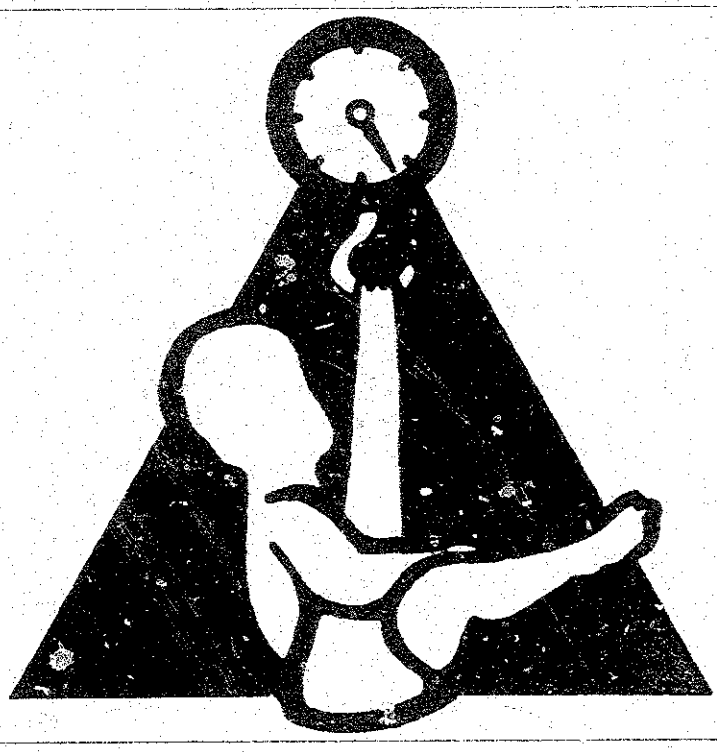
GROWTH MONITORING AND NUTRITION EDUCATION

Impact Evaluation of An Effective Applied Nutrition Program in the Dominican Republic

CRS/CARITAS, 1983–1986



U.S. Agency for International Development
Bureau for Science and Technology
Office of Nutrition
Washington, D.C. 20523

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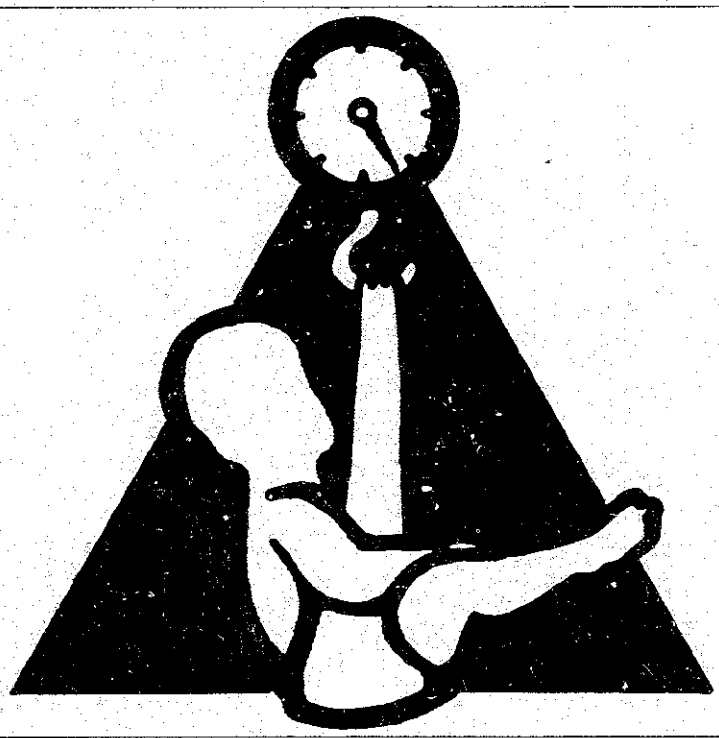

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PREFACE AND ACKNOWLEDGEMENTS

The Applied Nutrition Education Program (ANEP) represents a bold initiative of CARITAS DOMINICANA and Catholic Relief Services to radically restructure a traditional, food distribution program that, for 15 years, had not appeared to improve the nutritional situation. In 1983, under an A.I.D.-supported Operational Program Grant, and with continuous technical support from the A.I.D./Washington Office of Nutrition, ANEP was transformed into a risk-family targeted, home-based growth monitoring and individualized nutrition education program combining strategies of both women's self-reliance and social marketing. Through intensive and frequent training and supervision, and continuous motivation, the volunteer community health/nutrition promoters were able to communicate effectively with their neighborhood parent peers, raise consciousness concerning their health and nutrition problems, and suggest practical, participatory alternatives.

The carefully designed evaluation found significant and dramatic impact of the ANEP on nutritional status of the target children and on knowledge, attitudes and practices of the mothers when compared to non-ANEP communities. Reductions of over 50% in moderate to severe malnutrition are consistent with increased duration of exposure to the program. The data provide A.I.D. and other donor institutions with evidence here-to-fore scarce, that a well-designed, integrated growth monitoring/nutrition education program, within a community development framework, can work with appropriate adaptations to specific contexts. For donor agencies, it should be considered a success story in terms of the application of modest funds and state-of-the-art technical assistance to a non-governmental institution ready for change, and with government interest to expand nationwide.

The LTS/International Nutrition Unit acknowledges the continued support provided by Lee Hougen and Anne M. Weeks, Health Officers, USAID/Santo Domingo; the ample collaboration of ANEP staff of both CARITAS DOMINICANA and CRS, particularly Juana Maria Mendez and Barbara Liedtke, Leonardo Liriano, Altagracia Carrasco, the regional supervisors and promoters, and the CARITAS Director and Diocesan Team of Nagua, all of whom provided valuable information for the evaluation; the field work performed by Julian Rodriguez and the data collection team; the suggestions and ideas given by the International Consultants to the ANEP Program, Charles Teller and Marcia Griffiths; the important input given by Mr. Javier Garcia and his data processing and analysis team; the technical contribution of Alfred Zerfas in performing most of the data analyses; and, above all, the warm hospitality and candid attitude of the Dominican communities and mothers participating in the program who openly shared with us their concerns, their hopes and their experiences with ANEP, without reservations. Patient and careful editorial and secretarial help was provided by Arlene Richardson, Susanna Woodward and Barbara de La Viez.

The ANEP External Evaluation was supported by USAID/Santo Domingo and the A.I.D./Washington Office of Nutrition, with contribution from CRS/New York. Evaluation members were Jose O. Mora (team leader), Nancy Pielemeier, Patricia Avila de Hails and Maricela Ramirez. The transformation of the extensive Final Report into this shorter "Impact Evaluation" publication was accomplished by LTS/INU Senior Medical Nutritionist, Dr. Mora. This publication was requested by the USAID Mission in Santo Domingo, and supported by the A.I.D. Office of Nutrition in Washington under a RSSA with the Office of International Health, USDHHS, through a subcontract with Logical Technical Services Corp.

An impact evaluation of the Applied Nutrition Education Program (ANEP) implemented in the Dominican Republic by CARITAS and CRS was carried out early in 1987, after three years of program operation. The ANEP was conceived as a community based, grass-roots strategy to improve the nutritional status of children in 90 poor, rural communities. The strategy involves raising mothers' and families' awareness of child growth, health and nutrition; motivating them to take action to improve these conditions; fostering community initiative; promoting self-reliance of families and mothers; and providing a realistic, intensive educational intervention attached to systematic growth monitoring/promotion (GMP).

The child growth monitoring/promotion and health/nutrition education integrated intervention has been the core of the program approach. High risk children (under 2 years of age or otherwise malnourished) are weighed monthly, whereas all children in the community are measured every 6 months. Coverage of growth monitoring/education has been quite high (above 85% of high risks and above 70% under 5s). Education is fully integrated with growth monitoring, and uses a successful combination of community development/non-formal education and promotional/social marketing approaches. Educational messages and materials were carefully developed for use with GMP to bring about changes in concrete health and nutrition behaviors. Continuous contacts between promoters and mothers foster individual and community awareness and motivation for behavioral change, promote self-reliance and stimulate community action.

Field implementation is the responsibility of highly motivated, appropriately trained, community volunteers (promoters) working under close supervision from well-trained and equally motivated regional and central staff. Promoters carry out growth monitoring/education and community development activities with remarkable dedication, commitment and accountability to their own communities.

The impact evaluation was based on pre-post comparisons of health and nutrition knowledge/practices and nutritional status of children, as well as between program mothers/children and those of a comparison group of adequately matched neighboring communities not participating in the program. The evaluation disclosed significant behavioral changes and differences in key health and nutritional practices, as well as in the nutritional status of children. The overall prevalence of moderate-to-severe malnutrition was reduced by more than one-half after 2-3 years of program participation. There were consistent improvements in nutritional status over time in program children, and significant differences between them and non-program populations, as well as a clear dose-response relationship between length of exposure to the program and changes in nutritional status.

The evaluation provided convincing evidence that a well implemented growth monitoring/promotion and education intervention does make a significant difference in both prevention of malnutrition in children and recuperation of those initially malnourished.

Key elements for success were:

- appropriate community selection and targeting.
- careful selection and in-service training of personnel.
- consistent, flexible and motivational supervision.
- well defined and implemented growth monitoring/promotion activities.
- an effective communications strategy combining developmental education and social marketing approaches integrated with growth monitoring.
- a simple and efficient information system for program monitoring and ongoing evaluation.

INTRODUCTION

Malnutrition in young children, which is generally manifested as retardation of physical growth, is one of the most deleterious consequences of the impoverished conditions affecting large segments of the population in developing countries, particularly in rural areas (1). It is widely recognized that the ultimate solution to problems such as infant and child malnutrition is the elimination of poverty and underdevelopment through structural changes in society that effectively lead to more equitable distribution of greater income and wealth. Despite the constraints imposed by severe economic crises and concomitant budgetary adjustments affecting the poor, developing countries are actively pursing such changes. Yet it is difficult for them to achieve the accelerated social and economic development required to ensure a satisfactory level of nutrition and well-being for the majority of the population.

Even in the absence of severe restrictions, equitable socioeconomic development remains a long-term goal. In the meantime, a number of strategies and approaches for remedial action to mitigate the negative consequences of underdevelopment and poverty on health and nutrition have been designed, implemented, and in some cases tested and evaluated (2). In spite of some short-term impact of food distribution programs, which are by far the most common nutritional interventions, these strategies have been questioned because their paternalistic nature may keep them from achieving significant long-term improvement. Thus, community development strategies promoting self-reliance in Primary Health Care, increasing people's awareness and motivation, and the provision of effective health and nutrition education have been advocated as a way to achieve more significant and sustained improvement in the health and nutrition conditions of poor communities (3-5).

A community-based intervention to improve the nutritional conditions of children from disadvantaged rural communities has been operated by CARITAS DOMINICANA and Catholic Relief Services (CRS) in the Dominican Republic. The Applied Nutrition Education Program (ANEP), sponsored by USAID/Dominican Republic, CRS and CARITAS/NETHERLANDS since 1983, has been a demonstration project aimed at determining the extent to which the nutritional status of children in poor Dominican communities could be improved by a carefully designed and systematically implemented growth monitoring, health/nutrition education, and community development intervention delivered by community volunteers (18, 19).

A formal evaluation of this program was carried out between late 1986 and early 1987, after three years of implementation. The evaluation was sponsored by USAID/Dominican Republic with contributions from A.I.D./Washington and CRS/New York, and was performed by a team external to the program.* The present document is a summary of the full evaluation report (6) with emphasis on impact evaluation. The purpose of this report is to share major findings with social and nutrition planners and implementors. It is expected that the lessons learned and the results obtained may be of help in the design and implementation of more effective nutritional interventions worldwide.

*Evaluation team members were: Jose O. Mora, M.D., Nancy Pielemeier, D.P.H., Patricia Avila de Hails, M.S., and Maricela Ramirez, M.A.

I. PROGRAM DESCRIPTION

The new ANEP has been implemented as a radical change in strategy after more than 25 years of food distribution. Following a developmental approach, the program was restructured in 1983 as a community development effort aimed at increasing awareness of the health and nutritional problems of children and at promoting self-reliance to solve them. Program implementation has centered around home-based growth monitoring/promotion of children under 5 years, with major emphasis on concurrent and continuously reinforced nutrition and health education/counseling addressed specifically to mothers. Thus, a growth monitoring and nutrition education intervention has been the core of the community promoters' activities, reinforced by permanent communication and dialogue with the people, as well as by some promotion of community organization and group activities.

The program is staffed by a CARITAS central team of 4 (program director, education specialist, field coordinator, and agronomist), with the assistance of a CRS project manager, and by 7 area supervisors and 72 volunteer community promoters. The program has been carried out in 90 communities where the presence of some pre-existing community organization and a history of interest and participation in group activities has enhanced the chances of success. Volunteer promoters were selected from candidates proposed by the communities themselves; they have a minimal level of literacy, are experienced in community development work, and are highly motivated. Motivation is apparently related to strong religious feelings and Catholic Church affiliation, and is maintained and reinforced through regular training and systematic supervision by a dedicated central and regional staff. Promoters carry out growth monitoring and nutrition education and community development activities with remarkable dedication, commitment, and accountability to their own communities.

1. *Intervention components*

1.1. *Growth monitoring*

The major aim of growth monitoring in ANEP is neither to measure and register the child's growth pattern for survey or screening purposes, nor merely to interpret the growth information and use the results to feed a nutritional surveillance system. *The purpose is to improve the child's growth through immediate action, particularly through direct feedback, appropriate education and advice on household practices to the mother, and referral to health services* (7-11).

Growth monitoring is the basis for much of the promoters' activity in the community. All enrolled children up to 5 years of age are weighed at home every 6 months for the purpose of identifying those at high risk and for continual surveillance of the nutritional status of the community. Considered at high risk are all infants and children 0-23 months of age, as well as children 24-59 months who suffer from second or third degree malnutrition according to the Gomez classification (less than 75% of standard weight for age) or who have lost or not gained weight between two or three successive measurements. All high risk children are weighed at home on a monthly basis in order to provide more frequent attention and intensive counseling. Educational messages, individually tailored

according to the child's age, weight, and feeding pattern, are delivered at both the bi-annual and monthly weighing sessions.

The promoters' tools for growth monitoring include: a Salter-type hanging scale, a register or record book (called the "libreta"); growth charts which are retained by the mother in her home; and educational materials. The "libreta" is a large, thick, bound book which was specially designed and printed for the project, with columns for the following information: date of weighing, age, weight, nutritional status (Gomez classification), weight gain (good, fair, poor), and comments. Weight is measured in kilograms, to the nearest 100 grams. Nutritional status is determined by looking at the child's growth chart (see Figure 1). Weight gain adequacy is determined by the direction of the curve and by whether the child is gaining adequately according to age.

The growth chart (Figure 1) depicts weight in kilos on the vertical axis, age in months on the horizontal axis (with month numbers actually printed below the lines), and a 5-channel growth curve with bright contrasting colors corresponding to bands indicating the Gomez classification based on the so-called local standard (Harvard reference), as follows: white above the upper line for higher than normal weight for age (more than 100% of standard), green for normal weight for age (90-100%), yellow for first degree malnutrition (75-89%), pink for second degree malnutrition (60-74%), and red for third degree malnutrition (less than 60%).

Growth monitoring is performed as the program's basic entry point into the homes of high risk families in the community, and as an effective motivational tool, enhancing receptivity to nutrition/health education and facilitating the targeting of education messages (7,10). The coverage of the growth monitoring/promotion activities has been relatively high, usually above 70% of the total number of children under five years, and above 85% of those at "high risk".

