
f: a + b		50		55		46			
g: a - b		48		33		10			
h: g - 1		47		32		9			
i: h ²		2209		1024		81			
j: Degrees of freedom		1		1		1		1	
k: Chi Square = i ÷ f		44.18		18.62		1.76			
l: Significance of difference		<0.001		<0.001		>0.10			
m: Degrees of freedom (Sum of row j for Categories used)		3							
n: Chi Square (Sum of row k entries)		64.56							
o: Significance of difference		<0.001							

* Note that the differences are in the wrong direction.

Figure 16. ABCAR Analysis of First and Second Measures for the Control Group

vegetable categories was of such magnitude as to demonstrate overall regression when data for all three categories were combined ($p < 0.001$).

The nutritionists concluded that the regression in diets was at least partly explained by a seasonal effect. The first measure was taken during the harvest season, the second during the planting season. The fact that both groups showed poorer diets on the second measure reinforced this conclusion. The nutritionists also concluded that since the Iuna group regressed even more than the group which had been given education about foods, their education was having some positive effects. The effect of having their youth regress less than some other group in seasons of planting was, of course, an achievement far short of their program goals.

Comparisons Between the First and Third Measures

The third measure was taken approximately one year following the first, again during the harvest season. The sample experienced appreciable attrition over that time, particularly in the nontreatment (Iuna) area: 43 percent of the Iuna sample could not be located on the days of scheduled interviews; 22 percent of the Conceicao do Castelo group could not be located. On the chance that attrition in Iuna might have rendered the remaining control group comparable to the remaining experimental group, a statistical test of differences was applied to the first measure data, using only those respondents who remained in the sample a year later. The analysis, shown in Figure 17, demonstrates that the two groups were not comparable.

- ✓ The groups do not differ in consumption of green and yellow vegetables ($p > 0.10$).
- ✓ The experimental group consumes more of the other vegetables than does the control group ($p < 0.05$).
- ✓ There is no significant difference in the consumption of fruit ($p > 0.10$).
- ✓ When all food groups are combined, the control group has a better diet than does the experimental group ($p < 0.05$).

Without comparability between the groups, group comparison was again abandoned in favor of continued case study treatment of the data.

Figure 18 presents a case study comparison of the first and third measures for the group in the ACARES nutrition project. It again demonstrates a significant shift in consumption of both varieties of vegetables ($p < 0.001$) and, again, the shift is in the wrong direction: a far greater percent of the sample changed from appropriate to inappropriate than changed from inappropriate to appropriate consumption of vegetables. There is a close to significant shift in the consumption of fruits ($p < 0.10$, > 0.05) and it is in the desired direction. When all food categories are combined, there is a significant change of diet ($p < 0.001$) demonstrating regression in food behavior over the year of the demonstration project.

ANALYSIS FOR TWO GROUPS WITH ONE MEASURE

WORKSHEET NUMBER 2

GROUP 1 ABCAR Exper GROUP 2 ABCAR Control

STEPS	PROCEDURES	DATA CATEGORIES							
		1 Green and Yellow Vegetables		2 Other Vegetables		3 Fruits		4	
		N	%	N	%	N	%	N	%
a:	(+) Behavior	38	32.5	70	59.8	52	44.4		
b:	(-) Behavior	79	67.5	47	40.2	65	55.6		
c:	TOTAL (a + b)	117	100.0	117	100.0	117	100.0		
d:	(+) Behavior	33	37.1	37	41.6	33	37.1		
e:	(-) Behavior	56	62.9	52	58.4	56	62.9		
f:	TOTAL (d + e)	89	100.0	89	100.0	89	100.0		
g:	a + d	71		107		85			
h:	b + e	135		99		121			
i:	g + h	206		206		206			
j:	$c \times g \div i$	40.33		60.77		48.28			
k:	$c \times h \div i$	76.67		56.23		68.72			
l:	$f \times g \div i$	30.67		46.23		36.72			
m:	$f \times h \div i$	58.33		42.77		52.28			
n:	$ a - j - .5$	1.83		8.73		3.22			
o:	$ b - k - .5$	1.83		8.73		3.22			
p:	$ d - l - .5$	1.83		8.73		3.22			
q:	$ e - m - .5$	1.83		8.73		3.22			
r:	n^2	3.35		76.21		10.37			
s:	o^2								
t:	p^2								
u:	q^2								
v:	$r \div j$	0.08		1.25		0.21			
w:	$s \div k$	0.04		1.36		0.05			
x:	$t \div l$	0.11		1.65		0.09			
y:	$u \div m$	0.06		1.78		0.06			
z:	Degrees of freedom	1		1		1		1	
A:	Chi Square (v + w + x + y)	0.29							
B:	Significance of difference	> 0.10		< 0.05		> 0.10			
C:	Degrees of freedom (Sum of row "z" for Categories used)					3			
D:	Chi Square (Sum of row "A" entries)					6.74			
E:	Significance of difference					< 0.05			

