

PN 782
4402
Kam.
10/2/50
62

NUTRITION IN PRIMARY HEALTH CARE

THE STATE OF THE ART

Edward Sabin, Ph.D.
Chris Roesel, M.S.

Consultants,
Office of International Health
Department of Health, Education
and Welfare

Prepared for the Office of Nutrition, U.S. Agency
for International Development

Contract No. 782-77-0138 KS

January 1980

TABLE OF CONTENTS

| | <u>PAGE</u> |
|--|-------------|
| INTRODUCTION | 1 |
| PRIMARY HEALTH CARE, A DEFINITION. | 2 |
| NUTRITION IN PRIMARY HEALTH CARE | 3 |
| NUTRITION ACTIVITIES IN PRIMARY CARE | 7 |
| Weight Charts | 7 |
| Nutrition Education | 7 |
| Breast Feeding | 8 |
| Weaning Food | 9 |
| Basic Diet | 10 |
| Control of Infection | 12 |
| Diarrhea | 12 |
| Other Disease and Parasites | 14 |
| Nutritional Supplements | 15 |
| TRENDS AND RECOMMENDATIONS | 17 |
| SUCCESSFUL PROJECTS. | 18 |
| COSTS. | 22 |
| MODES OF IMPLEMENTATION | 23 |
| Community Participation | 24 |
| Health Worker Selection | 25 |
| Training | 28 |
| Health Worker Motivation | 29 |
| NUTRITION IN A.I.D. PRIMARY HEALTH CARE PROJECTS. | 31 |
| POPULATION SERVED | 35 |
| CONCLUSION | 37 |

- 1 -

NUTRITION IN PRIMARY HEALTH CARE

THE STATE OF THE ART

Eighty per cent of the children in the world today live in developing countries, the majority in an environment with poor food supply, many pathogens, poor housing, insufficient or poor quality water and inadequate health care. Mortality is high among infant and young children in developing countries. Infant mortality rates range from 60 to over 200 deaths per thousand live births per year, a range about ten times higher than infant mortality in industrialized countries.

Among children age 1 to 4 years, the difference in mortality rates between developing and developed countries is even greater. Death rates in this age group may range from 20 to 40 times higher in developing countries compared to developed countries. Most of the deaths are due to the combined effects of malnutrition and infections such as diarrhea, measles or respiratory illnesses not fatal to well-nourished children. Infection, parasites, inadequate diet, traumatic weaning experience, all contribute to high levels of morbidity and mortality and are the result of poverty, unhygienic living conditions, ignorance and a lack of essential health services.

With flat or even negative per capita economic growth in the rural areas of many developing countries, economic development cannot be relied upon, in the short term, to ameliorate the consequences of poverty in the countryside. Instead, direct interventions to improve the health and nutritional status of the poor

majority are required. But is this possible at a cost which LDC governments can afford?

In an important paper, "Can Interventions Make a Difference?" Gwatkin, Wilcox and Wray give an optimistic affirmative answer to this question. The 10 health and nutrition programs they review "present a persuasive case that ... in populations of up to 60,000 or 70,000, infant and child mortality can be reduced by one-third to one-half or more within one to five years at a cost under the equivalent of 2 percent of per capita income, an amount no greater than that currently being allocated to health."¹

PRIMARY HEALTH CARE

One of the principle obstacles to essential health services for the majority in developing countries is a lack of effective health networks that reach out to the community level, particularly in rural areas. In many countries access to child health care is very limited and even basic health programs such as child immunizations are not available. Conventional hospital-based health care systems have proven too costly and have provided access to health care for only a few. Early in the 1970's the importance of a realignment of health services with integrated planning, improved coverage and increased emphasis on participation at the community level was recognized. This approach to the extension of health services is called primary health care.

1. Davidson Gwatkin, Janet Wilcox and Joe Wray, "Can Interventions Make a Difference? The Policy Implications of Field Experiment Experience" Report to the World Bank, March 1979, p. 43

Local resources and self-reliance must play a large role in primary health care in order that care remains affordable and accessible to the poor majority. The people themselves possess many resources for better health and nutrition; but organization, motivation, and communication are necessary before these resources are used. In 1978, representatives from 140 nations at a WHO/UNICEF Conference on Primary Health Care in Alma Ata, USSR, endorsed the concept of primary care, and adopted the goal of "Health for All by the Year 2000".

Primary health care systems are typically three-tiered, pyramid-shaped structures administered by physicians or other health professionals. Mid-level workers and village level health workers are trained to extend scarce professional services by treating simple illnesses and referring more serious cases to central health posts or hospitals. The tasks of these health workers vary, but include illness prevention, health education, promotion of proper nutrition, as well as the dissemination of basic information on hygiene and clean water.

NUTRITION IN PRIMARY HEALTH CARE

The inclusion of nutrition in the primary health care movement is a timely, opportune and fortuitous trend. On the one hand, nutritionists are searching for a change agent who can reach people on the periphery or in their homes; on the other hand, health workers in developing countries are frustrated in attempts to improve the health of children and mothers when large numbers of them suffer from malnutrition.

Malnutrition has long been recognized as an obstacle to good health of infants, children and mothers in developing countries. While nutrition activities have been carried out in clinics and food distribution centers for some years, the practice of village level primary health care worker doing nutrition activities is relatively new.

What are the tasks which are within the capability of village health workers that will improve the nutritional status of the most vulnerable groups in the village? The answer to this question will, of course, vary by country and even by region within countries depending on the health and nutritional problems of the people. However, certain general guidelines are available which can be adapted to particular and local circumstances.

Table I lists in abbreviated form suggestions by the World Health Organization (WHO) on appropriate and effective nutrition activities for primary health care workers. The definition of just which activity is, or is not, a "nutrition" activity is arbitrary. For example, a new road built near a previously isolated village may have a positive impact on the nutritional status of villagers, but road building is not usually considered a nutrition activity. The borderline between nutrition and other health activities in a primary health care setting is blurred. Because of the intimate synergistic relationship between infection and malnutrition, infection control, not usually considered a nutritionist's task, receives equal priority with other "nutrition" activities in the WHO recommendations.