1.2. *Nutrition education*

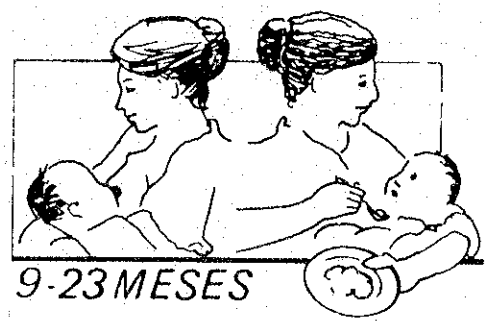
The ANEP educational component adopted a successful combination of non-formal (community development) education and promotional (social marketing) approaches (12-14). On the one hand, educational messages and materials, carefully developed and tested, and periodically refined, have been used in order to effect changes in specific nutrition and health related behaviors considered beneficial to the health and nutritional status of children (e.g., increased frequency and consistency of feedings). Emphasis has been placed on establishing a clear and consistent communications strategy, which includes the use of well defined techniques for message formulation and materials development and application (Figure 2), as well as communication materials for program promotion within and outside the implementing institutions.

On the other hand, and perhaps more importantly, the program has also focused on fostering community and individual awareness and motivation toward child health and nutrition, on promoting self-confidence, on encouraging self-reliance and on stimulating community action. Following such a integrated approach, the community promoter acts as both a transmitter of specific messages tailored to the child's condition at

RECOMENDACIONES

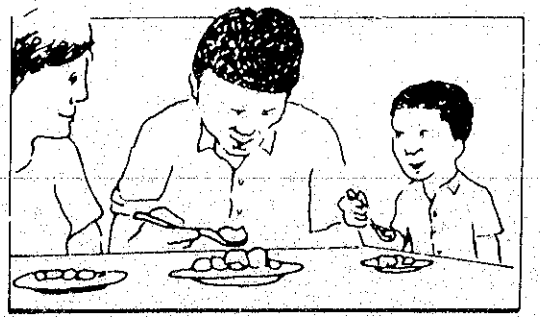
0 - 4 MESES

5 - 8 MESES



9-23 MESES

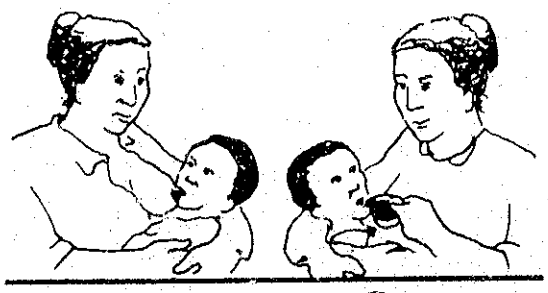
2 - 5 AÑOS



MAMA, CHEQUEE CON EL PROMOTOR LA VACUNACION DE SU HIJO.

TIPO	1Q	2Q	3Q	REF.
Polio				
DPT o Triple				
Sarampión				
Tuberculosis				

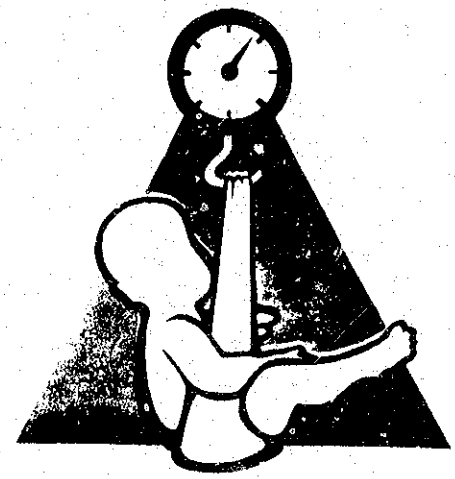
MAMA, SI SU NIÑO TIENE DIARREA DIGASELO AL PROMOTOR



DELE LIQUIDO INMEDIATAMENTE COMIENCE LA DIARREA

DELE LIQUIDO POR CADA EVACUACION.

NIÑOS SANOS, COMUNIDAD FUERTE



MADRE_____

NIÑO_____

FECHA DE NACIMIENTO_____

FECHA PRIMERA PESADA_____

PROMOTOR_____

COMUNIDAD_____

PROGRAMA DE EDUCACION NUTRICIONAL APLICADA

CARITAS DOMINICANA

FIGURE 1
GROWTH CHART

CURVA DE CRECIMIENTO PARA NIÑOS DE 0 A 5 AÑOS

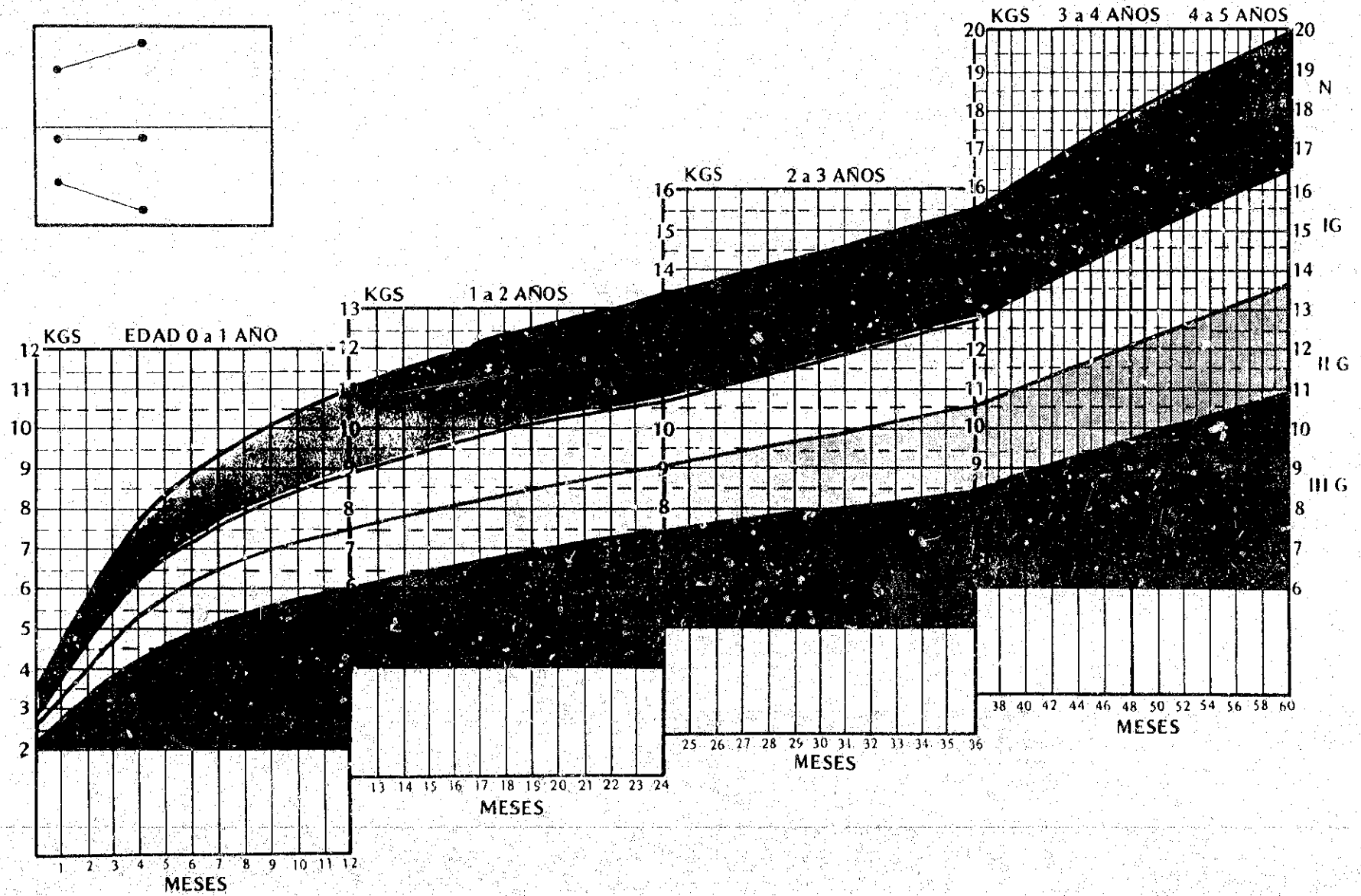
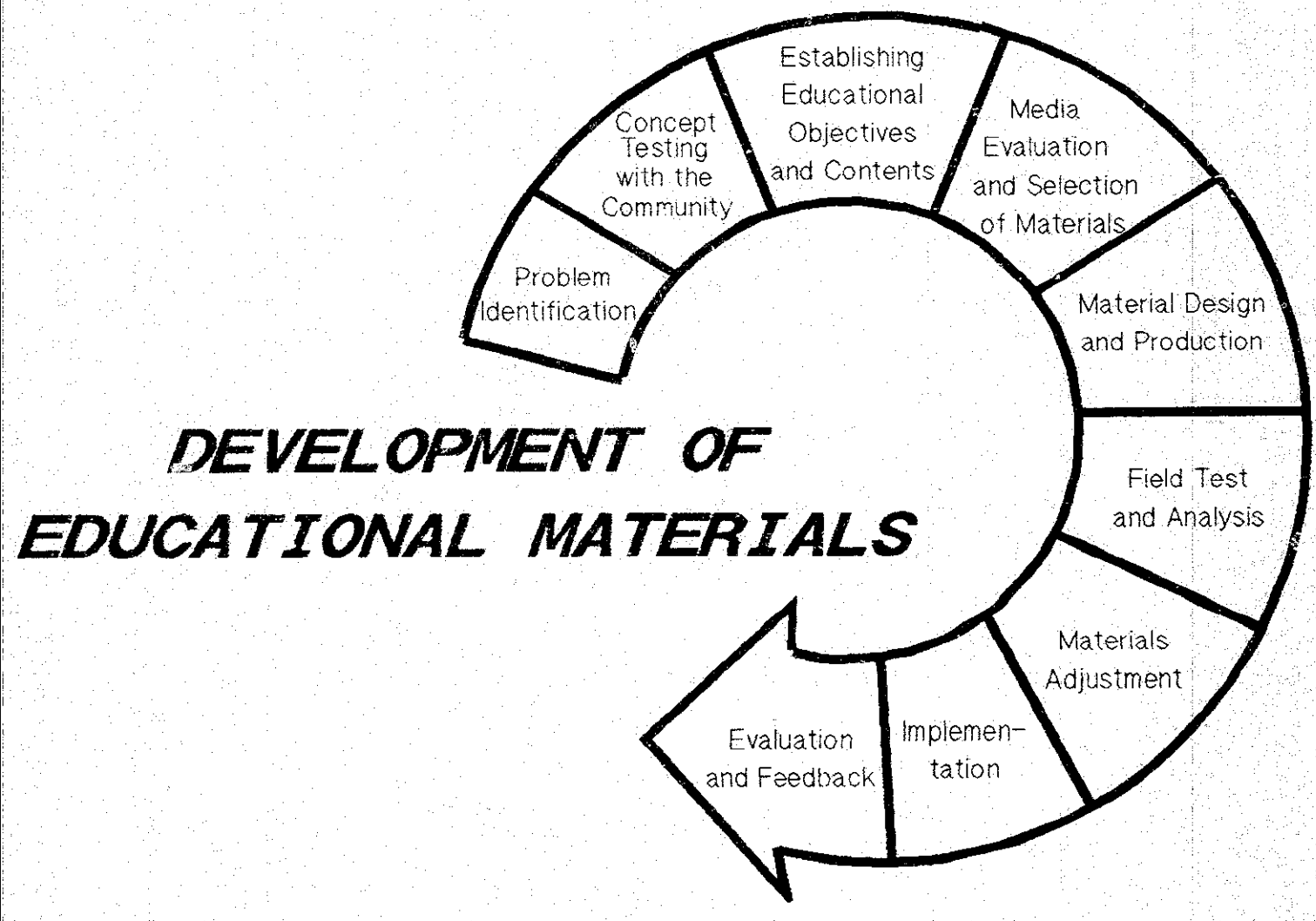


FIGURE 1 (back)

Figure 2


DEVELOPMENT OF
EDUCATIONAL MATERIALS
Problem Identification
Concept Testing with the Community
Establishing Educational Objectives and Contents
Media Evaluation and Selection of Materials
Material Design and Production
Field Test and Analysis
Materials Adjustment
Implementation
Evaluation and Feedback

monthly home visits, and as a change agent and permanent facilitator and motivator for individual and community action through face-to-face reinforcement and group meetings. In both cases, growth monitoring has been used as an entry point and as a motivational and management tool.

a) *Individual education of mothers*

To help the promoters provide the appropriate individual advice at the time of the growth monitoring home visits, ANEP developed a set of 12 card-drawings ("laminas"), whose message content is described in Table 1. The major emphasis of the nutritional education messages is placed on increasing the amount, daily frequency, and thickness of the feeding preparations for the child.

Each "lamina" is illustrated on one side with realistic drawings depicting the appropriate behavior (Figure 3). On the other side there are questions to be asked of the mother, along with educational messages that the promoter gives to the mother according to the child's condition. Questions are related to mother's present feeding practices. Clear instructions on how to advise mothers are also printed on this side. The "laminas" were specifically designed to provide advice to the mother immediately after her child is weighed and the results plotted and interpreted. Messages are intended to either reinforce currently appropriate behavior or to motivate mothers to adopt a new, positive behavior which would help the child to improve his or her physical growth.

The "laminas" have served as an educational instrument to help mothers and promoters focus their attention on specific and limited issues related to immediate child needs, to help the promoters to master simple concepts and to meet program goals in that the same series of selected messages are maintained over time.

b) *Group education*

Group education was designed as another way to transmit educational messages to mothers and to other members of the community. It was planned to complement individual education by giving mothers more information in areas where they resist changing current practices. Group education to mothers is given periodically by the promoters, taking advantage of the periodic meetings of the "organized community groups", and every 6 months by the area supervisor and the promoters. The educational instruments for these sessions are flipcharts, complemented by audio-cassettes presenting tape-recorded stories, and a "Community Growth Chart". This chart is an amplification of the individual growth chart to a size which makes it easily seen and understood by the people in group sessions.

The plotting of the individual weight values from each 6-month measurement on the Community Growth Chart allows a visual representation of the number of children in the community who fall within the different nutritional status categories (colors, as in the individual chart), thus facilitating comparison with the previous situation as seen in the preceding "community growth chart" (6 months before). This comparison, represented both visually and in terms of the corresponding percentages of prevalence, provides useful information to the field workers and the community about trends by season and about eventual changes in the

TABLE 1. MESSAGE CONTENT OF THE CARD-DRAWINGS FOR INDIVIDUAL EDUCATION

CHILD'S AGE, FEEDING PATTERN AND GROWTH	EDUCATIONAL MESSAGES
0-4 Months Breastfed Gaining Weight	1. Congratulate mother because child is gaining weight. 2. Breast feeding alone is enough up to 4 months.
0-4 Months Breastfed Not Gaining Weight	1. Give breast 8 times a day. The more the child sucks, the more milk mother will have. 2. Drink liquids, at least 8 glasses a day, to increase milk production. They could be soup, coffee, water, chocolate; eat more than usual to increase milk production.
0-4 Months Not Breastfed Not Gaining Weight	1. Give milk added to any cereal such as rice, oats, corn flower. Mixing nourishes better and child will grow better. 2. Give food with spoon because it is easier to clean.
5-8 Months Gaining Weight	1. Congratulate mother because child is gaining weight. 2. Continue breastfeeding. At this age child needs mother's milk to grow well. 3. Give 3 semi-solid feedings daily (with less water mixed in) so that child continues growing well.
5-8 Months Not Gaining Weight	1. At this age, child must continue breastfeeding to grow well. 2. Give one additional feeding to complete 4 feedings and a snack, such as banana, orange, mango. Child fills up with small quantity and needs to eat more times daily to gain weight. 3. Give thick foods, that is, with little water. A child at this age is able to swallow and needs the content of the food, not the water, because water fills him up but does not nourish him.