Enter the totals from the bottom of Worksheet 1 for Experimental Group

Enter the totals from the bottom of Worksheet 1 for the Control Group

Use the N's in rows a through f and calculate the Chi Squares

NOTE: If any entry in this block is less than 10, see instructions

NOTE: Disregard plus or minus signs of subtraction within

Chi Square for Individual Data Categories

Chi Square for Combined Data Categories

Figure 17. ABCAR Analysis of First Measure for Sample Remaining After Third Measure

ANALYSIS FOR ONE GROUP WITH TWO MEASURES (CASE STUDY)

GROUP ABCAR - Experimental (Nutrition Project)

WORKSHEET NUMBER 4

STEPS	PROCEDURES	DATA CATEGORIES							
		1 Green and Yellow Vegetables		2 Other Vegetables		3 Fruits		4	
		N	%	N	%	N	%	N	%
a: (-) → (+)		5	4.3*	12	10.3*	30	25.6		
b: (+) → (-)		34	29.1*	39	33.3*	17	14.5		
c: (+) → (+)		5	4.3	30	25.6	34	29.1		
d: (-) → (-)		73	62.4	36	30.8	36	30.8		
e: TOTAL (a + b + c + d)		117	100.1	117	100.0	117	100.0		
<p>Enter the totals for dietary change data from the bottom of Worksheet 1</p> <p>Use the N's in rows a and b and calculate the Chi Squares</p> <p>NOTE: If any entry in this block is less than 10, see instructions</p> <p>NOTE: Disregard plus or minus signs of subtraction within</p>									
f: a + b		39		51		47			
g: a - b		29		27		13			
h: g - 1		28		26		12			
i: h ²		784		676		144			
j: Degrees of freedom		1		1		1		1	
k: Chi Square = i : f		20.10		13.25		3.06			
l: Significance of difference		< 0.001		< 0.001		< 0.10 > 0.05			
m: Degrees of freedom (Sum of row j for Categories used)		3							
n: Chi Square (Sum of row k entries)		36.41							
o: Significance of difference		< 0.001							

* Note that the differences are in the WRONG direction.

Figure 18. ABCAR Analysis of First and Third Measures for the Experimental Group

Figure 19 presents a case study comparison of the first and third measures for the Iuna community, where ACARES did not have a nutrition education program. The results are quite similar to those shown in Figure 18. In the consumption of fruits there is some, but nonsignificant, improvement ($p < 0.10$, > 0.05). In consumption of vegetables there is marked regression ($p < 0.001$ for green and yellow vegetables; $p < 0.01$ for other vegetables). And when all categories are combined, there is a significant change ($p < 0.001$) in the direction of less adequate food consumption over time.

ABCAR Conclusions Following the Analysis of Measurement Three

At the midpoint of the demonstration, the ABCAR demonstration team believed they had at least a partial explanation for the regression in food behavior in terms of the seasonal effects. The regression effect remained, however, over the full cycle of seasons. There were no unusual events, meteorological or economic, by which the team could explain the phenomenon. They could take some small consolation in the fact that their youth club members regressed less than did the group in Iuna where they had no nutrition education program. But it was small consolation in the face of evidence that, despite the expenditure of funds and human resources to teach the importance of vegetables in the diets of the youth, positive changes in diets were not occurring. They concluded that:

- ✓ They should reexamine their entire approach to nutrition education, and explore better ways of teaching youth the importance of vegetables in their diets.
- ✓ They should get together with the agriculture specialists to explore the production capabilities of the community and the possibility of cooperative education about gardening.
- ✓ The data descriptive of family backgrounds and resources and the data on food behavior in the municipality of Iuna should be used to plan specific objectives and new approaches for Project Nutrition when the program is introduced in that municipality.