TABLE I: W.H.O. RECOMMENDATIONS FOR NUTRITION ACTIVITIES IN PRIMARY HEALTH CARE

| 1971 RECOMMENDATIONS NUTRITIONAL ACTIVITIES ¹ IN PERIPHERAL BASIC HEALTH SERVICES ² | 1974 RECOMMENDATIONS SUGGESTED NUTRITION ACTIVITIES ¹ AS A COMPONENT OF "MCH-NUTRITION- FAMILY PLANNING" PACKAGE ² |
|---|---|
| <ol style="list-style-type: none"> 1. Nutritional Surveillance <ol style="list-style-type: none"> a. Clinics: weight for age, serial records for under 5's to identify PEM b. Home visits: observation of PEM, follow-up c. Check for signs of locally most important deficiency (for instance vitamin A) and treat 2. Nutrition education <ol style="list-style-type: none"> a. Advise mothers on supplementary feeding and weaning, especially quantities and frequencies. Advise mothers on complementary foods, amounts and preparation. b. If non-cereal staple, advise on local protein sources. 3. Control of infectious diseases <ol style="list-style-type: none"> a. Immunization of all children that can be reached. b. Advise on food and fluid intake during infectious events, especially diarrhea. Simple oral rehydration service. c. Advise on sanitation in the home, especially for infant food. 4. Nutritional supplements. <ol style="list-style-type: none"> a. Distribution of iron to pregnant women. Prevention programme for iron deficiency anemia in pregnancy. b. Vitamin A to newborns and deficiency cases. c. Milk powder or other supplements to young children with PEM with advice on use. 5. Nutritional recuperation <ol style="list-style-type: none"> a. Refer moderate cases of PEM for nutritional recuperation and education program, if available. b. Refer severe cases to hospital or health center ward | <ol style="list-style-type: none"> 1. Individual surveillance and community surveillance by the use of simple indicators including weight charts. 2. Identification of severe cases of malnutrition and referral of severe cases to a higher level for treatment. 3. Nutrition education of mothers on: <ol style="list-style-type: none"> a. Promotion of breast-feeding b. Preparation of home-made weaning foods c. Improvement of basic diet. d. Food hygiene and environmental health 4. Distribution of nutrient supplements: <ol style="list-style-type: none"> a. Routine for anemia b. Corrective in selected cases 5. Control of infections and infestations: <ol style="list-style-type: none"> a. Immunization b. Deworming c. Oral rehydration 6. Family planning education and services. 7. Collaboration with workers from other sectors. |

¹ Includes only the recommendations for the minimum and medium programs but not the optimum program.

² Adapted from "Integration of Nutrition Activities in Basic Health Services" section 2.2.1 of the WHO Program Review: Nutrition, 1971, WHO Publication Number EB69/30, p. 13.

¹ Includes only the recommendation for the minimum and medium programs, but not the optimum program.

² Adapted from "A Guideline for Nutrition Activities Through Local Health Services for Joint WHO/UNICEF Strategy", 1974 WHO Publication, Number NUT/74.3, p. 7.

TABLE I (continued)

1976 RECOMMENDATIONS

MODEL OF NUTRITION ACTIVITIES¹ OF THE PRIMARY HEALTH CARE LEVEL²

1. Surveillance
 - a. Weigh children, chart, interpret, and act on the results.
 - b. Refer children with less than 70% of expected body weight, and children who are losing their body weight rapidly.
2. Nutrition education
 - a. Promote and protect breast feeding. Show dangers of using bottles, emphasize need for food supplements after infant is 4 to 6 months of age.
 - b. Advise mothers on weaning food mixtures. Identify successful weaning practices in a region and promote these.
 - c. Provide for health workers a list of locally available cheap food which would improve the basic diet of the region.
3. Control and management of infections
 - a. Health education on personal and food hygiene to prevent gastroenteritis.
 - b. Oral rehydration by health workers and promotion of the practice among mothers and others.
 - c. Immunize children, especially against measles to significantly reduce mortality among malnourished children.
4. Distribution of nutrient supplements.

In areas where certain type of nutritional deficiencies are endemic, e.g., xerophthalmia caused by vitamin A deficiency and nutritional anemia caused by iron and/or folate deficiency.
5. Collaboration with other workers.

¹ No distinction was made in this list between minimum and maximum programs.

² Adapted from "Interregional Consultation on Strategies for Nutrition Through Local Health Services, Teheran 1976"

WHO Publication Number NUT/77.4, pp. 6-9.

1979 RECOMMENDATIONS

NUTRITION ACTIVITIES¹ OF COMMUNITY HEALTH WORKERS²

1. Get to know the community and develop a work-plan.

Establish rapport with villagers: determine people's nutrition-related problems and felt-needs.
2. Motivation and organization of community group.

Involve community groups in nutritional activities.
3. Nutritional monitoring

Ascertain age of child, weigh the child, record weight on growth chart, and interpret necessary action; use other field techniques for detecting severe malnutrition.
4. Nutrition education
 - a. Educate on the role of nutrition in growth and development.
 - b. Encourage breast feeding; help the mother to overcome sore nipples, engorgement of breasts and fear of inadequacy of milk; impress upon the mother the high risk of bottle feeding.
 - c. Determine existing feeding practices in the community and advise on the best use of locally available cheap foods for improvement of existing diets.
5. Identify and manage nutritional deficiencies.

Recognize children in community suffering from PEM, or at risk of nutritional blindness. Identify cases of anemia. Manage and treat the preceding.
6. Control and management of infections.
 - a. Diagnose diarrhea and dehydration; take appropriate measures.
 - b. Organize immunization programs in the community and prepare educational messages for the prevention and management of infectious diseases.
7. Collaborate with other workers for nutrition promotion.

¹ No distinction was made in this list between minimum and maximum programs.

² Adapted from "Guidelines for the Training of Community Health Workers in Nutrition" Draft, 1979 WHO Publication Number NUT/79.6, pp. 15-18.

NUTRITION ACTIVITIES IN A PRIMARY HEALTH CARE SETTING

WEIGHT CHARTS

A sign of protein energy malnutrition (PEM) in children is failure to grow normally. The usual measure of growth retardation is to chart an infant or young child's weight for age and compare it against a standard of growth. Child weighing plays a central role in any assessment of nutritional status in a community. It is an important means of educating mothers or other child caretakers on the importance of nutrition. Ideally child weighing should begin with birth weights. Birth weights also provide important information about the health and nutritional status of mothers in a community. Unfortunately, determining the age of the child being weighed is not always easy in many village settings. Weighing children ranks at the top of the list of recommendations in three out of the four lists in Table I.

NUTRITION EDUCATION

"Properly planned and executed nutrition education can be of great value in nutrition promotion, especially for infants and children. Too often there is little impact since the messages endeavored to be conveyed are too many, rather technical and unrealistic." This quote from a WHO document published in 1977, best summarizes the state-of-the-art of nutrition education to date.² The statement continues, "For most developing countries,

2. "Interregional Consultation on Strategies for Nutrition Through Local Health Services." WHO Publication, 1977, Number NUT/77.4, pages 7-8.

the following three messages, properly conveyed, will produce significant impact on the nutritional status." The three message topics are (1) breast-feeding, (2) weaning practices and (3) improvement of basic diet.

Nutrition Education: Breast-feeding

Human breast milk is a unique and inimitable food for infants. It has stood the test of time and is recommended as the preferred method of infant feeding by all national and international scientific and health organizations. Infant feeding practices have public health implications worldwide. In many regions, how infants are fed is often a matter of life or death. One public health expert has estimated that if breast-feeding were reinstated in developing countries, where its use has declined, some 10 million children could be saved from diarrheal disease and severe malnutrition each year.

In rural areas of those developing countries where breast-feeding is the rule, the message should be the protection rather than the promotion of breast-feeding. Supplementation of breast milk with other food should be encouraged after the infant is 4 to 6 months old and breast feeding should be encouraged as long as possible.