TABLE 1. (continued) MESSAGE CONTENT OF THE CARD-DRAWINGS FOR INDIVIDUAL EDUCATION

CHILD'S AGE, FEEDING PATTERN AND GROWTH	EDUCATIONAL MESSAGES
9-23 Months Gaining Weight	1. Congratulate mother because child is gaining weight. 2. Give child food 3 times a day and 2 snacks between feedings. 3. Give child what family eats. 4. Continue breastfeeding.
9-23 Months Not Gaining Weight	1. Give child what family eats. Do not add water. 2. Give 4 feedings and 2 snacks daily so child gains weight. 3. Continue breastfeeding.
0-23 Months Not Gaining Weight	1. Boil drinking water for 10 minutes so child does not get diarrhea.
2-5 Years Gaining Weight	1. Congratulate mother because child is gaining weight. 2. Give child all that family eats 4 times a day and snacks between meals so that child grows well.
2-5 Years Not Gaining Weight	A.1. Give child 5 feedings and 2 snacks between meals. Child needs to eat many times a day so that he/she gains weight. A.2. Give child all that family eats, because child needs it to grow well. B.1. Wash child's hands before feeding so that he/she does not get diarrhea. B.2. Wash your hands after defecation and after changing child.
0-5 Years Child With Diarrhea	1. Continue breastfeeding more times a day to help child recuperate liquids lost. 2. Give "ORS" for each evacuation as soon as diarrhea begins to recuperate liquids lost. 3. Give soft food such as mashed banana or mashed potatoes. The child will retain some food which will help with recuperation.

Figure 3
EXAMPLE OF A CARD-DRAWING (LAMINA)
FRONT

Figure 3
EXAMPLE OF A CARD-DRAWING (LAMINA)
BACK

0 - 4 MESES
NO DANDO SENO
NO GANANDO PESO

DAR CUALQUIER TIPO DE LECHE LIGADO CON CEREAL.
DAR ESTOS ALIMENTOS CON UNA CUCHARA

(PR SUNTAS PARA HACER A LA MAMA.
E PROMOTOR DEBE ESPERAR LAS RESPUESTAS Y REFORZAR LOS MENSAJES.)

- ¿QUE TIPO DE ALIMENTOS LE DA AL NIÑO DIARIAMENTE?

LIGAR LA LECHE CON ALGUN CEREAL COMO: ARROZ, AVENA, HARINA DE MAIZ; PORQUE LA LIGA ALIMENTA MEJOR Y SU NIÑO CRECERA BIEN.

- ¿COMO LE DA LOS ALIMENTOS AL NIÑO?

DAR LOS ALIMENTOS CON UNA CUCHARA PORQUE SE PUEDE LIMPIAR MAS FACILMENTE

- ¿QUE VA A HACER EN EL PROXIMO MES PARA AYUDAR A SU NIÑO A CRECER MEJOR?

LIGAR LA LECHE CON ALGUN CEREAL PARA QUE SU NIÑO AUMENTE DE PESO.

USAR PLATO Y CUCHARA PORQUE SE PUEDE LIMPIAR FACILMENTE.

nutritional status of children, by age group. For the supervisors, this serves the dual purpose of allowing self-evaluation and facilitating discussions with the community every 6 months. Thus the "community growth chart" is both an evaluation tool and a method for motivation and education.

c) *Ongoing developmental education*

The growth monitoring activities and the individual growth charts are motivational tools setting the stage for the transmission of educational messages. However, the promoters do not restrict their educational input to the weighing session or group meetings, but take advantage of every opportunity other than the home weighing visits to build on mothers' awareness and concern for their child's health and growth, and to maintain continued interaction with them to reinforce the educational messages, even without the "laminas". Therefore, the educational input is not restricted to the periodic use of the individual (or group) education materials, but it extends well beyond this formal approach into informal, consciousness raising interaction. This permanent type of communication helps reinforce messages aimed at eliciting mother and family motivation to act. Continued reinforcing motivation and education are particularly focused on those mothers and families with young and moderately to severely malnourished children.

2. *Training and supervision*

2.1. *Training*

Regional supervisors have been continuously trained to:

a) supervise promoters in their field work, with particular emphasis on appropriate techniques for weighing and recording, and on specific messages to be given to the mothers according to the child's needs and growth status;

b) train promoters on specific topics (e.g., growth monitoring, nutrition education, information systems, etc.);

c) clean and hand-tabulate data for the nutritional surveillance and internal evaluation system;

d) hold community meetings and use the "Community Growth Chart" for motivational and educational purposes;

e) distribute growth monitoring and educational materials; and

f) make follow-up home visits to do in-depth assessments and diagnoses of the causes of malnutrition and to propose solutions, provide counseling, or make referrals.

Promoters have been trained to:

a) carry out growth monitoring of high risk children every month, and weigh all children in the community every 6 months. The training covers weighing techniques and methodologies for weight recording, plotting of weights in the child's growth chart, interpreting growth status in the charts, assessing weight changes from one check-up to the next, searching for the causes of growth failure (inquiring and listening to the mother), and taking appropriate action, including referrals to the health system either directly or through their supervisors;

b) give individual mothers educational messages at the time of the monthly weighing that are relevant to the child's age, diet, health and growth status, and reinforce these messages through successive contacts;

c) work with organized community groups both to raise awareness and to motivate them to cope with the perceived needs of the community, and provide group education on topics such as boiling water and hand washing in order to prevent diarrheal diseases in children, the feeding of children under five years of age, and the preparation and use of the WHO/UNICEF pre-packed Oral Rehydration Solution (ORS).

A participatory methodology is used in the training sessions, with attention to feedback, learning by doing, role playing, and demonstration by others. Training has covered topics such as community needs assessment, new methodologies for weight reading and recording with greater precision, guidelines for interpreting weight gain, and approaches to incorporate high risk children detected through semestral weighings. Training has also been given on home management of diarrheal diseases, the preparation and use of the home-prepared oral rehydration solution, and of the WHO/UNICEF pre-packed ORS (15).

2.2. *Supervision*

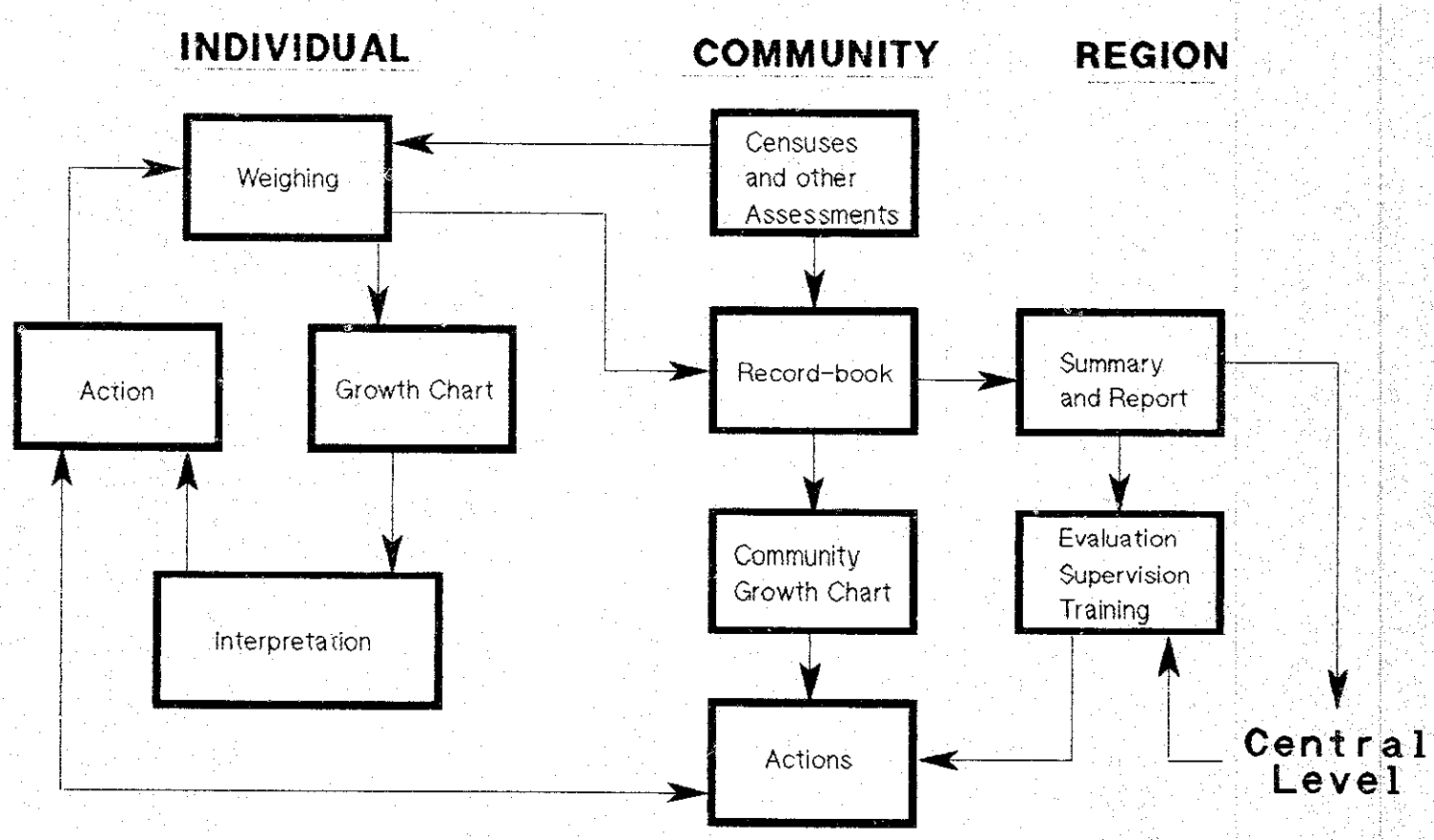
Supervision plays a key role in the implementation of the program components, particularly in the basic growth monitoring and nutrition education intervention. Supervision is closely related to feedback in that corrective measures are taken by either the central staff or the regional supervisors as part of a motivational supervisory process. Continuity and flexibility are two particularly important characteristics of this process.

3. *Surveillance and internal evaluation system*

Throughout the first three years of implementation, ANEP progressively developed a nutritional surveillance and internal ongoing evaluation system which is now in operation on a permanent basis. The system comprises a periodic flow of information from the field to the regional and ultimately to the central level, as well as some feedback mechanisms from the center to the periphery (Figure 4). It is intended to provide periodic information on the implementation of the field activities and on the nutritional and health conditions of the target population, to serve as a management tool for immediate regional and central level decisions, and to meet ongoing internal evaluation purposes.

Figure 4

ANEP NUTRITIONAL SURVEILLANCE SYSTEM



The basic instrument feeding the nutrition surveillance and ongoing evaluation system is the record-book ("libreta"), in which the promoter registers the information from both the monthly and the semestral (6-monthly) weighings. The information contained in the record-book is transferred monthly by the supervisor into a tally sheet or "Monthly Report" ("Informe Mensual de Supervision"), which contains not only the basic data from the record book, but also some additional information (e.g., number of children who entered but later dropped out of the program, reasons for dropping, etc.) and a series of "internal evaluation indicators" including coverage estimations.

The monthly reports submitted by the supervisors include all communities under their responsibility in each particular region, and are submitted regularly to the central level. These reports are periodically examined and summarized by the central staff, particularly by the Field Coordinator and the Program Director, assisted by the supervisors. Decisions for program adjustments are made accordingly.

The monthly reports are taken as a basis for discussions about the program progress and performance in the periodic (monthly and trimestral) meetings with supervisors and promoters. It is in these meetings that the central staff, the supervisors, and the field workers have the best opportunity to analyze the information coming from the internal evaluation system, to identify problem areas and suggest alternative solutions, and to make the most appropriate and informed decisions. Additional use of the information is made when central staff make supervisory visits to the regional level and into the communities.

4. *Communications strategy for program promotion*

A specific communications strategy was designed for program promotion within and outside CARITAS, and a series of related promotional materials was developed. The aim was to raise the awareness of promoters, mothers and the community in general of the importance of nutrition for child health and of the need to monitor child growth; to increase the visibility of the growth monitoring and education activities of the program; and to strengthen the image of the promoter, both within the institution and the program, and within the community. A program promotion/image strategy was emphasized because of the shift away from food distribution to a more positive, self-reliant approach.

The following communication materials were designed to address specific objectives:

OBJECTIVE	EDUCATION/PROMOTION MATERIALS
Promote the program	Brochure Semestral bulletin Press releases Home sticker and ANEP's symbol Calendars
Enhance the prestige of the promoter	Trimestral bulletins Poster Calendar ID Card (carnet)
Promote growth monitoring	Individual growth chart Community growth chart Flipchart and audiocassette on the importance of periodic weighing
Promote better feeding practices	Set of individual drawing cards (laminas) Leaflets or worksheets to serve as a reminder for the mother to check daily on the number of feedings given to child Flipcharts and audio-cassettes about boiling water and feeding between 5 and 8 months Flipcharts on oral rehydration and breastfeeding

II. EVALUATION APPROACH AND METHODS

The purpose of the evaluation was to assess the program's performance over the first 3 years of implementation, as well as its impact and cost, and to examine key issues related to improved implementation, program expansion, and eventual replication.

The major objectives of the evaluation were:

1. To examine the program implementation process and, specifically, its different intervention components (community organization and development, growth monitoring and nutritional surveillance, nutrition education, community projects, etc.)

2. To establish the extent to which program goals and objectives were achieved.

3. To assess the impact of the program on infant and child feeding knowledge and behavior, and on the nutritional status of children under five years of age.

4. To determine the cost and cost-effectiveness of the program.

The evaluation made use of the information generated by the CARITAS ongoing internal program evaluation, particularly that information obtained through the regular monitoring of program field activities. This included a baseline questionnaire which was applied again in October 1986, data from the nutrition surveillance activities, and the monthly and trimestral reports. The system currently includes 70 ANEP communities from which information is being reported to the central level on a fairly regular basis.

Additional information was collected by the evaluation team during the period September to November 1986 by field visits, interviews with key informants, review of program documents and files, and a knowledge, attitudes and practices (KAP) questionnaire administered to mothers with children under 3 years of age in 18 randomly selected program communities and 18 matched non-ANEP communities. Most children under 5 years in the non-ANEP communities were also weighed.

The special KAP study included 663 mothers in 36 communities (18 ANEP and 18 non-ANEP). The randomization procedure within ANEP communities was efficient in selecting a group representative of the total. No significant differences were found among KAP and non-KAP ANEP communities in any of the socio-economic, demographic and other variables studied, or in knowledge and behavior as assessed by the baseline questionnaires to the mothers.

Likewise, the matching procedure used for selecting the 18 non-ANEP comparison communities was also efficient in assembling a group of comparable non-exposed communities. Not only were the 18 ANEP communities representative of the total, but the 18 comparison communities were well-matched and may be assumed to reflect the KAP and related conditions of communities similar to the ANEP but not exposed to the program. Thus the

KAP of the non-ANEP respondents may be taken as indicative of those of the current ANEP communities if the program had not been carried out.

Evaluation of program impact was made in two major areas relevant to program objectives: a) changes in mothers' knowledge of infant feeding and child care, as well as changes in some feeding and health care practices related to the educational messages contained in the materials; and b) assessment of the nutritional status of the target population of children under five years. Changes in nutritional knowledge, practices and status were measured by cross-sectional comparisons of ANEP mothers and children over time, longitudinal surveillance of the nutritional status of ANEP children followed throughout program implementation (1983 to 1986), and comparisons with non-ANEP mothers and children measured cross-sectionally.

The impact evaluation design is schematically represented as follows:

MEASUREMENT DATES

SEPT 1983	MAR 1984	SEPT 1984	MAR 1985	SEPT 1985	MAR 1986	SEPT 1986
Weight	Weight	Weight	Weight	Weight	Weight	Weight
Socioeconomic and KAP baselines*			-	-	-	Repeat baseline
-	-	-	-	-	-	KAP (ANEP 25% sample)
-	-	-	-	-	-	Weight, KAP, Socioeconomic questionnaire (Non-Anep)

* At time of community enrollment.

Table 2 displays the number of communities covered and the total number of children under 5 years of age measured at 6-month intervals (semesters) from September 1983 up to September 1986 (the last measurement point available for the evaluation). Useful semestral weighings increased over time to reach 4,245 in September 1986; a grand total of 22,839 individual, 6-month measurements from 8,586 children were available in the computerized information system (an average of 2.7 measurements per child). A break-down by child's age and measurement date is given in Table 3. The relative age distribution of children measured has remained constant, except for a moderate reduction in the percentage of those 0-4 months and an increase in those older than 48 months.