Cost-Effectiveness Information

The nutritionists appeared to understand the method of cost-effectiveness analysis but were unable to complete the analysis for want of needed data. The data elements required include: an estimate of the cost of the program being evaluated, the net number of persons served by the program, and the effects data from the analysis of the food recalls. Nutritionists generally have access to effects data. They do not generally have easy access to budgetary information--particularly in very large programs such as ABCAR. Such information is controlled at the state or national level. With the assistance of the Executive Director of ACARES the nutritionist did attempt a cost-effectiveness analysis.

ANALYSIS FOR ONE GROUP WITH TWO MEASURES (CASE STUDY)

GROUP ABCAR - Control (No Nutrition Project)

WORKSHEET NUMBER 4

Enter the totals for dietary change data from the bottom of Worksheet 1

Use the N's in rows a and b and calculate the Chi Squares

NOTE: If any entry in this block is less than 10, see instructions

NOTE: Disregard plus or minus signs of subtraction within

Chi Square for Individual Data Categories

Chi Square for Combined Data Categories

STEPS	PROCEDURES	DATA CATEGORIES							
		1 Green and Yellow Vegetables		2 Other Vegetables		3 Fruits		4	
		N	%	N	%	N	%	N	%
a: (-) → (+)		1	1.1*	9	10.1*	20	22.5		
b: (+) → (-)		30	33.7*	30	33.7*	9	10.1		
c: (+) → (+)		3	3.3	8	9.0	24	27.0		
d: (-) → (-)		55	61.8	42	47.2	36	40.4		
e: TOTAL (a + b + c + d)		89	99.9	89	100.0	89	100.0		
f: a + b		31		39		29			
g: a - b		29		21		11			
h: g - 1		28		20		10			
i: h ²		784		400		100			
j: Degrees of freedom		1		1		1		1	
k: Chi Square = i ÷ f		25.29		10.25		3.45			
l: Significance of difference		< 0.001		< 0.01		< 0.10 > 0.05			
m: Degrees of freedom (Sum of row j for Categories used)		3							
n: Chi Square (Sum of row k entries)		38.99							
o: Significance of difference		< 0.001							

* Note that the differences are in the wrong direction.

Figure 19. ABCAR Analysis of First and Third Measures for the Control Group

The approximate cost of the state-wide operation of the division of ACARES under which the nutrition project was carried out was Cr\$2,253,084 for one year. That division of ACARES served twenty-six municipalities during the year in which the demonstration took place. The mean cost per municipality was approximately Cr\$ 86,657 (Cr\$2,253,084 ÷ 26 municipalities). The nutritionist had estimated that twenty percent of the program time was devoted to nutrition education. Thus, they estimated that the annual cost of the nutrition education portion of the project in the municipality was roughly Cr\$17,331 (Cr\$86,675 x .20, approximately U. S. \$1,940.00) for the program.

At the time of the demonstration, there were 224 youth enrolled in the youth clubs. Thus, the estimated annual cost per participant was placed at Cr\$77.37 (Cr\$17,331 ÷ 224 participants, approximately U. S. \$8.65). This cost figure was judged by the nutritionists to be highly inflated. They then realized that their calculation was based on an erroneous assumption: while the youth spent approximately 20 percent of their time in nutrition activities, a much smaller portion of salaried time was expended by the nutritionists since the major portion of activity with the youth was provided by volunteers. Unable to assess the monetary value of these voluntary services, the nutritionists abandoned their attempts at the cost-effectiveness analysis.

Appropriate questions for the nutritionists to have asked were: What percent of their own time was devoted to training the volunteer leaders? What costs were attributed to materials for use in such teaching? What estimate of monetary value could be placed on the volunteer services? Had the nutritionists been able to place monetary values on these items they could have completed their analysis. However, by the time the difficulties in cost-effectiveness analysis were identified, the reorganization and relocation of ABCAR had resulted in loss of the leader of the demonstration team and a general breakdown in team composition. Reworking of the analysis was not feasible. This experience by the demonstration team emphasizes the importance of defining the method for estimating program costs early in the planning of an evaluation, preferably as an integral part of the evaluation plan.