Successful breast-feeding is based on advice and instruction from more experienced women and requires confidence and assurance. Health personnel, not only in developing countries, but also in industrial countries, are poorly informed about breast-feeding and are often not prepared to help mothers with practical advice. Hospital deliveries may play a role in the decline of breast-feeding.

Infants are often taken from the mothers at the time of delivery and at night. They are given sugar water or formula in bottles with the result that the infant is later less able to breast-feed. Recent research has shown an increasing number of immunological factors present in breast milk and colostrum (first milk) which play an active role in combating infections. This function is vital for infant health particularly in unsanitary surroundings -- the norm in rural areas and urban slums of developing countries. Manufacturers have contributed to the decline of breast-feeding in developing countries. Some governments such as Jamaica and Venezuela, have taken steps to regulate the advertising of infant formula in hopes of reversing the downward trend in the proportion of mothers who breast-feed. Other governments, such as the Philippines and Guatemala, have not regulated infant food company activities in their countries. The advertising and promotion of infant formula products is widespread in the latter. Of nine countries surveyed by the World Health Collaborative Study of Infant Feeding, the Philippines showed the highest proportion of mothers who had never attempted breast-feeding.

For more information on breast-feeding, please request from the authors the paper, "Breast Is Best: A Bibliography on Breast-Feeding and Infant Health".

Nutrition Education: Supplementary and Weaning Foods

Because of their rapid growth and development, infants and small children have a higher need for nutrition relative to their

weight than do adults. For this reason and others, children are often the first in the community to show signs of malnutrition.

Most experts agree that after a child is 4 to 6 months old, his or her diet should be supplemented with other food while continuing to breast-feed. However, misconceptions about supplementation and weaning food are common in many communities and cultures. Supplementation is often delayed too long. When it is begun, the diet commonly consists of the local staples (grains or tubers) prepared as a watered-down milk-like beverage. It is usually low in nutrient concentration and lacks a number of vitamins and minerals. When cassava is the staple, protein is also deficient. Even when the more varied and nutritious family diet is fed to the young child, it may be spiced too heavily for the infant's taste or prepared too crudely for its digestion.

A major strategy in the campaign against malnutrition has been the search for adequate but inexpensive weaning food for infants. In some cases, high protein foods such as eggs, are taboo for young children. Local custom and taboos have complicated this search. Weaning foods with the most promise are usually a mixture of locally available food such as pulses and grains.

One strategy in weaning food education is to identify successful weaning practices already found in the region and promote them. Health workers should also urge mothers and other child caretakers to feed children many times a day rather than once or twice a day when the rest of the family eats.

Many mothers are incredulous when informed that a two year old should consume about half the amount of food of an adult. For more information, please request from the authors the paper: "Perspectives in Maternal-Infant Nutrition".

In no other nutrition activity is knowledge about local practices so important as in attempts to improve the basic diet in a community. Food habits are not easy to change in the best of circumstances. The use of glossy posters which urge people to eat expensive and unavailable foods is a waste of time for the health worker and ruins his or her credibility in the community.

Derrick Jelliffe, an expert on public health nutrition, suggests that messages to improve the basic diet should be realistic and focus on the main food or staple of the community. Depending on local circumstances, messages to improve the diet should, according to Jelliffe, stress one or more of the following additions to the local staple

- (1) legumes to add protein.
- (2) dark green leafy vegetables to add vitamins and minerals.
- (3) human milk, vital for infants, as a supplement for weanlings.
- (4) any animal products which are available for fat, protein and other nutrients.

The preparation of effective nutrition education messages is an art in itself which depends on knowledge of local language, culture, and food practices together with communication skills.

Nutrition education on breast-feeding, weaning food and improvement of the basic diet ranks second in importance. The four lists of recommendations concerning nutrition activities in primary health care services in Table I.

CONTROL OF INFECTION: DIARRHEA

Infections and malnutrition go hand in hand. Without the control and management of infections in children, nutrition education and food supplementation will have limited impact. Thus, prevention, cure, or control of infections, especially gastroenteritis, are priority activities for the primary health care worker.

Diarrhea is a leading killer of children in developing countries. In some developing countries, diarrheal attacks may occur as frequently as once a month during the child's second year of life. When a child is malnourished the impact of diarrhea is more severe. A series of attacks of diarrhea seriously undermines the nutritional status of the child, particularly when foods and fluids are withheld during the diarrheal episode, a nearly universal practice. Loss of appetite, a consequence of severe malnutrition, combined with the withholding of food contributes to the downward spiral of health in cases of diarrhea and malnutrition. The immediate threat of diarrhea is dehydration, the loss of water and electrolytes in the feces. Shock and coma result when the fluid deficit equals about 10% of body weight. Greater losses cause death.

Recent findings show that an oral glucose electrolyte solution is effective in alleviating the dehydration and electrolyte imbalances that result from acute diarrhea. This fluid, a mixture of salt, baking soda, potassium chloride and glucose in water, when used in combination with reformed infant

feeding, can successfully prevent severe dehydration and salt imbalances in the great majority of cases. Oral rehydration (ORT) is much cheaper and easier to use than intravenous rehydration. Despite this, the technique has not yet been adopted by the majority of hospitals, or health posts or community health workers in developing countries. The simple technology of ORT makes it an ideal candidate to be moved from the hospital or health post to the periphery in the hands of the primary health care workers.

ORT does not treat diarrhea directly but only the hazard of dehydration which accompanies diarrhea. ORT can have a substantial impact on childhood morbidity and mortality only if the knowledge and the supplies necessary are widespread in a country. ORT may also be appropriate for home use, administered by the mother or other child caretaker. This will require an educational campaign of large proportions, particularly since ORT goes against the widespread cultural practice of withholding fluid and foods during diarrhea episodes. In those cases where villagers are using appropriate fluids in the treatment of diarrhea, this should be reinforced.

Inevitable consequences of public education programs to promote health practices such as ORT are mistakes in the way in which messages are received. Because of messages about the benefits of ORT to child health, mothers have been found feeding only rehydration mixtures to their malnourished children who had diarrhea in the mistaken belief that this alone would improve the health of their child. The caloric value of rehydration fluid is insufficient to meet food needs. ~~... ..~~ ~~... ..~~ feeding and/or feeding with other foods in conjunction with ORT

is very important, particularly with malnourished children.

For more information on diarrheal disease and the use of oral rehydration therapy, please request from the authors the paper: "Diarrheal Disease and Oral Rehydration: An Annotated Bibliography".

Infectious Diseases and Parasites

The interactions between infections and malnutrition are well known. Measles, tuberculosis, and respiratory infections are major child killers, their relative importance varying by area. Parasites such as malaria, hookworm, and roundworm also contribute to malnutrition, the first two causing anemia and the last general nutrient insufficiency.