The percent of population coverage could only be estimated accurately for September 1986, when data from the updated population census (manually tabulated) were available. The results are shown in Table 4. The overall coverage of weighing at that 6-month measurement point reached 70.3% (4,245 of the 6,035 children in the program communities). This figure could be reasonably taken as the maximum coverage ever achieved, since in the previous 6-month measurements the total number of weighings was always lower. Indeed the coverage of the 6-month weighings increased remarkably over time. Such coverage was somewhat lower in the combined east region, with only 65.6%. The highest coverage was seen in Santiago (87.5%), and the lowest in Higuey (58.2%) and La Vega (58.6%).

The average number of children per community was 86, of which 61 were measured and their mothers given educational messages. The mean number of children under 2 years per community was about 43, of which an average of 30 (70%) were measured at the September 1986 weighing round. The total number of children measured was actually somewhat larger. Indeed, these estimations are restricted to cases with useful information, that is, with reliably recorded weights and ages within permissible ranges, after exclusion of outliers and gross inconsistencies. According to the computerized information system, a total of 8,586 different children under 5 years were ever reliably measured, of whom 6,852 (79.8%) were measured at least twice, and 1,734 (20.2%) only once. According to program accounts, 8,798 children were measured; thus data on 212 children were not suitable for computer analysis.

The estimated coverage of monthly growth monitoring in children under 2 years was relatively high, ranging from 75% in Santiago to 99% in Higuey, with 87% overall. About 81% of the children had been weighed for at least two consecutive months, without major differences by region. According to the program interpretation criteria, 64% of those children had adequate weight gain, 15% had a relatively low weight gain, and 21% had poor gain or lost weight; these figures were consistent by region. A review of reports over a 10-month period, covering monthly totals of between 37 and 49 communities, shows that 87 new children were enrolled, 78 were dropped because of age, and 78 were lost due to migration.

TABLE 2. NUMBER OF ANEP COMMUNITIES AND CHILDREN UNDER FIVE YEARS COVERED THROUGH SUCCESIVE WEIGHINGS AT 6-MONTH INTERVALS FROM SEPTEMBER, 1983 TO SEPTEMBER 1986, BY REGION (*)

REGION	1983 SEPTEMBER	1984 MARCH	1984 SEPT.	1985 MARCH	1985 SEPT.	1986 MARCH	1986 SEPT.
Mao-Montecristi	4/183	4/224	10/553	10/605	10/653	10/623	10/587
Santiago	4/288	4/421	10/488	10/1,056	10/902	10/885	10/874
La Vega	4/173	6/336	10/357	10/246	10/296	10/479	10/638
San Francisco	6/226	7/260	9/279	10/424	10/642	10/482	10/537
Higuey	4/123	4/220	9/404	10/146	10/485	10/436	10/426
San Juan	4/199	5/370	10/408	10/645	10/774	10/669	10/676
Arquidiocesis	1/44	6/332	10/327	10/740	10/596	10/595	10/507
TOTAL	27/1,236	36/2,163	68/2,816	70/3,862	70/4,348	70/4,169	70/4,245
Mean no. of children per community	46	60	41	55	62	60	61

(*) Communities/children

TABLE 3. COVERAGE OF WEIGHING OF CHILDREN UNDER 5 YEARS IN SEPTEMBER 1986, BY REGION

REGION	CHILDREN UNDER 5 YEARS		
	TOTAL NO. (*)	NO. WEIGHED	COVERAGE % WEIGHED
1. Mao-Montecristi	721	587	81.4
2. Santiago	999	874	87.5
3. La Vega	1088	638	58.6
4. San Francisco	788	537	68.1
5. Higuey	732	426	58.2
6. San Juan	1016	676	66.5
7. Arquidiocesis	691	507	73.4
North (2,3,4)	2875	2049	71.3
East (5,7)	1423	933	65.6
West (1,6)	1737	1263	72.7
TOTAL	6035	4245	70.3
Average per community	86	61	--

(*) From ANEP Population Census updated July 1986

1. *Knowledge and behavior*

Comparisons of mothers' responses at entry into the program and again in 1986 revealed some changes in knowledge and behavior related to child feeding (Table 5). Significant changes were observed in responses to questions about child's feeding, management of diarrhea, and parents' participation in organized community activities. *Preference for exclusive breastfeeding* throughout the first four months increased, as did the proportion of mothers *breastfeeding on demand.* The age at *introduction of bottle feeding* was somewhat delayed. Initiation of bottle feeding dropped from 69% to 61% in the first month of life. The age at *introduction of supplementary feeding*, other than milk, was also moderately delayed. Late introduction of supplementary feeding (after 12 months) was also reduced from 10% to 4%.

Mothers' reported behavior at the onset of their child's diarrhea also changed. Mothers appeared to become more self-reliant and confident in their ability to manage their child's diarrhea at home. They reported less frequent consultation with doctors, more frequent use of the home-prepared salt and sugar rehydration solution, and more frequent use of home remedies. The percent of mothers who reported fasting dropped dramatically from 44% to 19%.

Both mothers and fathers reportedly increased their participation in organized community activities, including groups other than ANEP. Mothers' participation went up from 27% to 37%, whereas fathers' increased from 23% to 33%.

Table 6 shows the frequencies of the KAP responses obtained from ANEP and non-ANEP mothers to questions related to knowledge and practices of feeding and health care of children under 3 years of age. ANEP mothers would increase feeding to a child not gaining weight more frequently than would non-ANEP mothers, whereas the non-ANEP mothers would tend to consult a doctor more frequently.

The first source of advice when a child had diarrhea was a medical doctor for 74% of non-ANEP mothers, versus only 54% for ANEP respondents. The promoter's advice was relied on by 21% of the latter but by only 1% of the non-program mothers, (despite the fact most non-ANEP communities were served by promoters from SESPAS). The ANEP program promoters were trained to refer to the public health services those cases of diarrhea with fever or bloody stools, as well as those with persistent dehydration. Medicines were very popular and widely used for the treatment of diarrhea (47% of the mothers in both groups used them), and the pre-packed ORS (15), which has been recently introduced in the country, was used by similar proportions of program and non-program women (16% and 18%). The home-prepared salt and sugar rehydration solution was more frequently used by ANEP mothers; unfortunately, only a small percentage of the women knew how to prepare it correctly, although that proportion was greater among program mothers (11% versus 4%).

TABLE 4. COVERAGE OF GROWTH MONITORING IN 6 REGIONS, AS ESTIMATED FROM THE SUPERVISORY MONTHLY REPORTS AVAILABLE AT ANEP CENTRAL OFFICE. MARCH TO DECEMBER, 1986 (*)

	REGIONS						
	MAO MONTECRISTI	SANTIAGO	LA VEGA	HIGUEY	SAN JUAN	ARQUIDIOCESIS	TOTAL
Monthly reports available	5	10	9	8	8	10	50
Communities included, range	6-9	5-10	7-10	6-10	7-10	6-10	37-49
Children under 2 years							
Mean number	216	260	293	222	315	280	1586
Mean no. weighed monthly	192	195	251	219	280	245	1382
Mean % weighed monthly	89	75	86	99	89	88	87
Children under 2 years weighed for at least 2 consecutive months							
Mean number	182	218	231	175	254	223	1283
% of total	84	84	79	79	79	80	81
Monthly weight gain (**)							
Adequate (% children)	64	64	66	57	69	62	64
Fair (% children)	18	14	12	22	12	15	15
Poor (% children)	18	22	22	21	19	23	21
"High risk"(***) children above 2 years							
Mean number	8	18	18	18	26	60	148
Mean no. weighed monthly	6	17	15	17	24	60	139
% weighed monthly	75	94	83	94	92	100	94
Mean no. of new enrollments/month	8	17	19	15	12	16	87
Mean no. of drop-outs due to age	9	19	22	5	6	26	78
Mean no. of drop-outs due to migration	4	7	19	9	14	25	78

(*) Manual tabulations
(**) According to current ANEP criteria by age
(***) In Gomez Grades II and III, or lost or not gained weight during the semester.

TABLE 5. CHILD FEEDING AND HEALTH CARE KNOWLEDGE AND PRACTICES OF MOTHERS IN ANEP COMMUNITITES IN 1983/84 AND IN 1986

KNOWLEDGE AND PRACTICES	1983/84 N	1983/84 %	1986 N	1986 %	P (*)
1. Type of foods a child under 4 months needs					
Breast milk alone	613	65	453	76	.001
Breast and cow's milk	158	16	107	18	
Cow's milk and other foods	178	19	34	6	
Total	949	100	594	100	
2. Youngest child breastfed	726	93	546	93	
3. Daily frequency of breast-feeding the first month					
1-3	88	10	47	9	
4-7	347	40	102	19	
7-12	128	15	47	9	
On demand	311	35	331	63	.001
4. Use of bottle feeding	736	78	447	75	
5. Child's age (months) at introduction of bottle feeding					
Less than 1	509	69	268	61	.002
1-2	141	19	87	20	
3 or more	86	12	82	19	
6. Child's age (months) at introduction of food other than milk					
0-2	46	5	22	4	.001
3	188	22	86	15	
4	140	17	100	18	
5	116	14	117	21	
6	174	21	133	24	
7-11	97	11	67	14	
12 or more	84	10	22	4	
7. What mother does first day when child has diarrhea					
Sees a doctor	169	22	71	13	.001
Gives salt/sugar solution	101	13	110	20	
Gives home remedies	73	9	180	34	
Initiates fasting	346	44	104	19	
Gives medicines	96	12	76	14	
8. Parents participation in organized community groups					
Mothers	243	27	229	37	.001
Fathers	117	23	200	33	.001

(*) Chi-squared test.

TABLE 6. INFANT FEEDING AND HEALTH CARE KNOWLEDGE AND PRACTICES OF MOTHERS IN ANEP AND IN COMPARISON COMMUNITIES. KAP STUDY, 1986.

KNOWLEDGE AND PRACTICES	ANEP N	ANEP %	COMPARISON N	COMPARISON %	P (*)
1. What to do when child does not gain weight					
See doctor	162	46	197	59	.001
Give more food	119	33	60	18	
Give vitamins	39	11	42	13	
Change feeding	36	10	34	10	
2. Youngest child breastfed	327	98	315	96	
3. What to do to produce more milk					
Eat more	41	13	48	16	.03
Drink more	146	46	121	40	
Other	38	12	21	7	
Nothing	92	29	109	37	
4. First source of advise for diarrhea					
Doctor	181	54	242	74	.001
ANEP Promoters	71	21	3	1	
Relatives & others	66	20	64	19	
None	16	5	20	6	
5. Diarrhea Treatment					
Medicines	206	47	190	47	.009
Pre-packed ORS	70	16	74	18	
Salt/sugar solution	48	11	26	7	
Other home fluids	20	5	17	4	
Other treatment	82	19	71	18	
None	8	2	24	6	
6. Salt/sugar solution preparation					
Correct	37	11	13	4	.001
Incorrect	123	37	102	31	
Does not know	171	52	213	65	

(continued)

TABLE 6. (cont.) INFANT FEEDING AND HEALTH CARE KNOWLEDGE AND PRACTICES OF MOTHERS IN ANEP AND IN COMPARISON COMMUNITIES. KAP STUDY, 1986.

KNOWLEDGE AND PRACTICES	ANEP N	ANEP %	COMPARISON N	COMPARISON %	P (*)
7. Boils water for children					
Always	130	39	128	39	.82
Sometimes	48	14	53	16	
Never	155	47	148	45	
8. Washes her hands					
After defecation	30	9	20	6	.001
Before meals	184	56	143	44	
Both	107	32	144	44	
Never	10	3	20	6	
9. Washes child's hands before meals					
Always	221	73	182	66	.16
Sometimes	53	18	60	22	
Never	29	9	35	12	

(*) Chi-squared test.

There were no differences in the proportion of mothers boiling drinking water for children or washing their hands before preparing meals (two of the program messages), but more ANEP than non-ANEP mothers reported washing the child's hands after defecation and before feeding. This was a specific message given to mothers whose children did not gain weight.

The educational messages consistently stressed two major aspects of feeding: increased number of feedings (both meals and snacks) at all ages, particularly when the child was not gaining weight, and increased thickness of preparations. A simplified dietary recall included in the KAP survey allowed a rough estimation of the number of meals and snacks between meals, the total number of feedings, and the major food groups represented in the child's diet (sources of protein, calories, and vitamins). The results are shown in Table 7. Program women tended to report slightly greater but statistically significant frequency of snacks, total number of feedings, and number of food groups represented in the diet.

The prevalence of diarrhea was consistently lower among program children in all age groups, the overall prevalence being 7.3% vs. 10.1% in non-ANEP children. Other illnesses were also more frequent in the comparison communities, with a general prevalence of 10.9% in program and 13.4% in non-program communities. Program exposure may have contributed to reduced morbidity through general improvement in child care and health awareness.

About 40% of the mothers responded that they valued the promoter's advice, mainly for its input on child care. About one third regarded the advice as "generally good" and, less frequently, as "good" regarding child feeding and health care (Table 8). It appears that the promoter was widely recognized as an important source of advice in general matters related to child care, rather than in specific areas such as feeding, health care, or hygiene. This would suggest that the promoter's role is highly appreciated not only as a transmitter of specifically tailored messages, but also as a permanent, informal counselor in a wide variety of child care matters. This is probably a result of the continuous interaction between promoters and mothers in their daily activities.

Overall, the promoter's advice proved to be what mothers liked best about the ANEP program. Weighing was their second choice. There were 16% who liked everything in the program. Interestingly, only 2% complained about the lack of medical services. Also, very few (less than 1%) complained about the lack of food distribution, which would suggest that the program has successfully promoted some self-reliance, at least in terms of perceived dependence on food hand-outs. Mothers appreciate the usefulness of promoter's working instruments (that is, the growth chart, scale, and the "laminas"), mostly in connection with the assessment of growth status, and, secondarily, in regard to advice to improve feeding and prevent illnesses. The most frequent reaction to the hypothetical question about what they would do if ANEP were phased-out was that "somebody should take the promoter's role". This would suggest that the program, and the promoter, are well rooted in the community to the extent of becoming indispensable. About one-fourth of the mothers thought that, without the promoter, they wouldn't learn about child health, and others contended that there would be more child deaths in the community.

TABLE 7. REPORTED DAILY FREQUENCY OF FEEDINGS GIVEN TO ANEP AND TO COMPARISON CHILDREN, BY AGE GROUP. KAP STUDY, 1986.

AGE GROUP (MONTHS)	3 MEALS		2 OR 3 SNACKS		5 OR 6 TOTAL FEEDINGS		3 FOOD GROUPS	
	ANEP %	NON-ANEP %	ANEP %	NON-ANEP %	ANEP %	NON-ANEP %	ANEP %	NON-ANEP %
4-12	94	96	75	74	75	74	30	15 (*)
13-18	96	97	69	63 (*)	68	60 (*)	50	45
19-24	93	95	62	62	62	61	50	48
25-36	96	96	69	55 (*)	68	53 (*)	55	43
TOTAL	95	96	69	64	69	63	45	36 (*)

(*) $p < .05$ in ANOVA on full table

TABLE 8. PERCEPTION OF THE PROGRAM BY ANEP MOTHERS. KAP STUDY, 1986.