SECTION V
THE SUNAB FIELD DEMONSTRATION

Background

The educational function of SUNAB is that of maintaining programs which foster good nutrition for the population of Brazil in relation to the economic realities of food production, import requirements and export opportunities. The educational activity is referred to as "The Consumers' Nutrition Orientation Program." It has the following main objectives:

- ✓ To contribute to the improvement of the nutritional status of the Brazilian people, through constant release of the elementary concepts of basic nutrition, using all available means and always emphasizing the relationship which exists between nutrition, health, well-being, and work productivity.
- ✓ To encourage a better application of domestic resources (salaries, etc.) through the constant release, by all available means, of practical and useful concepts of home economy.
- ✓ To stimulate the consumption of foods of established nutritive value, when there is an excess of production.
- ✓ To promulgate clarification concerning equivalent food substitution, without prejudice to the ration's nutritive value, as an adequate solution during periods of scarcity or high prices of specific products.
- ✓ To combat food taboos because of their prejudicial effect on families with low purchasing power.

The approach to education is by way of multi-mass media. Illustrated leaflets are prepared for wide distribution to the general public. Educational messages in common language, containing one or two ideas each, and aimed at the consumer in general are disseminated via radio and television. Short articles of approximately three hundred and fifty words, in simple language, are published in newspapers and journals. These articles accentuate the utility of planting gardens and fruit trees, of raising domestic animals, etc., and are generally targeted to rural populations. Radio messages and journal articles may also contain recipes for preparing low cost nutritious foods. Billboards are used in many locations for display of nutrition-related messages. The reach of the SUNAB program is demonstrated by the number of mass media outlets to which it has access and the number of locations of outlets.

<u>Media Types</u>	<u>Number of Outlets</u>	<u>Number of Locations</u>		
		<u>States</u>	<u>Territories</u>	<u>Federal District</u>
Radio Stations	85	17	1	1
TV Channels	11	6	-	1
Periodicals	30	12	-	1
Rural Radio of the Ministry of Agriculture	1		Nationwide	

An experimental field evaluation of mass media education presents special control problems in any location. Most of the substantive evaluations have been done in laboratories where one has easy control over whether or not an individual has been exposed to the message. Isolating persons who have and who have not been exposed to a media message in the general population is quite a different matter. Further, having evidence of exposure, one has the added problem of identifying whether the person has cognitively attended to the message or simply was "exposed." There are techniques for coping with these problems. The intent of the SUNAB demonstration was to explore these techniques.

Several options were available to SUNAB. The first derives from the fact that SUNAB, a national government service, does not purchase time and space from the media. Its promotional efforts have elicited wide media support from local government, but not all of the states cooperate with the program. Thus, its messages may saturate some areas but not be received in others. The State of Sao Paulo, for example, does not provide media time and space for the SUNAB messages. The State of Espirito Santo, some thousand miles or so to the north, does. The initial plans for the demonstration called for the use of the Sao Paulo region for a control group and selection of the experimental group in a similar population in the State of Espirito Santo. A number of constraints mitigated against fulfillment of this concept for the demonstration.

- ✓ Program resources for evaluation. Staffing was limited. Nutritionists are drawn from other agencies on a part-time basis. Continuity of personnel for the demonstration could not be assured; only one nutritionist could be made available.
- ✓ Evaluation planning. Perhaps because of the staff limitations and lack of continuity in staff, a comprehensive plan for the demonstration was not prepared by SUNAB. Rather, the Executive

Director, working with the nutritionist, prepared a list of questions which they would like an evaluation to address.⁶

- ✓ Selection of an experimental group. It was the intent of the SUNAB Executive Director to select an experimental group from the many persons who had written to or called the organization or the media representatives (to ask for recipes, pamphlets, or other information). This population clearly had been exposed to and attended to SUNAB messages. Such a list is maintained, but was in the hands of a staff member who was not available during the several months of planning the demonstration.
- ✓ Reorganization and relocation of SUNAB. SUNAB was reorganized and in process of being moved from Rio de Janeiro to Brasilia during the latter period of the demonstration.