Immunization against contagious diseases or prompt treatment are important in nutrition improvement. Measles is a serious problem in developing countries, particularly Africa. Mortality from this disease can be up to 400 times greater among malnourished children than among healthy children. Infants can lose 10% of their body weight during an episode of measles. Another serious disease affecting nutritional status is tuberculosis, a condition found in areas of poor housing, malnutrition and overcrowding. Immunizations against measles and tuberculosis are often very cost-effective. During periodic immunization campaigns, the primary health care worker can help increase participation by villagers even if he or she is not able to provide immunizations.

Treatment of lower respiratory infections with antibiotics can prevent body wasting and death.

Maternal malaria affects maternal iron status, infant birth weight and infant mortality. Treatment of pregnant women in malaria endemic areas should be a priority for health workers. Another parasite, roundworm, infects up to an estimated one-quarter of the world's population with probable detrimental consequences for nutrition, particularly in children. Hookworm, a major cause of anemia around the world, can be prevented by sanitary measures and the wearing of shoes.

Control of infections ranks third in two of the four lists of recommendations concerning nutrition activities in primary health care services in Table I.

Nutritional Supplements

To protect maternal, fetal and infant health, "feed the mother" is an excellent strategy. The nutrition of the mother-infant dyad begins with the mother. In industrialized countries, mothers gain on the average over 20 pounds during pregnancy. Studies in developing countries among poor mothers show that their weight increase is often limited to between 8 and 15 pounds. Over 60% of the women in these populations may be deficient in iron and folic acid. A high proportion of the infants born to women in these circumstances are "low birth weight" babies. These infants are more prone to infection, congenital defects and death than normal weight babies are. Appropriate maternal prenatal supplementation can significantly increase infant birth weight.

Maternal prenatal supplementation in various projects has been found to be highly associated with decreased perinatal mortality and low birth-weight babies. The Narangwal study, discussed later in this paper, found that iron and folate supplements during pregnancy were the most cost-effective measures to reduce perinatal mortality. Other studies in Guatemala have demonstrated the effectiveness of prenatal calories in increasing birth weight. These results probably vary according to endemic disease patterns, birthing practices, and cultural dietary patterns. Despite this, iron and folic acid for all pregnant women and caloric supplementation for the high risk mothers, are likely to be effective in most developing country settings.

A major portion of international development assistance is in the form of food aid through the U.S. Food for Peace Program, the World Food Program and other sources. A substantial part of this food aid is used in supplementary feeding programs. Children are the main beneficiaries of supplementary food programs which may be attached to schools, health centers, or other sites.

Debate concerning these programs centers on coverage, cost and the relative merits of on-site feeding versus take-home programs. With the growing recognition of the vulnerability of infants and young children to malnutrition, the emphasis in supplementary feeding programs has shifted from school feeding to pre-school programs attached to, for example, mother-child health centers. Pyle estimates that most supplementary feeding programs reach fewer than 10% of the malnourished pre-schoolers in their respective countries.³

³David Pyle, *Preschool Nutrition Intervention Manual*, Unpublished paper, Harvard Institute of International Development, 1978, p. 7.

Nutrition supplements rank fourth in three out of four lists of recommendations concerning nutrition activities in primary health care projects in Table I.

TRENDS IN RECOMMENDATIONS ON NUTRITION IN PRIMARY HEALTH CARE

Changes which have occurred from 1971 to 1979 in WHO recommendations concerning nutrition activities in primary health care services are shown in Table I. One addition to the 1974 list and appearing thereafter is breast-feeding promotion. The term "primary health care" first appears in the 1976 list and remained in 1979. Community organization appears on the list of nutrition activities in 1979.

Comparing the 1971 recommendations with the 1979 recommendations, one can see an increased emphasis on the local community. In the later recommendations health workers are urged to learn about local organizations and enlist their support. Also, they are asked to learn about successful weaning practices in the region and promote them. In addition, in the 1979 list, health workers are asked to learn about locally available foods which are low in cost in order to promote these for improved diet. These changes mean that socio-cultural factors have assumed greater importance during the decade of the seventies in WHO recommendations concerning nutrition activities in primary health care programs.

Persons trained to be primary health care workers are often selected from among the villagers they will later serve. In many cases, they lack formal education beyond the primary level and may in some cases be illiterate. All four lists of recommendations in Table I, considered in this context, can be seen as an ambitious set of duties to be added to other health tasks which are expected of primary health care workers. Is this realistic? Are we overloading the health worker and expecting too much of him or her?

Analysis by WHO of the activities of community health workers reveal that, in general, their performance in nutrition and nutrition-related activities have very little impact.⁴ This is for two reasons:

- (1) In most cases they are so overburdened with curative work that they have no time to do any preventive or promotional work. Most nutritional tasks are preventive and promotional.
- (2) Often these workers are not clear as to what precisely is to be done for nutrition promotion and malnutrition prevention. Inadequate and inappropriate nutrition training is responsible, to a large degree, for this unsatisfactory situation.

4. "Guidelines for the Training of Community Health Workers in Nutrition" WHO Publication # NUT 179.6 (DRAFT) p. 3.

5. Same source.

SUCCESSFUL PROJECTS

The preceding gloomy assessment of the effectiveness of nutrition activities in the hands of community health workers contrasts sharply with the optimistic view cited earlier in this paper. Gwatkin, Wilcox and Wray, together with other researchers, have asserted that low-cost health and nutrition interventions can and have had an impact!*

The authors have examined several of the more thorough of these reports to determine if there is consensus regarding appropriate nutrition activities, their costs and their attributed effects. Also, an attempt was made to clarify patterns in training, selection and support of community health workers, as well as the role of community participation in those projects.

The results of this research, presented in Tables II and III parallel the basic observations of Gwatkin, Wray and Wilcox, that low-cost health and nutrition interventions can have an impact on growth and on infant and child mortality. The dramatic decline in mortality rates over the several year life of these projects shown in Table II support this generalization.

* See references 1,3,5,6,13,15,20,27,28,31,36 in the bibliography.