	No.	%
Promoter's advice		
Good on child's care	149	38
Generally good	127	32
Good on child's feeding	54	14
Good on health care	37	9
Good on hygiene	16	4
No advice has been given	14	3
Total	397	100
Group meetings (those attending)		
Good advice	57	27
Very important	58	27
Good to learn	45	21
Good to discuss	42	20
Good help	12	5
Total	214	100
What she likes most about ANE?		
Advice	206	52
Weighing	116	29
Everything	62	16
Know health status	13	3
What she dislikes most about ANEP		
Nothing	344	87
Other	43	11
No doctor	8	2
No food	2	--
Usefulness of Promoters materials and instruments		
Know growth status	183	46
Improving feeding	75	19
Other uses	55	14
Preventing illnesses	32	8
Food preparation	28	7
Hygienic practices	4	1
Useless	20	5
What would happen if ANEP were phased out		
Somebody should take promoter's role	123	31
We wouldn't know about child's health	94	24
More deaths	76	19
More malnourished children	32	8
Other	27	7
Nothing would happen	24	6
More sick children	21	5

The mothers' understanding of the growth charts, a pervasive problem in many growth monitoring programs, was still somewhat deficient. About two-thirds of the mothers had some difficulty in interpreting the child's growth trend. Mothers tended to more easily understand the child's growth status according to the colored areas of the chart rather than by following the trend of the growth curve, which in many cases was not drawn (i.e., connecting the dots) by the promoter. They understand and are usually concerned about the concept of weight gain based on the difference in "rayitas" (0.1 kg. marks).

2. *Nutritional status*

In order to evaluate the ultimate impact of ANEP on the nutritional status of children under 5 years of age, weight attained at a given age by the child was taken as the basic indicator. No use was made of the growth monitoring data collected monthly, because these were not available for computer analysis. A weight-for-age indicator was calculated for every child measured at the time of the 6-month weighings, after cleaning the weight and age data of inconsistencies and gross errors (outliers). Weight-for-age was expressed as a percentage of the standard, and the well-known Gomez classification was used to assess the nutritional status in three categories: normal or well-nourished (90% or more of weight-for-age), mildly or first degree malnourished (75% to 89%), and moderately-to-severely or second-to-third degree malnourished (less than 75%). The analyses were cross-sectional in nature, even when cohorts of children by region, by year of entry, by child's age, and by time of exposure to the program were analyzed over time by means of follow-up transition matrices.

Four types of analyses are presented:

a) Cross-sectional assessments of nutritional status of all program children measured at each of the 7 semestral weighing sessions from September 1983, up to September 1986;

b) Comparisons of cross-sectional assessments of nutritional status of different cohorts of program children measured at least twice, at entry and at the last measurement point available;

c) Comparison of follow-up assessments of the ANEP children measured in September 1986, and of the non-ANEP children (from neighbor comparison communities) included in the KAP study and measured in November 1986;

d) Comparison of cross-sectional assessments of children in ANEP communities and in communities measured by the Ministry of Health (SESPAS) from 1983 to 1986.

a.) *Cross-sectional assessments at 6-month intervals*

The estimated prevalence of moderate-to-severe malnutrition (Gomez classification) at the seven measurement points is presented by region in Table 9 and by age group in Tables 10 and 11. The overall prevalence has tended to consistently decline over time, from 14.6% in 1983 (including only 27 communities), to 6.9% in 1986 (Graph 1). Prevalence figures by age group also showed a consistent downward trend over time.

TABLE 9. PREVALENCE (%) OF MODERATE TO SEVERE MALNUTRITION (LESS THAN 75% WEIGHT-FOR-AGE) AMONG ANEP CHILDREN UNDER FIVE YEARS MEASURED AT 6-MONTH INTERVALS, BY REGION

REGION	1983 SEPTEMBER	1984 MARCH	1984 SEPTEMBER	1985 MARCH	1985 SEPTEMBER	1986 MARCH	1986 SEPTEMBER	CHANGE SEPT/84 - SEPT/86
1. Mao-Montecristi	9.3	7.1	12.1	11.2	9.2	7.4	5.6	-53.7
2. Santiago	11.8	9.5	9.8	8.6	6.9	6.3	5.7	-41.8
3. La Vega	8.1	4.8	10.6	7.3	4.1	6.1	7.5	-29.2
4. San Francisco	18.1	8.5	10.0	11.1	7.3	8.7	10.8	+ 8.0
5. Higuey	13.8	9.5	11.1	11.0	9.7	6.0	4.5	-59.5
6. San Juan	22.6	12.4	16.7	12.4	13.2	10.5	6.4	-61.7
7. Arquidiocesis	27.3	7.5	15.3	11.2	11.2	8.1	8.1	-47.1
TOTAL	14.6	8.6	12.2	10.4	9.1	7.6	6.9	-43.4
No. measured	1236	2163	2816	3862	4348	4169	4245	
No. malnourished	180	186	343	402	396	317	292	
No. of communities	27	36	68	70	70	70	70	

TABLE 10. PREVALENCE OF MODERATE TO SEVERE MALNUTRITION (LESS THAN 75% WEIGHT-FOR-AGE) AMONG ANEP CHILDREN UNDER FIVE YEARS MEASURED AT 6-MONTH INTERVALS, BY AGE GROUP.

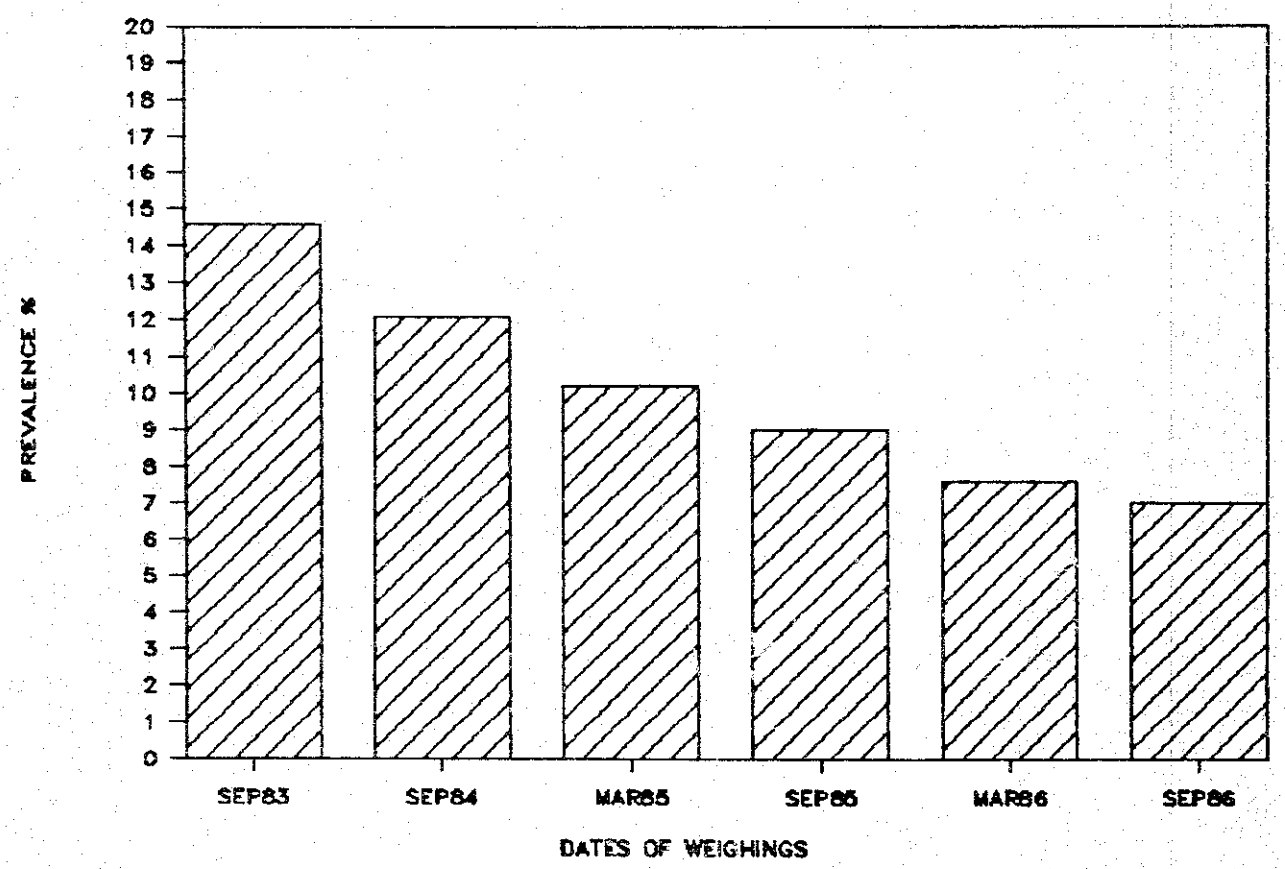
AGE IN MONTHS	1983	1984		1985		1986	
	SEPTEMBER	MARCH	SEPTEMBER	MARCH	SEPTEMBER	MARCH	SEPTEMBER
0-4	16.5	8.9	9.3	14.0	8.0	9.8	4.6
5-8	11.1	7.0	16.4	15.9	13.1	8.4	8.8
9-11	9.9	9.9	8.9	16.9	11.3	11.6	8.4
12-23	12.1	8.8	14.5	9.1	9.6	7.8	7.0
24-35	15.0	7.4	9.2	6.0	6.1	5.0	4.4
36-47	14.3	7.9	12.7	8.5	7.1	6.0	7.3
48-60	22.3	11.4	15.0	13.7	12.7	10.1	8.6
0-11	12.8	8.4	11.3	15.4	10.8	9.9	7.5
12-23	12.1	8.8	14.5	9.1	9.6	7.8	7.0
24-60	16.3	8.6	11.7	9.1	8.5	6.9	6.7
TOTAL	14.6	8.6	12.2	10.4	9.1	7.6	6.9

Table 11. CHANGES IN THE PREVALENCE OF MODERATE TO SEVERE MALNUTRITION (LESS THAN 75% WEIGHT-FOR-AGE), BY AGE GROUP.

AGE IN MONTHS	SEPT 83 TO SEPT 84		SEPT 84 TO SEPT 86	
	CHANGE	%CHANGE(*)	CHANGE	%CHANGE(*)
0-4	-7.2	-19.8	-4.7	-51.7
5-8	+5.3	+43.6	-7.6	-46.3
9-11	-1.0	-10.1	-0.5	- 5.6
12-23	+2.4	+19.8	-7.5	-51.7
24-35	-5.8	-38.7	-4.6	-50.0
36-47	-1.6	-37.2	-5.4	-42.5
48-60	-7.3	-32.7	-7.4	-49.3
0-11	-1.5	-11.7	-3.8	-33.3
12-23	+2.4	+19.8	-7.5	-51.7
24-60	-4.6	-28.2	-5.0	-42.7
TOTAL	-2.4	-16.4	-5.3	-43.4

(*) Percent of initial prevalence

GRAPH 1. PREVALENCE OF MODERATE TO SEVERE MALNUTRITION (LESS THAN 75% WEIGHT-FOR-AGE) AMONG ANEP CHILDREN UNDER FIVE YEARS AT PERIODIC WEIGHINGS*



* Data from Tables 9 and 10 (Total)

Comparisons throughout the first 3 cross-sectional measurements are not strictly valid because they included different numbers of communities, since the program was in the process of enrollment from September 1983 to March 1985. Thus, eventual changes in total prevalence throughout the first three semestral measurements are less likely to be related to program implementation than to the nutritional situation of the new communities progressively enrolled in the program. For practical purposes, the weighing in September 1984, when 68 of the 70 communities had already entered the program, has been taken as a conventional baseline to compare the prevalence of malnutrition over time.

When weight in September 1984 is taken as a baseline and compared to that of September 1986 (last measurement point available, with communities' time of exposure to the program ranging from 1 1/2 to 3 years), a reduction in the prevalence of malnutrition is observed in all regions, except in San Francisco (Table 9). The overall reduction amounted to about 43%, and the highest positive changes occurred in San Juan (62%), Higuey (59%), and Mao-Montecristi (54%). The greatest reductions (51.7%) occurred in the age groups 0-4 months and 12-23 months, and the lowest (5.6%) in the group 9-11 months (Tables 10 and 11).

A major limitation affects these comparisons, however. Children measured at each point represent a mix of children in the program for some time and undergoing follow-up, and new children enrolled in the program. Thus, eventual changes in prevalence rates are likely to be affected by both drop-outs and new enrollments, and not only by program inputs. As an example, a drop in prevalence may be due either to selective drop-out of malnourished children, to enrollment of a lower ratio of malnourished to well-nourished, or to actual program impact.

When cross-sectional analyses were done by year of entry (Table 12), the same declining trend was observed. The percent reduction of prevalence is 60% for children enrolled in 1983, 44% for those entering in 1984, and only 3% for those beginning in 1985 (and with little time in the program). In interpreting these comparisons, however, year of entry and length of participation are probably confounded. Analyses of cohorts by year of entry and length of participation are more indicative.

b.) *Cohort analyses*

Program impact may be more accurately estimated by cohort analyses looking at eventual changes in the nutritional status of the same children over time. Table 13 shows the prevalence status of cohorts of children measured over consecutive 6-month check-ups. The prevalence of malnutrition in the same children dropped consistently from one measurement point to the other, except from March to September, 1984. The magnitude of the reduction generally increased with the time interval, and ranged from only 3% from March to September, 1986, to about 55% from September 1983 to March 1986. Incidentally, Table 11 also provides evidence of a substantial increase in program coverage, in terms of the total number of children measured over consecutive weighing rounds.

Apparently, the magnitude of the change (reduction) in the prevalence of malnutrition varied by region and by year of the community enrollment in the program (Tables 14 and 15). When estimated through cohort analyses

TABLE 12. PREVALENCE OF MODERATE TO SEVERE MALNUTRITION (LESS THAN 75% WEIGHT-FOR-AGE) AMONG ANEP CHILDREN BY DATE OF WEIGHING AND YEAR OF ENTRY

YEAR OF ENTRY	1983	1984		1985		1986		% REDUCTION
	SEPT	MARCH	SEPT	MARCH	SEPT	MARCH	SEPT	ENTRY-SEPT 86
1983	14.7	9.3	10.3	10.4	9.5	7.4	5.8	60.5
1984		6.3	12.5	0.1	8.5	7.4	7.0	44.0(*)
1985				18.1(**)	21.7	14.7	17.8	3.0(***)
TOTAL	14.7	8.6	12.2	10.4	9.1	7.6	6.9	43.4(*)

(*) From September/84
(**) n = 69
(***) From March/85

TABLE 13. CHANGES IN PERCENT PREVALENCE OF MODERATE-TO-SEVERE MALNUTRITION IN COHORTS OF ANEP CHILDREN DURING DIFFERENT TIME INTERVALS

TIME INTERVAL START	TIME INTERVAL FINISH	DURATION (months)	NO.	PERCENT PREVALENCE BEFORE	PERCENT PREVALENCE AFTER	PERCENT PREVALENCE DIFFERENCE	PERCENT CHANGE*
Sept/83	March/84	6	947	14.5	10.5	-4.0	-27.6
	Sept/84	12	98	8.2	7.1	-1.1	-13.4
	March/85	18	443	14.0	7.2	-6.8	-48.6
	Sept/85	24	588	12.8	8.5	-4.3	-33.6
	March/86	30	432	12.0	6.5	-5.5	-45.8
	Sept/86	36	306	10.8	4.9	-5.9	-54.6
March/84	Sept/84	6	216	3.7	8.3	+4.6	+124.3
	March/85	12	1025	8.5	6.7	-1.8	-21.2
	Sept/85	18	1130	8.5	7.8	-0.7	- 8.2
	March/86	24	899	7.7	6.0	-1.7	-22.1
	Sept/86	30	666	7.7	4.4	-3.3	-42.9
Sept/84	March/85	6	1701	13.3	10.2	-2.1	-15.8
	Sept/85	12	1735	12.0	7.8	-4.2	-35.0
	March/86	18	1290	11.7	6.5	-5.0	-42.7
	Sept/86	24	1269	11.7	7.2	-4.5	-38.5
March/85	Sept/85	6	2783	10.2	8.6	-1.6	-15.7
	March/86	12	2269	10.0	7.0	-3.0	-30.0
	Sept/86	18	1974	9.5	6.1	-3.4	-35.8
Sept/85	March/86	6	2943	8.5	6.8	-1.7	-20.0
	Sept/86	12	2533	7.9	6.3	-1.6	-20.3
March/86	Sept.86	6	3030	6.7	6.5	-0.2	- 3.0

* percent of initial prevalence

comparing the first and last weighings of those children measured at least twice, the magnitude of program impact was greater in Santiago, San Juan and San Francisco, which accounted for the greater impact in the north and west combined regions. Higuey and Arquidiocesis had the least impact. The overall reduction amounted to 31%.