Under these circumstances, one might well ask why a demonstration project was attempted. With respect to a tryout of the Field Guide, it was not. For diplomatic reasons and because of the high interest of SUNAB and of USAID, an evaluation was carried out. The part-time nutritionist became a member of the ABCAR demonstration team. The questions posed by SUNAB were appended to the ABCAR questionnaires and asked of all the respondents in the ACARES study area. This turn of events was indeed fortunate, since the ABCAR reorganization and physical relocation from Rio de Janeiro to Brasilia left their study team short-handed. The SUNAB nutritionist eventually did the bulk of the scoring of food recalls for the ABCAR demonstration, as well as the analysis of results of the SUNAB portion of the interview. It is in deference to this singular dedication that the results of the SUNAB "non-demonstration" are recorded in this report.

The SUNAB Evaluation Plan

Objectives of the Evaluation

The objectives, as stated in the draft plan, were as follows:

- ✓ To verify the receptivity to the advice proffered by SUNAB, before the reading of the recipe of the day.

⁶As will be seen in the pages which follow, these questions exceeded the boundaries defined in the Field Guide. The evaluation advisors discussed the questions with the Executive Director in the context of the evaluation methodology in the Field Guide. But the agreement in the demonstration project was that the users would plan the demonstration; the advisors should advise and facilitate where possible, but not control the demonstration.

- ✓ To determine if the concepts were understood and used by the housewives who listen to the program.
- ✓ To compare the knowledge and attitudes of the experimental and control groups.

The Data Collection Instrument

Table 6 presents the list of questions prepared by SUNAB and attached to the interview schedule used in the ACARES demonstration municipalities. As with the objectives, the questions do not bear on the matter of diets or the food recall or the methodology set forth in the Field Guide. Neither do they bear a direct relationship to the study objectives. The latter condition is in part explained by the fact that the questions were prepared at a different time from the objectives and with many intervening changes of plans.

Training of the Field Workers

SUNAB personnel did not participate in the training of field workers. They were represented by the team leader for the ABCAR demonstration team.

Analysis of the Results of the SUNAB Evaluation

The analysis consisted of a straight tabulation of responses to the questions and calculations of percentages of different responses. No attempt was made to examine the relationship of food recall data, which had been collected by ABCAR for the same population sample, or to compare those data for subgroups who had and had not reported exposure to the SUNAB messages.⁷

Conclusions about the meaning of the data were not prepared by SUNAB or ABCAR. Review of the tabulations, however, suggests that at both data collection times, roughly one fourth of the respondents reported having seen or read the messages (Tables 7 and 8). Frequency of hearing the radio messages didn't appear to shift from the first to the second measure. There is a tendency toward more frequent reading of messages in newspapers and magazines at the time of the second data collection (Table 9). Without some

⁷ Only data for the first and second measures are presented. Data for the third measure were tabulated after the reorganization and movement of ABCAR and SUNAB to Brasilia. They were not tabulated by the same person who handled the first tabulation and are formatted in categories inconsistent with the first tabulations. Therefore, they have not been presented in this report.

Table 6

CONTENT OF THE SUNAB QUESTIONNAIRE

1. a. Have you heard any radio programs that teach what to eat and how to eat?
b. Have you heard any radio programs that present recipes for food preparation?
2. a. Have you read in newspapers or magazines instructions on what to eat and how to eat?
b. Have you read in newspapers or magazines messages which present recipes for food preparation

INSTRUCTIONS TO INTERVIEWERS: If the answers to questions 1 and 2 are negative, conclude the interview at this point. If an affirmative answer has been given to any of the questions in 1 and 2, continue the interview.

3. How many times have you --
 - a. Heard these messages on radio?
 - b. Seen the messages in newspapers or magazines?

a	b	
_____	_____	More than once a week.
_____	_____	Once a week.
_____	_____	Twice a month.
_____	_____	Less than twice a month.

4. Have you found these radio programs or newspaper or magazine articles useful?
5. In what ways were they useful?
6. Have you ever written to the radio station or to newspapers or magazines requesting recipes that are offered, or asking advice about feeding children or adults?