TABLE II
IMPACT OF PRIMARY HEALTH AND NUTRITION SERVICES
ON GROWTH AND MORTALITY BY PROJECT AND COST *

| Project | Population | Services | Growth data or decline in malnourished | Infant Mortality Change | Young Child Mortality Change | Costs per capita per year | costs per at-risk person per year |
|----------------------------------|---|--|---|---|--|---------------------------|---|
| Manover, Malawi (1973-1977) | 65,000 (6,500 under 5's) | <ul style="list-style-type: none"> . Census all homes. Identify malnourished. . Provide food supplements to malnourished. . Teach nutritious foods and good preparation. Promote kitchen gardens. Encourage breast-feeding. . Distribute vegetable seeds. . Monitor W/A monthly (malnourished) or bi-monthly. . Promote home hygiene and cleanliness . Promote immunizations, natal care, and family planning. . Promote greater use of health services. | 50% decline in children less than 75% of weight for age standard. | 73% decline 47/1000 to 11/1000 | 64% decline 16/1000 to 6/1000 | \$0.40 - \$5.92 ** | \$20 per 0-5 child to \$59 per 0-5 child. |
| Imeni, Malawi (1956-1977) | 5,850 (1,120 under 5's) 1 village | <ul style="list-style-type: none"> . Check weight charts, screen and follow-up as appropriate in the clinic. . Immunize and give anti-malarial treatment. . Treat acute ailments (fevers, colds, and diarrhea (ORT)). . Child spacing services. | 50% fewer children less than grade III malnourished compared to control village | 37% lower than control. 57/1000 versus 91/1000 | 65% lower than control 18/1000 versus 51/1000 | \$1.50 | \$4.43/child |
| Jamshed, Maharashtra (1971-1977) | 40,000 30 villages | <ul style="list-style-type: none"> . Help mothers and others cook and feed children . Weigh children once per week. . Educate mothers and care-takers in child care. . Visit each pregnant woman and distribute vitamin and mineral tablets. . Promote and facilitate potable water, sanitation & food production (cooperate with extensionists). . Screen children for common diseases. . Refer children for immunizations. . Give Tetanus toxoids to mother in 3rd trimester. . Treat acute ailments. | N.A. | 62% decline 97/1000 versus 41/1000 | end of project: (1978) 15/1000 | \$2.25 | N.A. |

* See Bibliography for References to these Projects

** Cost figure depends on which set of inputs are included in the cost calculation

Table II (cont.)

| Project | Population | Service | Growth data or decline in malnourished | Infant Mortality Change | Young Child Mortality Change | Costs per capita per year | Costs per at-risk person per year |
|--|--|--|--|---|-----------------------------------|---------------------------|-----------------------------------|
| Hiraj, Maharashtra (1974-1977) | 216,635 (23,830 0-5's) 58 villages | <ul style="list-style-type: none"> 0-5's Screen arm circumference; follow II & III degree malnourished with weight-age chart. Supplement with vitamin A biennially. Teach breast-feeding and appropriate supplementation. Distribute Iron and folate supplements. Disinfect wells weekly with bleach. Immunize young children. Register pregnant women and record vital statistics. Give 2 tetanus toxoids for pregnant women. Instruct in ante- and post-natal care. Treat simple diseases. Teach home Oral rehydration. Screen for malaria. Refer those who wish family planning. | N.A. | 66% decline 68/1000 versus 23/1000 | N.A. | \$0.52 | N.A. |
| Narangwal, India (Nutritional) (1970-1973) | 1000 00 0-3's 1 villages | <ul style="list-style-type: none"> Prepare food, record consumption, push participation in feeding program especially for malnourished children. Visit homes bi-monthly; record birth weight and supplementation data. Postnatal care: weigh monthly to tri-monthly; chart weight. Iron and folate to all pregnant & lactating women, food to high risk. Educate: Promote breast-feeding & good weaning practices. | This group combined with medical & nutrition group below for growth measurement | 24% less than control Villages | 47% less than control Villages | \$1.82 | \$23 per year per 0-3 year old . |
| Narangwal (medical) (1970-1973) | 1000 00 0-3's 1 villages | <ul style="list-style-type: none"> Immunize with DPT, BCG, measles, and (for pregnant women) tetanus. Early diagnosis and treatment of respiratory infections and diarrhea. Refer emergencies for treatment. | N.A. | 45% less than control villages | 47% less than control villages | \$1.00 | \$9 per 0-3 year old |
| Narangwal Nutrition (1970-1973) | 1000 20 0-3's 1 villages | Above two lists of activities combined | 25% fewer children less than 70% of the weight for age standard compared with control villages | 32% less than control villages | 32% less than control villages | \$1.80 | \$21 per 0-3 year old |

Taking a quick tally of the activities of health workers in different projects listed in Table II, one can see that nutrition activities seem to predominate although the borderline between nutrition and health activities is not firm. Nutrition activities blend imperceptibly into health activities, particularly in the case of home visits during which several services are usually provided. This is just as well because it was, unfortunately, rarely possible to separate the effects of nutrition activities from health activities. Although the Narangwal project does permit analysis of the impact of nutrition versus health services, the results in Table II regarding the relative impact on nutrition versus health activities are not conclusive. For example, the combined effect of health and nutrition activities appears to be less than the effect of either set of activities by themselves. This may be due to small sample size.

COSTS

The governments of 44 of the poorest countries spent \$3 or less per person per year on health services for their citizens in the mid-1970's. In contrast the per capita figure for North America was \$236 per person per year.⁶

6. Ruth Sivard, World Military and Social Expenditures. 1978
WMSE Publication, Leesburg, Va. 11:25-59.

Table II shows that the per capita costs for health and nutrition services in these successful primary health care projects were usually under \$3 per person per year. However, it is important to realize that the services in Table II were not spread evenly over the entire community but were highly focused on a subset of the community: namely, at-risk groups, infants, young children and pregnant women. It is among these groups that nutrition and health services can have the greatest impact. Naturally, the cost per at-risk person (the last column in Table II), ranging from a low of \$4 to a high of \$59, is higher than the cost per capita when the entire community, many of whom receive no service, is used as the denominator for calculating costs per capita.

A number of researchers have found that pre-school malnutrition is not perceived as a community problem in developing countries. The careful focusing of services on one sector of the community is, in a sense, a political decision based on certain priorities in the minds of project planners. One should be prepared to face the prospect that these priorities may not be shared by village elders or other potential consumers of health services in a community. Village councils composed of men may not be aware of nor put a high priority on the nutritional needs of women, infants and small children.

MODES OF IMPLEMENTATION

Even the most carefully planned nutrition activities in a primary health care system stand or fall on the success of the

primary health care system itself. Primary health care is labor intensive. The organization, training, motivation and supervision of manpower is critical. Indeed, Gwatkin, Wray and Wilcox concluded that the effectiveness of administration may be as important as the particular mix of services activities in determining success in the health and nutrition projects they examined.

Important considerations in the implementation of primary health care systems are

- (1) community organization and participation,
- (2) health worker selection,
- (3) health worker training, and
- (4) health worker motivation.

Community Participation

Local resources and self-reliance must play a large role in primary health care in order that care remains affordable and accessible to the poor majority. The people themselves possess many resources for better health and nutrition; however, community organization and mobilization are necessary before these resources will be better used. Simple tasks performed by villagers or primary health care workers, are not simple to organize.

Many proposals regarding primary health care projects, including those funded by the U.S. Agency for International Development (AID) to be discussed later in this paper, specify that a village health committee should select persons in the village to be trained as primary health care workers. The issue of

how the village health committee is organized in the first place and by whom, is sometimes glossed over even though this in itself is a formidable task.

Several of the projects examined by Gwatkin, Wilcox and Wray do not qualify as primary health care projects in the current meaning of that term because they were based on health professionals providing direct services to groups and did not depend on community resources. Gwatkin et al. note that community mobilization is considerably more difficult to plan than straight forward provision of services.