Data from Table 15 indicate that the magnitude of the decline in malnutrition, as estimated from comparisons of its prevalence in cohorts of the same children measured at least twice, was related to *year of enrollment*, *length of exposure* to the program, and *child's age at entry*, as well as to *mother's education*. Impact in terms of reduction in prevalence of moderate to severe malnutrition was higher in communities enrolled in the program in 1983, and also increased proportionaily with length of exposure from 17.9% to 54.1% for less than 12 and more than 24 months, respectively. Children under 2 years (high risk) were nearly 3 times more improved than older children (40.3% vs. 14.4% reduction).

A consistent gradient was observed from highest to lowest impact for later enrollment and lower length of exposure, but not for mother's education and child's age at entry. Specifically, the impact was greatest when mothers had 3 to 5 years of school education, lesser when they had zero to 2 years, and lowest when mother's education was 6-12 years. Impact was largest for children enrolled at age 12-23 months, who may have greater potential for catch-up growth, and smallest for those entering after 2 years of age.

Length of exposure was positively related to program impact, even after controlling for year of entry (Graph 2). When controlling for age, the impact of length of exposure held only for age of enrollment below 2 years, probably as a result of the lower overall impact observed in older children. The influence of variables related to program input, such as year of entry and length of exposure, strongly suggests a "dose-response" relationship (increasing impact as exposure to the program increased), which supports the conclusion that changes in the prevalence of malnutrition can be mainly attributed to the program. The significant and remarkable reduction in the prevalence of malnutrition in the program may be the result of recuperation of the initially malnourished children, prevention of malnutrition in those initially well-nourished, or both.

Further cohort analyses in the form of "transition matrices" of children followed over periods of 1, 2, or 3 years are presented in Table 16 and Graph 3. Hence, changes in both well-nourished and malnourished children can be observed. The recuperative impact of the program on those children who were enrolled while having moderate-to-severe malnutrition may also be estimated, as well as the incidence of malnutrition among those initially well-nourished. In the whole cohort of children measured at least twice with variable time intervals, 62.9% of those initially malnourished were found to be well-nourished (grade 0 or I, Gomez classification) at the last measurement. Thus, the global recuperative impact of the program on malnourished children may be estimated at about 63%. This effect may be somewhat overestimated, since it does not take into account eventual recuperation as a result of factors other than the program, nor the effect of regression towards the mean.

TABLE 14. NUTRITIONAL STATUS AT FIRST AND LAST MEASUREMENT OF ANEP CHILDREN MEASURED AT LEAST TWICE, BY REGION

REGION	FIRST MEASUREMENT			LAST MEASUREMENT			% REDUCTION*
	WELLNOURISHED	MALNOURISHED		WELLNOURISHED	MALNOURISHED		
	%	I(%)	II&III(%)	%	I(%)	II&III(%)	II&III
1. Mao-Montecristi	53.9	36.1	10.1	53.9	38.1	8.1	19.3
2. Santiago	56.1	32.8	11.1	55.0	38.9	6.1	45.0
3. La Vega	58.0	32.3	9.8	61.3	31.3	7.4	24.5
4. San Francisco	51.5	34.4	14.1	53.6	36.9	9.5	32.6
5. Higuey	57.7	32.1	10.2	58.1	34.3	7.6	25.5
6. San Juan	51.7	32.0	16.3	47.3	42.4	10.2	37.4
7. Arquidiocesis	56.6	32.3	11.1	55.2	35.7	9.2	17.1
NORTH (2,3,4)	55.3	33.1	11.6	56.4	36.1	7.4	36.2
EAST (5,7)	57.1	32.2	10.7	56.4	35.1	8.5	20.6
WEST (1,6)	52.7	33.9	13.4	50.3	40.4	9.2	31.3
TOTAL	55.0	33.1	11.9	54.7	37.1	8.2	31.1
	------(n = 6848)------			------(n = 6848)------			

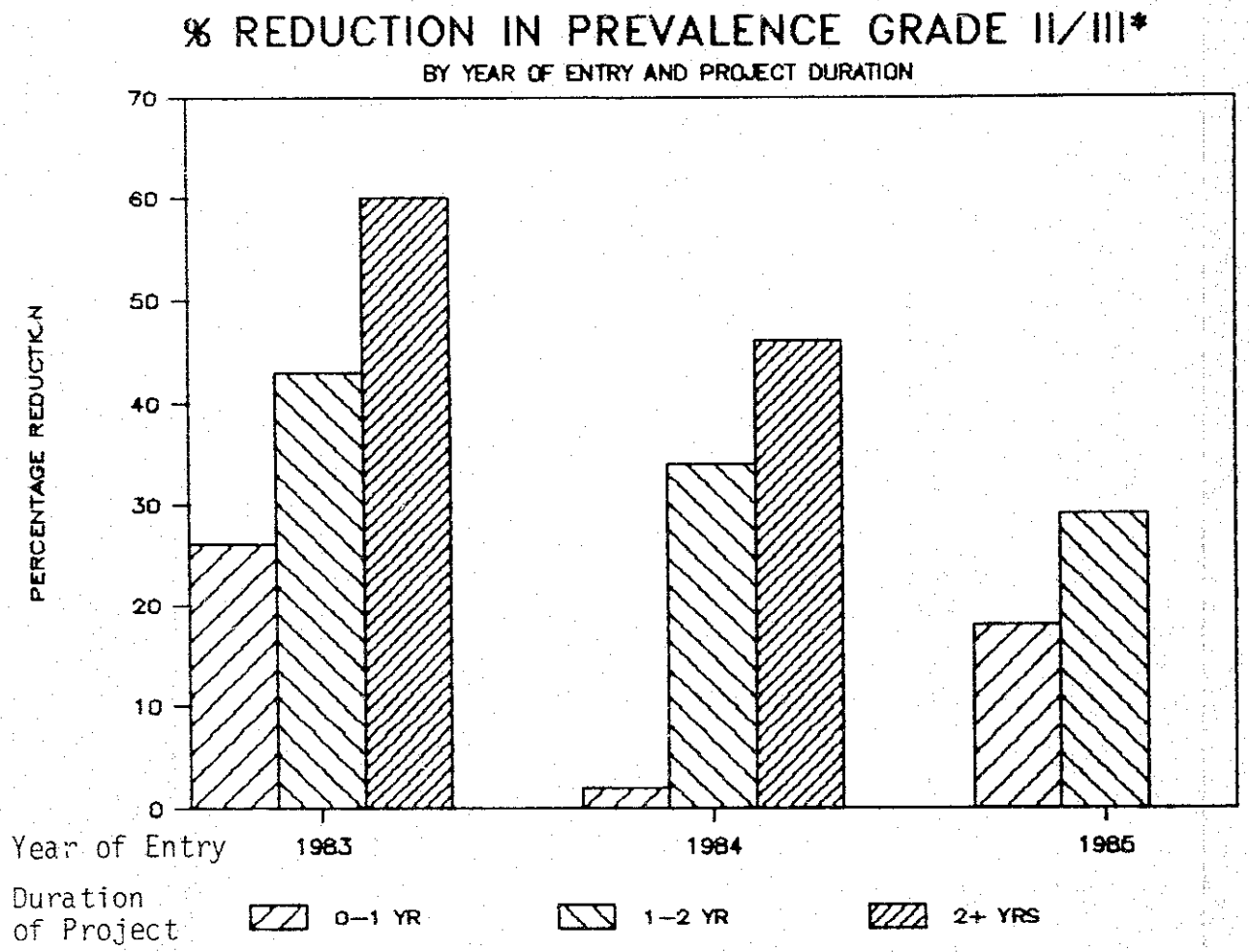
*percent of initial prevalence

TABLE 15. PERCENT PREVALENCE OF MODERATE TO SEVERE MALNUTRITION AT FIRST AND LAST MEASUREMENT (VARIABLE TIME INTERVALS) IN COHORTS OF ANEP CHILDREN GROUPED BY DIFFERENT CRITERIA.

CRITERIA		NO.	ENTRY	LAST WEIGHT	DIFFERENCE	% REDUCTION*
1. YEAR OF COMMUNITY ENTRY						
1983		2677	12.9	7.9	5.0	38.8
1984		4033	11.0	8.2	2.8	25.5
1985		138	18.1	15.2	2.9	16.0
2. LENGTH OF EXPOSURE (MONTHS)						
LESS THAN 12		2888	12.3	10.1	2.2	17.9
12-23		2958	11.7	7.4	4.3	36.8
24+		1002	11.1	5.1	6.0	54.1
3. CHILD'S AGE AT ENTRY (MONTHS)						
0-11		2785	11.3	7.2	4.1	36.3
12-23		1481	13.1	6.9	6.2	47.3
0-23		4266	11.9	7.1	4.8	40.3
24-60		2582	11.8	10.1	1.7	14.4
4. MOTHER'S YEARS OF SCHOOLING						
0-2		2864	14.4	10.2	4.2	29.2
3-5		2413	11.1	6.8	4.3	38.7
6-12		1503	8.7	6.9	1.8	20.7
5. YEAR OF ENTRY	LENGTH OF EXPOSURE (MONTHS)					
1983	Less than 12	1239	14.0	10.3	3.7	26.4
	12-23	721	12.6	7.2	5.4	42.9
	24+	717	11.4	4.5	6.9	60.5
1984	Less than 12	1574	10.0	9.8	0.2	2.0
	12-23	2205	11.3	7.4	3.9	34.5
	24+	254	8.7	4.7	4.0	46.0
1985	Less than 12	75	14.7	12.0	2.7	18.4
	12-23	32	21.9	15.6	6.3	28.8
6. AGE IN MONTHS	LENGTH OF EXPOSURE (MONTHS)					
0-11	Less than 12	1069	9.8	10.3	0.5	-5.1
	12-23	1225	12.7	5.7	7.0	55.1
	24+	491	11.4	4.1	7.3	64.0
12-23	Less than 12	435	15.6	8.5	7.1	45.5
	12-23	669	12.3	6.6	5.7	46.3
	24+	377	11.7	5.6	6.1	52.1
24-60	Less than 12	1384	13.2	10.4	2.8	21.2
	12-23	1063	10.3	10.0	0.3	2.9
	24+	134	8.2	7.5	0.7	8.5

*percent of initial prevalence

GRAPH 2



* Between first and last weighing

(See Table 15 (5.) for data.)

TABLE 16. CHANGES IN THE NUTRITIONAL STATUS* OF DIFFERENT COHORTS OF ANEP CHILDREN BY YEAR OF ENTRY AND LENGTH OF EXPOSURE TO THE PROGRAM

CHILDREN WITH WORSENING OF NUTRITIONAL STATUS

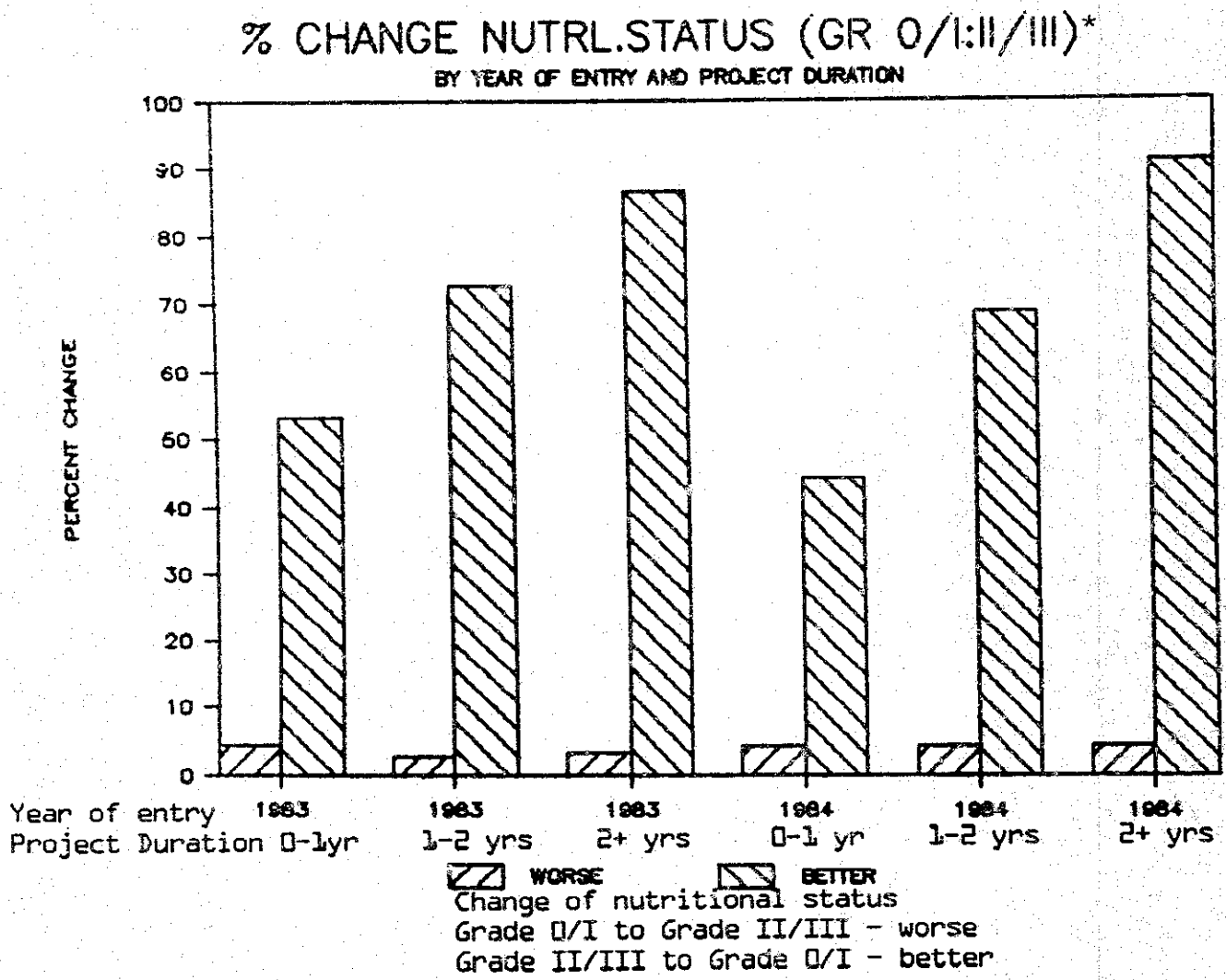
YEAR OF ENTRY	LENGTH OF EXPOSURE (YRS)	INITIAL GRADE 0/I	CHANGED TO GRADES II/III	PERCENT CHANGE
1983	UP TO 1	1066	47	4.4
	1 TO 2	630	17	2.7
	2 TO 3	635	21	3.3
1984	UP TO 1	1402	58	4.1
	1 TO 2	1956	85	4.3
	2 TO 3	232	10	4.3
	TOTAL	5821	238	4.0

CHILDREN WITH IMPROVEMENT OF NUTRITIONAL STATUS

YEAR OF ENTRY	LENGTH OF EXPOSURE (YRS)	INITIAL GRADES II/III	CHANGED TO GRADE 0/I	PERCENT CHANGE
1983	UP TO 1	173	92	53.2
	1 TO 2	91	66	72.5
	2 TO 3	82	71	86.6
1984	UP TO 1	172	76	44.2
	1 TO 2	249	171	68.7
	2 TO 3	22	20	90.9
	TOTAL	789	496	62.9

* BASED ON PERCENT OF REFERENCE MEDIAN WEIGHT-FOR-AGE (GOMEZ CLASSIFICATION)

GRAPH 3



* BETWEEN FIRST AND LAST WEIGHING

However, given the trends in the economic situation of the country, spontaneous recuperation as children grew older is less likely to have occurred. Furthermore, the recuperative impact was related to the length of exposure to the program (dose-response relationship), and it was independent of year of entry. About 88% of the malnourished children who remained in the program for 3 years recuperated, as compared to 70% of those who stayed for 2 years, and 50% of those staying for only 1 year. Length of exposure was partially related to child's age, since those entering at younger ages were more likely to stay longer than older children who were dropped when reaching 60 months.