Table 7

Number of Persons Reporting Having Heard or Read Messages
About What and How to Eat (Questions 1a and 2a)

Response	Radio Messages				Written Articles			
	First Measure		Second Measure		First Measure		Second Measure	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Yes	70	23.0	77	27.6	61	20.0	63	22.6
No	235	77.0	202	72.4	244	80.0	216	77.4
Total	305	100.0	279	100.0	305	100.0	279	100.0

Table 8

Number of Persons Reporting Having Heard or Read Messages
Which Presented Recipes (Questions 1b and 2b)

Response	Radio Messages				Written Articles			
	First Measure		Second Measure		First Measure		Second Measure	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Yes	82	27.0	79	28.4	79	25.9	62	22.2
No	222	73.0	199	71.6	226	74.1	217	77.8
Total	304	100.0	278	100.0	305	100.0	279	100.0

Table 9
Reported Frequency of Having Heard or Read Messages
(Question 3)

Response	Radio Messages				Written Articles			
	First Measure		Second Measure		First Measure		Second Measure	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
More than once a week	22	20.3	17	20.0	7	7.8	10	14.1
Once a week	19	17.6	14	16.5	10	11.1	16	22.5
Twice a month	23	21.3	16	18.8	17	18.9	13	18.3
Less than twice a month	44	40.8	38	44.7	56	62.2	32	45.1
Total*	108	100.0	85	100.0	90	100.0	71	100.0

**Totals exceed those shown as a "Yes" in Tables 7 and 8 since these data do not distinguish between those who received messages about "what to eat" from those who received messages which presented recipes.*

interpretation from SUNAB it is impossible to know whether this is due to increased publication, heightened interest, or what.

The number of persons reporting that the information was useful (Table 10) changed rather dramatically from the first to the second measure. Whereas only thirteen percent of those exposed to the messages reported usefulness on the first measure, seventy-three percent reported usefulness on the second measure. This could be a contamination effect from the first to the second exposure to the question. There is no way to verify this since the related data on how information was useful has been reported only for the first measure. These data indicate that specific reports of usefulness of the information were negligible excepting in the area of "influence on eating and health" (37 comments) and the area of "food preparation" (73 comments).

Table 10
Usefulness of Messages (Questions 4 and 5)

Number of Persons Reporting They Found the Messages Useful				
Response	First Measure		Second Measure	
	Number	Percent	Number	Percent
Yes	16	12.9	77	73.3
No	108	87.1	28	26.7
Total*	124	100.0	105	100.0

Ways in Which Messages Were Reported Useful (First and Second Measures Combined)	
	Number of Comments
<u>Comments Relating to Food and Nutrition</u>	
Influenced eating and health	37
Sources of vitamins	1
Importance of milk	1
Importance of fruits and vegetables	5
Relationship of food and energy	1
Food for children and adolescents	2
Fundamentals of good diets	1
Importance of variety in the diet	1
<u>Comments Relating to Home Economics</u>	
Good use of leftovers	1
Ways to include vegetables	1
Food preparation	73
<u>Comments Relating to Food Hygiene</u>	
Care of meats and fish	1
Hygienic handling of foods	3
Correct chewing of foods	1

**Totals exceed those shown as "Yes" in Tables 7 and 8 since these data do not distinguish between those who received messages about "what to eat" from those who received messages which presented recipes, nor do the data distinguish message source.*

Finally, the number of persons who reported that they had written to the media to request recipes is exceedingly small, with only four persons so reporting on the first measure and five so reporting on the second (Table 11). This response is not surprising since the municipalities in which the demonstration was done are rural, somewhat isolated communities, and the education levels are very low. In addition, the respondents were not housewives--to whom the SUNAB messages are primarily directed. They were youth, ages 15 to 25.

Table 11
Number of Persons Reporting Having Written to the
Media to Request Recipes (Question 6)

Response	First Measure		Second Measure	
	Number	Percent	Number	Percent
Yes	4	3.2	5	4.8
No	119	96.0	100	95.2
No Response	1	0.8	0	-
Total*	124	100.0	105	100.0

**Totals exceed those shown as "Yes" in Tables 7 and 8 since these data do not distinguish between those who received messages about "what to eat" from those who received messages which presented recipes, nor do the data distinguish message source.*

Cost-Effectiveness

The method of evaluation carried out by the SUNAB organization does not lend itself to the methodology presented in the Field Guide for cost analysis. Such analyses were not planned. Without examination of the food recall data for groups exposed to and not exposed to the messages, no cost-effectiveness analysis was possible.

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