Home visits, a form of outreach that usually increases community participation, figured importantly in all the successful projects listed in Table II except for Imesi. The primary health care worker visited all homes in his or her area on a regular basis. The home visit may have been an important factor in the success of these projects in that it afforded an opportunity to identify needs and promote better nutrition and child rearing practices. Home visits also expose the worker to the home environment and may provide a better understanding of environmental factors in the family's health or disease.

Health Worker Selection

Table III shows how health workers were selected, trained and paid in the successful projects listed in Table II. All the projects used females as the major community health worker although Miraj also used men as traveling sanitation and disease control workers. Literacy was a common but not universal requirement by projects. Miraj required literacy of all their workers. Special reporting methods were developed in these

TABLE III

VILLAGE LEVEL WORKERS: SELECTION, TRAINING, AND SUPPORT

| PROJECTS | SELECTION | QUALIFICATIONS | TRAINING DURATION | | INCENTIVES | NOTES |
|--------------------|---|--|---|---|--|---------------------------|
| | | | PRE-SERVICE | IN-SERVICE | | |
| 1 Hanover, Jamaica | HA ¹ By prior project from local area although not necessarily the community. | Female. Literate. Lives in the district. Closely related culturally. | 8 weeks. Locally-trained in makeshift classroom close to home. General: medical, nutrition, hygiene, first-aid, family planning. Functional: census-taking. Measure weight, & chart on a weight/age chart | 1 day per month to discuss problems and solutions | Full salary (\$1,612/year) | 1 Community Health Aid |
| 2 Inesi | AM ² Government-trained, project selected. Not from the community. | Female. NA | NA | NA | Full Salary | 2 Auxillary Nurse Midwife |
| 3 Jamkhed | AM ³ Village selected after the project. Credibility and importance were established. From the village | Female. Middle-aged. Reasonable amount of life experience | One (1) week orientation. - 1/3 on social responsibility. - 1/3 technical. | One day per week at PHC: Report vital stats, review, & analyze. One morning/week on site. Tri-monthly new problems identification. | Honorarium and expenses -- work is part-time, AM and evening | 3 Community Health Worker |

See Bibliography for References to these Projects

TABLE III (Continued)
VILLAGE LEVEL WORKERS: SELECTION, TRAINING AND SUPPORT

| PROJECTS | SELECTION | QUALIFICATIONS | TRAINING DURATION | | INCENTIVES | NOTES |
|----------------------------|--|---|---|---|--|--|
| | | | PRE-SERVICE | IN-SERVICE | | |
| 4 Miraj | ANM ² ANM, BHW, and supervisors are project-selected. | .ANM: (F) BHW's (M) and (F/M) supervisors are prior health workers. | 1-week for entire staff .Re-training: 6 weeks for BHWs, ANMs and supervisors. .2 additional weeks for supervisors. | 1 day per month as a group. | ANM, BHW, and supervisors are salaried. | ² Auxiliary nurse-midwife. ³ Village health associate |
| | BHW ⁴ VIAs and DAI's (for upgrading) Selected by Project and community together | VIA (F) and Dai/HP ⁵ middle-aged, unemployed, married, and motivated to learn and serve. | BHWs, ANMs and supervisors 2 additional weeks for supervisors | 1 day per month as a group. | VIA is paid on honorarium of (Rs 60/mo.) Traditional dais are paid Rs3 per delivery | ⁴ Basic health workers. ⁵ Health promoter |
| 5 Narangwal Nutrition | (FHW ⁶) Selected by the project. FHWs are from outside the community | . Female. . Pre-trained by government . Selected on the basis of aptitude and acceptability critical. | 6 weeks at Narangwal. Training is conducted alternating between on-site and the central health center. | Weekly supervisor visits by (MD & PIN) who review records and trouble-shoot. Bi-weekly peer sharing of successes and difficulties. | Full-time salary. | ⁶ Lady health worker. |
| -----Medical | " | " | " | " | " | |
| -----Medical and Nutrition | " | " | " | " | " | |

projects to overcome difficulties resulting from illiteracy.

Political factions were strong in the Narangwal villages; therefore, it was thought desirable to have the health worker come from outside the village but from the same region. In the projects listed in Table III, whether the health worker was local or not depended largely upon whether the project was training new health workers (who tended to be local) or retraining already functioning health workers (who tended to be from outside). An obvious advantage of selecting local women as health workers is their superior knowledge of all the local conditions listed in the 1979 WHO recommendations in Table I.

Health Worker Training

Richard Smith, an expert on primary health care worker training, warns against overtraining village health workers or bringing them to the capital city for training.⁷ Either may weaken health workers' ties to the community and cause the worker to migrate.

Table III shows that initial periods of orientation and skill training in some of the successful primary health care projects were very short -- as short as one week in the case of Jamkhed. In these projects most training was carried out locally and was followed up by continual in-service training. In several of the projects part of the training consisted of social-value orientation. In the case of Jamkhed, half of the health workers

7. Richard Smith et al., Manpower and Primary Health Care, University Press of Hawaii, Honolulu, 1978.

initial and in-service training was devoted to social values. According to 1979 WHO recommendations cited in Table I, the training of primary health care workers in nutrition should be action oriented and highly directive.

Health Worker Motivation

The WHO-UNICEF Conference on Primary Health Care at Alma Ata, USSR, affirmed that health is a fundamental human right and recommended that "governments incorporate and strengthen primary health care." The consensus arrived at during this conference on the importance of primary health care is an indicator that more governments in the near future will be launching primary health care programs. One regrettable consequence of this popularity may be a multiplication of projects where health workers are trained, located in villages, but in the course of time, are forgotten and wither on the vine. According to Richard A. Smith cited earlier, this has already occurred in too many countries for lack of support, follow-up and infra-structure to service health workers in villages.⁸

According to Steve Joseph, a large scale primary health care system based on village health auxiliaries may require a change in roles and reorientation of all health workers at all levels in a country. The peripheral village health worker must be seen as the pivotal and most important point of service. Progressively central levels of the health system, such as health training,

⁸ Ibid.

logistic support, administration and referral health services should serve the peripheral health worker rather than vice versa.⁹

Table III shows that all health workers in the projects received at least some money in connection with their work. Salaries, honoraria or just reimbursements for expenses are important signs of commitment on the part of the larger unit to back up the activities of the health worker.

Without supervision and support from the primary health care system, village health workers often end up concentrating on personal curative or healing activities and neglect prevention and promotion according to both Smith¹⁰ and Taylor¹¹. This occurs because villagers reward the worker directly for curative activities, but not usually for prevention or promotion activities. Since many nutrition activities are preventive and promotive in nature rather than curative, health system support of the nutrition activities of primary health care workers is especially important.

⁹ Steve Joseph, "The Community Health Worker in Developing Countries: Issues in Administrative Structure, Support and Supervision," paper presented at a symposium on the Community Health worker, Airlie House, Virginia, October 1977, p. 11.

¹⁰ Richard Smith, et al., Manpower and Primary Health Care, p. 32

¹¹ C. Taylor, et al., The Narangwal Experience. Unpublished report to the World Bank, 1978, Chapter 9, p. 7.