Estimating the preventive impact of the program is more difficult, since there are no data from comparison communities over time on which to figure out the expected incidence of malnutrition (new cases) as children grew older. The data indicates that only 4.0% of those children normally nourished at entry into the program were found to be malnourished (new cases) when measured for the last time, after various time intervals (Table 16).

The potential confounding in the cohort analyses described above might be eventual self selection of drop-outs by which children not measured at least twice may have tended to be worse off. This was discarded by further analysis showing that children weighed only once did not differ in their nutritional status from those measured at least twice and included in the cohort analyses.

c.) *Comparison between ANEP and non-ANEP communities (KAP study)*

In order to explore further the eventual impact of the program on the nutritional status of children, data from weights taken in September 1986 in ANEP communities were compared with those of children from the 18 non-ANEP communities included in the KAP study carried out between October and November, 1986. As mentioned when describing the KAP study, these 18 communities were successfully matched with an equal number of neighboring, randomly selected, program communities, thus constituting a true comparison group not exposed to the program. Therefore, the nutritional status of children in these comparison communities may be thought to represent the hypothetical situation of the program communities at the time of the last measurement in 1986, if they had not been directly exposed to the program.

Comparisons between ANEP and non-ANEP communities are presented in Tables 17 and 18. The proportion of well-nourished children was greater in ANEP communities (57.2% vs. 50.3%), and that of moderate-to-severe malnutrition (Gomez classification), was 38% lower (6.9% vs. 11.1%). The difference was of greater magnitude in the east region, where the prevalence of malnutrition in ANEP communities was 58% lower than in non-ANEP. The percentage of Gomez grade I was also larger in non-ANEP communities. Consistent differences were found by age group, except among infants 0 to 4 months, whose prevalence of moderate-to-severe malnutrition was higher in ANEP communities (Table 18). The greatest differences in favor of ANEP were found in the age groups 9-11, 12-23, and 24-35 months, that is, throughout the highest risk period for malnutrition.

TABLE 17. NUTRITIONAL STATUS* OF CHILDREN UNDER FIVE YEARS OF AGE IN 70 ANEP COMMUNITIES AND IN THE 18 COMPARISON COMMUNITIES INCLUDED IN THE KAP STUDY, BY REGION. SEPTEMBER-NOVEMBER, 1986

REGION	COMPARISON (n = 542)			ANEP (n = 4245)			% DIFFERENCE
	WELLNOURISHED	MALNOURISHED		WELLNOURISHED	MALNOURISHED		GRADES II&III
		Grade I	Grades II&III		Grade I	Grades II&III	
	%	%	%	%	%	%	
NORTH (Santiago, La Vega and San Francisco)	53.1	36.7	10.2	57.3	35.1	7.6	25.5
EAST (Higuey and Arquidiocesis)	44.4	40.5	15.1	58.3	35.3	6.4	57.6
WEST (Mao-Montecristi and San Juan)	53.8	37.4	8.8	56.2	37.8	6.0	31.8
TOTAL	50.3	38.0	11.1	57.2	35.9	6.9	37.8

* Gorez Classification

TABLE 18. NUTRITIONAL STATUS* OF CHILDREN UNDER FIVE YEARS OF AGE FROM 70 ANEP AND 18 COMPARISON COMMUNITIES INCLUDED IN THE KAP STUDY, BY AGE GROUP. SEPTEMBER-NOVEMBER, 1986

AGE GROUP (MONTHS)	COMPARISON (n = 542)			ANEP (n = 4,237)			% DIFFERENCE
	WELLNOURISHED	MALNOURISHED		WELLNOURISHED	MALNOURISHED		GRADES II&III
		Grade I	Grades II&III		Grade I	Grades II&III	
	%	%	%	%	%	%	
0-4	77.8	18.5	3.7	75.8	19.6	4.6	+24.3
5-8	53.1	36.7	10.2	56.4	35.3	8.8	-13.7
9-11	48.1	25.9	25.9	58.7	34.0	8.4	-67.6
0-11	58.2	29.1	12.6	62.6	30.5	7.5	-40.5
12-23	51.1	36.7	12.2	61.2	31.8	7.0	-42.6
24-35	58.7	30.3	11.0	64.6	31.0	4.4	-60.0
36-60	42.4	48.2	9.4	49.0	43.2	7.9	-16.0
TOTAL	50.9	38.0	11.1	57.2	35.9	6.9	-37.8

* Gomez Classification

d.) *Comparison between ANEP and Ministry of Health (SESPAS) assessments of nutritional status*

Over a number of years, the Ministry of Health (SESPAS) has implemented a national nutritional surveillance system which is based on the collection of data on the nutritional status of children under 5 years of age through periodic (yearly or semi-annual) weighings carried out by about 5,000 community health workers all over the country. Annual data from that surveillance system are presented in Table 19, as provided directly by SESPAS, for the period 1983-1986, that is, the same period of ANEP implementation.

The total prevalence of grades II and III malnutrition in the same regions where ANEP has been implemented was 11.3% in 1983, 11.2% in 1984, 10.1% in 1985, and 10.0% in 1986. It is of interest to note that, against the expectations based on the serious deterioration of the economic situation during that period, the prevalence of malnutrition remained stable and even showed a slight downward trend. This contrasts, however with the progressive reduction of malnutrition observed throughout the same period in ANEP communities, which were presumably at higher risk of malnutrition than the general population measured by SESPAS.

By the end of 1986, the prevalence of malnutrition was about 31% lower in the program communities than in the general sample from the total rural population measured by SESPAS in the same regions. The difference was greater in the east and west regions than in the north, where SESPAS detected a slight reduction. The total number of children measured by SESPAS in the regions where ANEP is implemented was 65,000 in 1983, and between 120,000 and 125,000 in subsequent years. The total sample in the country reached about 135,000 in 1986. The nutritional status of children in Barahona, one of the poorest regions of the country on the southwest area bordering Haiti, an area which is not covered by ANEP, apparently remained unchanged or even worsened.

e.) *Summary of nutritional impact*

Table 20 and Graph 4 summarize the estimations of the program impact on nutritional status, as derived from different types of comparisons used for assessment. When comparing cross-sectional measurements of different children measured at 6-month intervals, the program impact was estimated as a 43.4% reduction in the rate of malnutrition (Gomez, grades II and III), and increased from 3.5% for children enrolled in 1985, to 44.0% for those enrolled in 1984, and 60.5% for those in 1983.

Estimations based on cohort analyses varied by year of enrollment, age at entry, and length of exposure (dose-response relationship), the overall impact amounting to 31.1% reduction in the prevalence of malnutrition. Comparisons between ANEP and non-ANEP communities included in the KAP study in 1986 yield a 37.8% difference which may be regarded as a gross estimate of the magnitude of program impact, provided that no changes occurred in non-ANEP communities between 1983 and 1986.

Finally, when ANEP and SESPAS data obtained in 1986 are compared, the overall program impact may be estimated as a 31% reduction in malnutrition among children under 5 years. Thus, different global estimations of

TABLE 19. PREVALENCE OF MODERATE TO SEVERE MALNUTRITION (LESS THAN 75% WEIGHT-FOR-AGE) AMONG RURAL CHILDREN UNDER FIVE YEARS MEASURED BY SESPAS* FROM 1983 TO 1986, BY REGION

REGION	1983		1984		1985		1986	
	CHILDREN MEASURED	% PREVALENCE	CHILDREN MEASURED	% PREVALENCE	CHILDREN MEASURED	% PREVALENCE	CHILDREN MEASURED	% PREVALENCE
NORTH	34,174	8.9	66,690	10.0	48,227	7.6	48,225	7.6
EAST	24,855	14.6	46,313	13.1	49,397	11.8	49,397	11.8
WEST (excluding Barahona)	6,431	10.7	12,680	10.0	21,396	12.0	23,201	11.3
TOTAL (excluding Barahona)	65,460	11.3	125,683	11.2	119,020	10.1	120,823	10.0
BARAHONA	7,482	16.8	14,752	21.9	—	—	14,758	21.9
TOTAL COUNTRY	72,942	11.9	140,435	11.6	119,020	10.1	135,573	11.3

* Secretaria de Salud Publica y Asistencia Social (Ministry of Health)

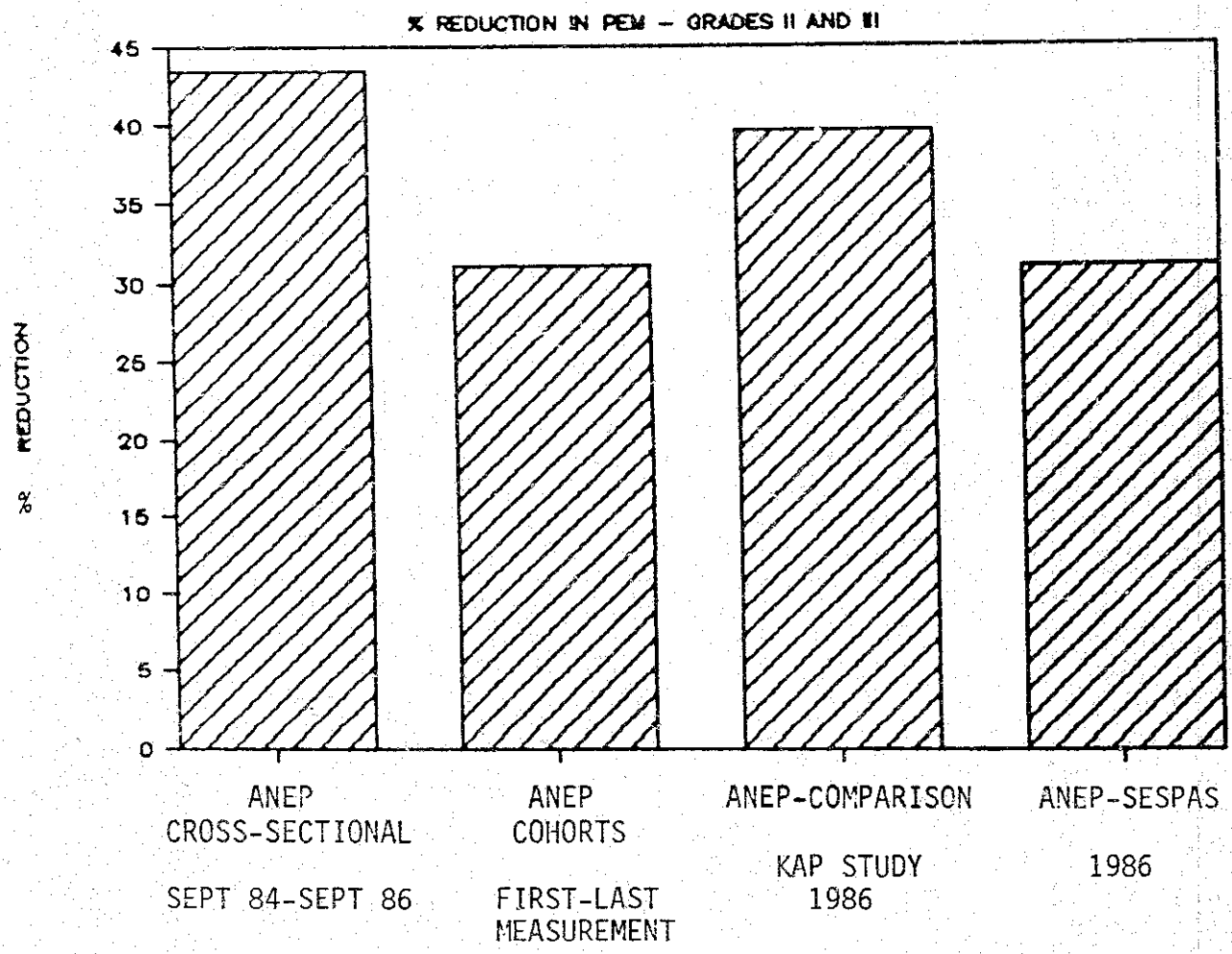
TABLE 20. SUMMARY OF TOTAL IMPACT, ESTIMATED AS THE PERCENT REDUCTION IN CHILD'S MALNUTRITION (GRADES II/III, GOMEZ CLASSIFICATION), BY DIFFERENT APPROACHES

APPROACH	% REDUCTION/ DIFFERENCE
1. TOTAL MEASUREMENTS AT 6 MONTH'S INTERVALS	
SEPT 84 TO SEPT 86 - ALL COMMUNITIES	43.4% (*)
SEPT 84 TO SEPT 86 - COMMUNITIES ENROLLED IN 1983	60.5
SEPT 84 TO SEPT 86 - COMMUNITIES ENROLLED IN 1984	44.0
SEPT 84 TO SEPT 86 - COMMUNITIES ENROLLED IN 1985	3.3
2. FIRST VS. LAST MEASUREMENT (SAME CHILDREN)	
TOTAL	31.1(*)
BY YEAR OF ENROLLMENT	
1983	38.8
1984	25.5
1985	16.0
BY AGE OF ENTRY (MONTHS)	
0 - 11	36.3
12 - 23	47.3
24 - 60	14.4
BY LENGTH OF EXPOSURE (MONTHS)	
LESS THAN 12	17.9
12 - 23	36.8
24 - 36	54.1
3. ANEP VS. COMPARISON COMMUNITIES (KAP STUDY, 1986)	
NORTH	25.5
EAST	57.6
WEST	31.8
TOTAL	37.8(*)
4. ANEP VS. SESPAS	31.9(*)

(*) See Graph 4.

GRAPH 4

COMPARISON OF SUMMARIES IN IMPACT



program impact ranged between 31% and 43%. This includes the total recuperation of 63% of the initially malnourished children, and an incidence of malnutrition of only 4.0% among those who were initially well nourished at the time of enrollment.

The results of impact evaluation, particularly in regard to the nutritional status of children over the follow-up period, should be interpreted in the context of the deteriorating socioeconomic situation of the Dominican Republic during a long, ongoing period of economic stagnation.

3. *Costs*

Costs of the growth monitoring and nutrition education portions of the program were analyzed for the 3 years of the evaluation period. Total local costs for the 3-year period amounted to $270,639. In addition, the CRS and CARITAS in-kind contribution was estimated at $35,170. Outside technical assistance costs, which were not paid for with project resources, were valued at $36,150. Additional inputs from the community (e.g., economic aid to some families with severely malnourished children) as well as voluntary work (e.g., local technical input in materials design) are difficult to estimate (16).

Based on the total 3-year cost of $305,809 (including local costs and in-kind contribution from CARITAS), costs were concentrated in the following categories:

	Cost	% of total costs
Salaries	$181,246	59.3%
Vehicles/transport	26,221	8.6%
Training Costs	18,454	6.0%
CARITAS in-kind contribution	18,000	5.9%
CRS in-kind contribution	17,170	5.6%
Overhead	13,713	4.5%
Per diem	8,666	2.8%
Office equipment and supplies (including educational material)	7,610	2.5%
Computer operation	4,578	1.5%
Rent, contingencies, and other	10,151	3.3%
TOTAL	$305,809	100.0%

As the cost analysis illustrates, the growth monitoring and nutrition education program is very labor-intensive, with 59% of total costs attributed to salaries and benefits. Although the "stimulus" paid to the promoters was not considered a true salary, this cost amounted to 11% of total program costs. Regional supervisors salary and benefit costs were 18% of total costs; central staff salary and benefits accounted for 17% of the total; and CRS salaries were 13% of the total. The non-salary costs of intensive training, retraining, and supervision amounted to 17% of total costs.