NUTRITION IN A.I.D. PRIMARY HEALTH CARE PROJECTS

Congress has mandated the U.S. Agency for International Development (AID) to

emphasize low-cost integrated delivery systems for health, nutrition and family planning for the poorest people, with particular attention to the needs of mothers and young children using paramedical and auxiliary medical personnel, clinics, and health posts... and other modes of the community outreach.¹²

Since the early 1970's AID has led with initiatives in low-cost health delivery systems with projects such as the Lamphang Province Project in Thailand (1972) and the Integrated Health Delivery System Project in Brazil (1973). By 1979 over \$70 million was allocated in AID to primary health care projects designed to integrate health, nutrition and family planning activities.* This figure is three times the amount allocated by AID for these projects in FY 1976, an indication of the high priority which the agency places on primary health care.

Baumslag, Roesel and Sabin examined AID primary health care project planning documents and proposals to ascertain

¹² Legislation on Foreign Relations Through 1978: Current Legislation and Related Executive Orders Volume I, Committee on Foreign Affairs, U.S. Congress, Feb. 1979, p. 10.

* The \$70 million figure includes some Security Supporting Assistance funds as well as some Population, and Sahel Development funds.

the role which nutrition activities play in these projects.¹³ Table IV shows the results of their research. With the exception of nutrition education, nutrition activities do not play a large role in these primary health care projects according to planning documents. Fewer than one-quarter of the projects had as many as half of the major nutrition activities recommended by WHO.

Over 3/4ths of the planning documents mentioned nutrition education; however, the documents usually did not specify target groups in the educational campaign, nor the message to be communicated, nor the means to carry out the campaign. Table IV shows that breast feeding promotion was mentioned only in one-fifth of the proposals.

The most striking gap in nutrition activities planned in these primary health care projects is the minor role assigned to child weighing, a key nutrition activity. Child weighing or nutrition surveillance will receive a major role in only one-sixth of these projects. Checking to insure the accuracy of this observation, scales for child weighing did not appear on the lists of commodities to be purchased in these projects.

Another major gap in the plans for these primary health care projects is the fact that oral rehydration treatment of diarrhea will receive a major focus in less than one-fifth of the projects.

¹³ See Baumslag, Cox, Laskin and Sabin, AID Integrated Low Cost Health Projects: Volume I Project Summaries, 1978 and Baumslag, Roesel, and Sabin, AID Integrated Low Cost Health Projects: Volume II Analysis, 1978. Both publications of the Office of International Health, HEW, for the Office of Nutrition, AID.

TABLE IV (continued)

| Nutrition Activity | LATIN AMERICA | | | | | | | | | | | | | | NEAR EAST | Middle East | Afghanistan | Egypt |
|---------------------------------------|---------------|--------------|--------|--------|------------|-------------|---------------|----------------|-------------|-----------|-----------|------------|----------|---------|-----------|-------------|-------------|-------|
| | Nicaragua I | Nicaragua II | Panama | Brazil | Columbia I | Columbia II | D. Republic I | D. Republic II | El Salvador | Guatemala | Bolivia I | Bolivia II | Honduras | Jamaica | | | | |
| Nutrition Surveillance, weight charts | | | | X | | | | | X | | | | | | | | | |
| Nutrition Education | | | | | | | | | | | | | | | | | | |
| (1) General | X | X | X | X | | X | X | X | | | X | X | X | X | | X | X | X |
| (2) Breastfeeding | X | | | X | | | X | | | | | | X | | | | | |
| (3) Weaning foods | | | | | | | X | | | | | | | | | | | X |
| Nutrition supplements | | | | | | | | | | | | | | | | | | |
| (1) For infants & small children | | | | X | | | X | | | | | | | | | | | X |
| (2) For mothers (includes iron) | | | | X | | X | X | | | | | | | | | | | X |
| Control of Infection | | | | | | | | | | | | | | | | | | |
| (1) Treatment of Diarrhea | | X | | | | | | | | | | | X | | | | | X |
| (2) Immunization of children | X | X | X | | | X | X | X | | | X | X | X | X | | | | X |
| (3) Sanitation, clean water | X | X | X | X | X | X | | X | | | X | X | X | | | | | X |
| (4) Malaria treatment | | | | | | | | | | | X | X | | | | | | |

23-1

On the positive side, immunization of children will receive a major focus in over half the projects and sanitation and improved water will be emphasized in three-quarter of the projects.