Costs per beneficiary were calculated on two bases: total local costs, and local costs plus technical assistance costs. The total number of beneficiaries was defined as the total number of children ever enrolled in the program, or 8,798. Costs per beneficiary, per year were estimated based on the assumption that the average length of participation during the first 3 years of the project was 1.5 years. The resulting costs per beneficiary resulted from these calculations:

	Costs/beneficiary	Costs/beneficiary/year
Cost excluding TA	$34.76	$23.17
Cost including TA	$38.87	$25.91

The number of children removed from moderate and severe malnutrition was estimated by calculating the actual number of cases of malnutrition at each 6-monthly weighing, from September 1984 to September 1986, and subtracting this from the number of cases expected at the rate of malnutrition observed at the September 1984 weighing, once most of the communities had been enrolled. Calculations are shown below:

	9/84	3/85	9/85	3/86	9/86	Total
Number of children weighed	2,816	3,862	4,348	4,169	4,245	19,440
Proportion malnourished (less than 75% of standard weight-for-age)	12.2%	10.4%	9.1%	7.6%	6.9%	
Number malnourished	344	402	396	317	293	1,752

It can be inferred that in the absence of the program, the rate of malnutrition probably would have remained at the initial level of 12.2%. This would mean that, of the 19,440 children weighed, 12.2% or 2,372 would have been malnourished. The number of cases of malnutrition prevented would then be estimated as follows:

2,372 cases expected
- 1,752 cases observed
620 cases removed from malnutrition

Cost/child removed from malnutrition (excluding TA)	$493
Cost/child removed from malnutrition (including TA)	$552

The costs per beneficiary and cost per child removed from malnutrition at a first glance appear to be relatively high due to a number of factors:

- The program has been implemented as a pilot project, and all "research and development" and start-up costs are included (as well as external TA costs in one of the estimates).

- As a pilot project, the number of beneficiaries is limited. Costs per beneficiary would presumably be reduced if the program were to be expanded beyond the pilot stage.

- The ANEP Program was designed as a single-purpose intervention. If additional services were added, such as an intensified ORT component (which is already beginning), the costs of each component would be reduced.

- It is relatively more difficult, and therefore more expensive, to remove children from malnutrition starting from a relatively modest rate of malnutrition (12.2% of children less than 75% of weight for age standard) than if the program were carried out in an area in which malnutrition rates were higher to begin with.

Indeed, the costs per beneficiary are relatively low when compared to recent cost-evaluations of similar PVO projects in different countries (17). Furthermore, if mothers enrolled in the program are included as beneficiaries (they were actually the target for most program activities), the costs per beneficiary become even lower (almost half); likewise, long lasting positive changes in knowledge, attitudes and behavior of the target mothers are likely to extend the benefits of the program to subsequent children, thus increasing the number of beneficiaries.

ANEP was designed and has been implemented as a grass-roots approach to promote self-reliance in primary child care through volunteer community work using growth monitoring as an entry point to enhance awareness and motivation and to provide nutrition and health education to mothers and organized community groups. Growth monitoring, the core home-based activity, is conceived as a necessary step to trigger action to promote child growth and health (8,9). Growth monitoring is used to facilitate mothers' understanding of the linkages between feeding, growth, and health. Specific educational messages reinforcing mothers' positive behaviors or otherwise suggesting behavior modifications are systematically delivered at the time of the growth monitoring sessions, as well as informally at any opportunity for contact between the community worker and the mothers and families. Informal referrals to the health system are also operational in most communities.

The ANEP growth monitoring and nutrition education intervention is well established in 70 communities and has been extended spontaneously to some neighboring areas. The program is implemented by a highly motivated and dedicated field staff, under the close supervision of equally motivated regional and central staff, with the assistance of the CRS project manager and the technical guidance of competent international consultants. Training, retraining, flexible and continued supervision, and maintenance of motivation of field personnel are permanent concerns of the central staff. Although significant improvements could still be made in program implementation, growth monitoring and promotion and educational activities are performed routinely and efficiently, with increasing coverage reaching above 70% of the 6,000 children under 5 years and above 85% of those at "high risk." Group education and other community-based activities (e.g., productive projects) are less efficiently performed; the coverage of group education has been relatively low and the outcomes of the few community projects have generally been poor.

The major conclusion of the impact evaluation is that the systematic implementation of an integrated package of growth monitoring and nutrition education activities with high coverage of populations at risk and within a grass-roots developmental strategy, significantly reduced the prevalence of child malnutrition in the target communities in the Dominican Republic. This is consistent with evaluations of programs with similar approaches to nutrition in PHC (3,5,10,11,16,17). Program effectiveness could not be attributed to isolated single program elements, but to the efficient planning, design, and implementation of a combination of technically sound strategies for growth monitoring and nutrition education within a grass-roots, participatory community approach. Consciousness raising, individual and community motivation, and the promotion of self-reliance, self-esteem, self-confidence, and individual initiative, enabling people to assume responsibility for their own destiny, have constituted an efficient framework for the delivery of a systematic growth monitoring and nutrition education intervention. This has been effectively used as an entry point to facilitate continuous person-to-person interaction between highly motivated community volunteers and mothers, families, and the community as a whole.

The following are the major elements of program success in achieving a significant impact on the nutritional status of children:

a) *Community selection.* The presence of any form of pre-existing community organization, as well as a history of participation or interest in *group* activities prior to enrollment in ANEP, may have substantially enhanced the chances of success. The typical clustering of households in the rural communities, as well as the remarkable receptivity of women to community work, clearly facilitated the home-based program implementation.

b) *Selection and training of personnel.* Community volunteer promoters were selected in a way that would ensure successful program implementation, given their past experience in community development work, their leadership ability and their initial, uncommon level of motivation and commitment to volunteer work, which appears to be stimulated by deep religious feelings. Training and re-training of promoters and area supervisors has been a permanent concern and a systematic activity which has focused, not only on developing technical skills, but also, most importantly, on reinforcing motivation.

c) *Supervision and maintenance of motivation.* Continuity, consistency, and flexibility have been key elements in a periodic supervision which, fully integrated with continued re-training of personnel, have been geared toward improving implementation and maintaining motivation. Whenever field workers' motivation is perceived to diminish, as it does when positive changes in mother's behavior or child's adequate weight gain are not apparent, supervision is strengthened to reinforce motivation and provide more training and guidance.

d) *A technically well-defined and integrated growth monitoring and nutrition education intervention.* A concrete sequence of activities for growth monitoring was established for field implementation, including not only measurement and interpretation procedures, but also immediate feedback to mothers and effective integration with immediate action (nutrition and health education, referral) and follow-up, and these program activities are implemented with high coverage (70 to 85%) in the program communities. Although there is no basis on which to estimate the maximum workload an individual promoter could handle efficiently, program experience indicates that a volunteer community worker could efficiently cover about 60 children under 5 years, including some 30-35 high risk children to be monitored on a monthly basis.

e) *An effective communications strategy.* A well-defined communications strategy has been used, not only for enhancing promoter and program image and acceptance by the community, but also for the design and testing of educational messages and materials used to complement and reinforce the program's developmental approach. Although the production of educational materials was lower than originally planned, those which were developed and used undoubtedly contributed to efficient program implementation. Important features of the promotional "social marketing" approach used for the development of educational messages and materials were the systematic use of formative field research, the specificity of program content (and limitation of messages), the feasibility of actions recommended in the educational messages, the ability to target messages and thus to achieve segmentation of the audience by need, the consistency of

contact between community workers and mothers, and the stability of messages over time, all of which appear to be key elements of success (10, 12-14).

f) *A simple and efficient information system for surveillance and ongoing evaluation.* Although the program's information system is still in the process of development and will require further refinement, improvement, and simplification, it has certainly contributed to ongoing evaluation and the resulting periodic adjustments in program implementation, as well as to the maintenance of motivation among program personnel. A key element has been the regular field use of data by promoters, supervisors and central staff.

The ANEP experiment has been closely followed by other institutions (locally and abroad) interested in innovative and effective approaches for the control of infant and child malnutrition in impoverished communities. The grass-roots community approach and the program philosophy of self-reliance, coupled with the emphasis placed on growth monitoring and education, rather than on food distribution, are key program elements that have generated increased interest in ANEP performance and outcomes. The program's communications strategy, a promotional social marketing approach which complemented a basic community development approach, is an additional remarkable asset.

The attractiveness of the ANEP model centers, not only on its potential as an effective means to improve outreach to high risk families and the health and nutrition of children in poor communities, but also on its relative low cost as compared to other models not relying on volunteer community work.

The ANEP has been successful in promoting community awareness and self-confidence and in implementing growth monitoring and education as entry points to generate motivation, foster community action, and enable individuals and the community to assume responsibility for improving their children's health and nutrition. Therefore, other institutions interested in community action to improve child health and nutrition, particularly PVOs, should consider replicating some or all program strategies and elements of the model. In so doing, it is strongly suggested that feasibility of replication be carefully examined on a case by case basis, taking into account the key program elements above described.

Effective program replication should be feasible under certain conditions. Some of the program elements would be replicable, (e.g., the integrated growth monitoring and nutrition education approach, the use of the educational messages and materials), provided that the program's philosophy, as well as the specific purposes and context within which they were developed and applied, are well understood. Interested institutions should examine their own contexts and potentialities for grass-roots community work, and assess the extent to which the key elements of program success outlined here could be reasonably achieved by them. While some of these elements are related to specific selection criteria for both communities and staff, and may not be fully met by all programs (e.g., due to political and bureaucratic constraints), it is clear that the realization of all other program elements is at least theoretically feasible, provided that measures are taken to ensure the necessary organizational and technical inputs.

In fact, similar program approaches taken by voluntary, non-governmental community organizations are likely to succeed if the following elements, currently present in ANEP, are efficiently operationalized:

- careful selection of field personnel, with leadership and motivation for community work, rather than formal education, as major selection criteria;

- systematic practical training and retraining of personnel, in response to identified needs, and reinforcing motivation and incentives;

- continued, consistent and flexible motivational supervision;

- a well defined and technically implemented growth monitoring/ education integrated intervention;

- an effective communications strategy designed to enhance the image and self-esteem of program and field workers and to generate the need for growth monitoring and education in the community;

- appropriate development and testing of messages and materials for person-to-person education linked to growth monitoring, and ensuring their proper use coupled with continuous mother-worker interaction for motivation and educational reinforcement (messages and materials should be developed and tested with the intended audience to ensure that they are understood, feasible, and culturally relevant);

- a simple and efficient information system for surveillance and ongoing evaluation purposes.

Program replication by governmental institutions not committed to participatory community development work is not likely to succeed. The key elements of ANEP should be seriously considered in any community program aimed at improving child health and nutrition. Child Survival Programs would provide the best opportunity to make as much use as possible of the experience and lessons learned, particularly by replicating key program components through PVO child survival initiatives. Governmental institutions have great potential for replication which may be realized if their usually large number of human resources (promoters) at the community level are adequately selected, trained, supervised, given proper incentives, and motivated to perform effective community work under appropriate support and supervision.

Both the individual and the group education materials developed by the program can be utilized in other settings within the Dominican Republic, especially in connection with systematic growth monitoring activities; in fact, the materials were specifically designed to be used within such a context. Dominican institutions would not need to design new messages addressing similar problems; ANEP has already done careful community research, has used the messages and materials successfully, and has adjusted them. Local institutions could either utilize the same messages and materials or use the same messages to produce new education materials that better conform to their own institutional organizations and operational systems. Other institutions could make use of the social-marketing approach for the design, testing, and application of educational messages and materials.

Local institutions interested in using ANEP educational materials should plan to be trained for this purpose, preferably by the appropriate ANEP personnel. Direct use of the materials without programmatic orientation and training is not likely to succeed. Training should integrate both the growth monitoring and the educational components.

Additional technical support after training should be provided by ANEP for some time, with further phase-out according to needs.

For program replication by other institutions in the country or abroad, it would be advisable to begin implementing the integrated growth monitoring and nutrition education program in a small number of communities to allow the institution to test its own capacity, work load, amount and quality of human resources, degree of community participation, etc., prior to further expansion to other areas or communities.

Institutions willing to replicate this program should also take into account the identified weaknesses and implementation drawbacks of ANEP as it currently operates, with the purpose of preventing or correcting them to ensure improved program implementation. Some of the *problems to be avoided* include:

- collection of information from field activities which exceeds the handling and analytical capability of the program staff and thus is not fully utilized;

- concentration of most planning, implementation and evaluation responsibilities in a single person;

- failure to assure consistent and continued local technical assistance, thus having to rely on sporadic international assistance;

- unbalanced emphasis on individual actions as compared to support of community organization and group activities.

REFERENCES

1. Keller, W. and Filmore, C.M. The prevalence of protein-energy malnutrition. World Health Stat. Quart. 36(2): 129-167, 1983

2. Austin, J. and M.F. Zeitlin. Nutrition Intervention in Developing Countries. An overview. Harvard Institute for International Development. Deigeschlager, Gunn and Hain Publishers, Inc. Cambridge, MA 1981.

3. Gwatkin, D., Wilcox, J. and Wray, J. Can health and nutrition Interventions make a difference? Overseas Development Council. Washington, D.C. 1980.

4. Hendrata, L. and Rohde, J.E. Ten Pitfalls of Growth Monitoring and promotion. Indian Journal of Pediatrics, 1987 (in press).

5. Wilcox, J.R., Teller, C.H. and Horwitz, A. Making Primary Health Care Nutrition Work: Issues Raised in a Review of the Record. International Nutrition Unit Technical Report Series. Rockville, MD. 1984.

6. Mora, J.O., Pielemeier, N., de Hails, P. and Ramirez, M. External Evaluaton of the Applied Nutrition Education Program (ANEP) of CRS/CARITAS in the Dominican Republic. Final Report, September 1987.

7. Griffiths, M. Growth Monitoring. Primary Health Care Issues Series I, No. 3. American Republic Health Association, International Health Programs. Washington, D.C., 1981.

8. Teller, C., Yee, V. and Mora, J.O. Growth Monitoring as a Useful Primary Health Care Management Tool. Presented at the Annual Meeting of the National Council for International Health. Washington, D.C., 1985.

9. Rohde, J. Feeding, feedback and sustenance of primary health care. Proceedings of the XIII International Congress of Nutrition. T.G. Taylor and N.K. Jenkins (Eds.). John Libbey, London, 1985.

10. Griffiths, M. Growth Monitoring and Nutrition Education: Can Unification Mean Survival? In: Using Communications to Solve Nutrition Problems: A Compendium. Christine Hollis (ed.) International Nutrition Communication Service (INCS), Education Development Center (EDC), 1986.

11. McGuire, J.S. and J.E. Austin. Beyond survival: children's growth for national development. Assignment Children. UNICEF, 1987.

12. Manoff, R. Social Marketing. New Imperative for Public health. Praeger Special Studies - Praeger Scientific. New York, 1985.

13. Using Communications to Solve Nutritions Problems: A Compendium. Christine Hollis (ed.). International Nutrition Communication Service (INCS), Education Development Center (EDC), 1986.

14. WFPHA. Health Education. Information for action issue paper. World Federation of Public Health Associations. American Public Health Association. Washington, D.C. 1986.

15. Parker, R.L., Rinehart, W., Piotrow, P.T., Douchette, L. Oral rehydration therapy (ORT) for childhood diarrhea. Population Reports, Issues in World Health. Series L., No. 2, 1984. Revision. Volume XII No. 4, 1985.

16. Ho, T.J. Economic Issues in Assessing Nutrition Projects: Costs, Affordability and Cost Effectiveness. The World Bank PHN Technical Note 85-14. Washington, D.C. 1985

17. Danforth, N., Schwarzwalder, A. and Le Sar, J. MSH. PVOs Reach Out. A summary of thirteen Primary Health Care Project Evaluations. Report prepared for AID/FVA by Management Sciences for Health, MSH, 1986.

18. Caritas Dominicana. Hallazgos y Metodologia en Programa de Educacion Nutricional Comunitaria. Santo Domingo, Dominican Republic, May, 1986.

19. Caritas Dominicana. Programa de Educacion Nutricional Aplicada. Santo Domingo, Dominican Republic, 1985 (brochure).