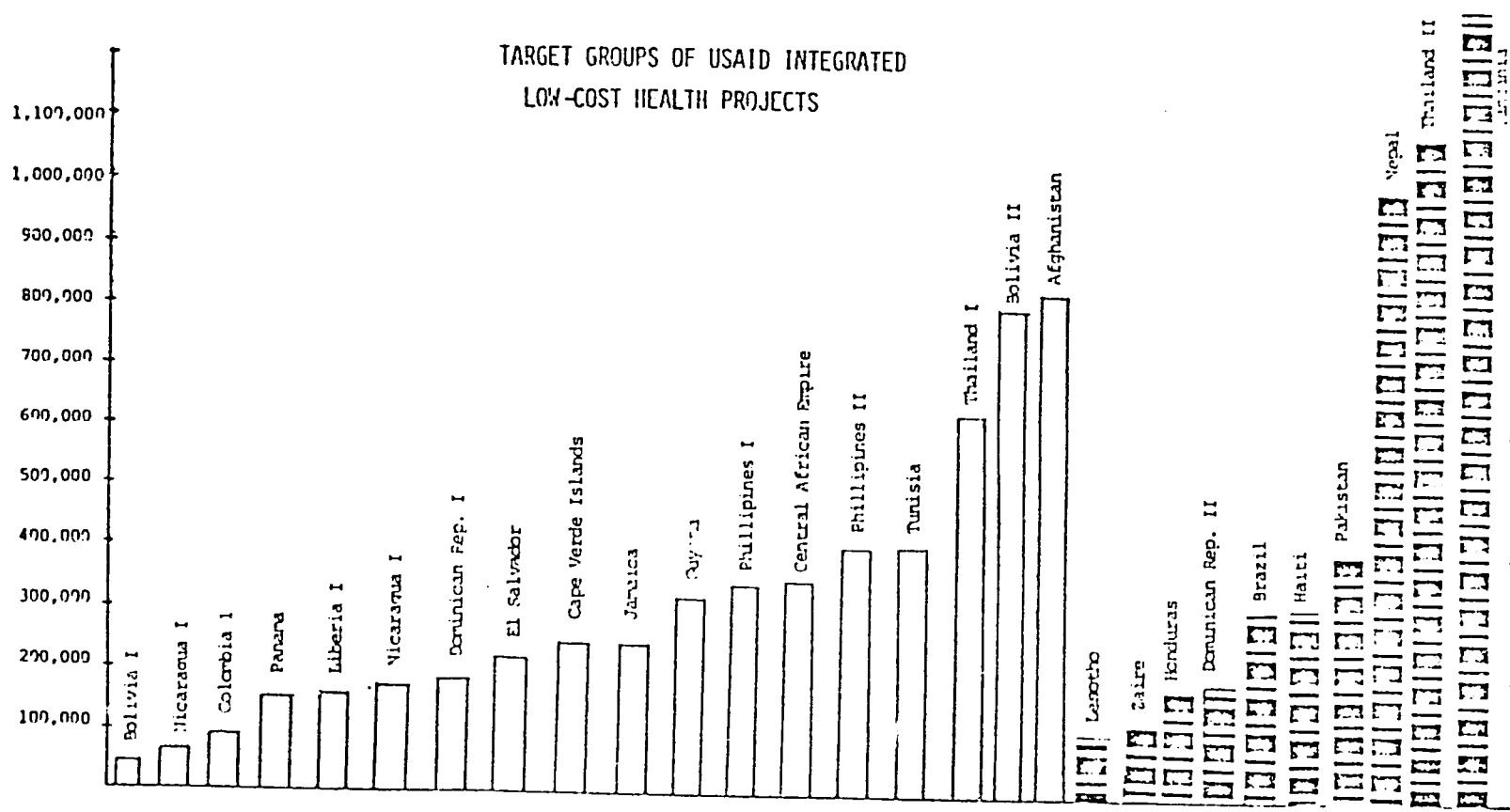
Population Served

AID assisted primary health care projects are much more ambitious in coverage than the five projects listed in Table II. The average population size served by the projects listed in Table II was under 50,000 people whereas the AID assisted projects, as shown by Table V, were designed to serve on the average over 1.5 million people.

The successful primary health care projects listed in Tables II and III show that primary health and nutrition services can reduce mortality and morbidity. Besides being smaller, several of the successful projects were associated with medical schools or universities and enjoyed considerable organization, training and technical backup. These latter skills are often in short supply in developing countries. Because of their scale, the AID-assisted primary health care projects can be seen as bold attempts to make low cost health services available to large numbers of people in settings where many of the personnel, training, and organizational issues remain to be worked out.

For specific recommendations regarding the upgrading of nutrition activities in AID primary health care projects see page 56-59 of AID Integrated Low Cost Health Projects: Volume II Analysis previously cited.

TABLE V*



TARGET GROUP IN HUNDRED THOUSANDS

TARGET GROUP IN MILLIONS

* Includes only those project proposals which specified populations to be served.

CONCLUSION

International interest and support for the concept of primary health care for unserved and underserved populations in developing countries is strong. A commitment to basic health care for all by the year 2000 has been made by governments and international health agencies. World Health Organization experts on nutrition in primary health care have shown a strong concensus regarding certain nutrition activities as essential components of primary health care projects.

The Agency for International Development (AID) has focused its resources in health on primary health care services which, in theory, integrate nutrition and health services. In practice, the AID integrated projects have stressed only nutrition education out of the list of nutrition activities recommended by the World Health Organization and this only in bare outline. Based on an analysis of information available in Washington, D.C., the AID integrated projects have been found to, by and large, lack the specific and highly targeted nutrition activities which, in combination with other health activities, prove to be effective in the five successful primary health care projects examined in this paper.

It is hoped that this review of the state of the art of nutrition activities in primary health care projects can be used by AID personnel and health and nutrition planners to upgrade nutrition activities in AID assisted primary health care projects.

BIBLIOGRAPHY

- 1 Alderman, M.H., R.P. Ferguson, H.T. Laverde and A.I. D'Souza. "Reduction of Young Child Malnutrition and Mortality in Jamaica." The Journal of Tropical Pediatrics and Environmental Child Health 24 (1): 7-11, 1978.
- 2 Alderman, M.H., J. Husted, B. Levy and R. Searle. "A Young-Child Nutrition Programme in Rural Jamaica." The Lancet 1166-9, 1977.
- 3 Anderson, M.A., CARE Preschool Nutrition Project, CARE Preschool Nutrition Project, CARE, New York, 1977.
- 4 Arole, M. and R. Arole. "A Comprehensive Rural Health Project in Jamkhed (India) "in K.W. Newell, ed. Health by the People World Health Organization, Geneva, 70-90, 1975.
- 5 Arole, R.S., "India: The Comprehensive Rural Health Project, Jamkhed," in D.B. Jelliffe, Community Action-Family Nutrition Program. p. 97-114, 1977.
- 6 Arole, R.S., "Comprehensive Rural Health Project - Jamkhed - 1978. Statistics." Unpublished report, 1979.
- 7 Baumslag, N., M. Laskin, and E. Sabin, AID Integrated Low Cost Health Projects: Volume I Project Summaries, Office of International Health, HEW, for Office Of Nutrition, AID, Washington, D. C., 1978.
- 8 Baumslag, N., L. Grace-Mason, R. David and E. Sabin, Diarrheal Disease and Oral Rehydration: An Annotated Bibliography. Office of International Health, HEW, for the Office of Nutrition, AID, Washington, D. C., 1979.
- 9 Baumslag, N., L. Grace-Mason, C. Roesel and E. Sabin, Breast is Best: A Bibliography on Breast-feeding and Infant Health. Office of International Health, HEW, for the Office of Nutrition, AID, Washington, D. C., 1979.
- 10 Baumslag, N., C. Roesel and E. Sabin, AID Integrated Low Cost Health Projects: Volume II Analysis, 1978. Office Of International Health, HEW, for the Office of Nutrition, AID, Washington, D. C.
- 11 Behar, M., "The Role of Feeding and Nutrition in the Pathogeny and Prevention of Diarrheic Processes," PAHO Bull., IX: 1-9, 1975.

- 12 Cameron, M., Y. Hofvander, Manual on Feeding Infants and Young Children (Second Edition), United Nations, 1976.
- 13 Cunningham, N.R., "The Under Fives Clinic - What Difference Does it Make?" The J. of Trop. Ped. and Env. Child Hlt. 24 (6): 237-334.
- 14 Gordon, J.E., et al., "Nutrition and Infection: Field Study in Guatemalan Villages, 1959-1964," Arch Env. Hlth., 16: 424-437, 1968.
- 15 Gwatkin, D.R., J.R. Wilcox, and J.D. Wray, "Can Interventions Make a Difference? The Policy Implications of Field Experiment Experience." Overseas Development Council, 1979.
- 16 Hearings on the Marketing and Promotion of Infant Formula in Developing Countries Before the Subcommittee on Health and Scientific Research of the United States Senate, Washington, D.C., May 23, 1978.
- 17 International Union of Nutritional Sciences. Community Action-Family Nutrition Programme Generation of Interrelated Activities, Guidelines on Policies and Procedures. Hyderabad, India, 1977.
- 18 Jelliffe, D.B. and E.F.P. Jelliffe, Human Milk In the Modern World, New York: Oxford University Press, 1978.
- 19 Joseph, Steve, "The Community Health Worker in Developing Countries: Issues in Administrative Structure, Support and Supervision," paper presented at a symposium on the Community Health Worker, Airlie House, Virginia, October 1977.
- 20 Joshi, D.G., J.G. Kirshnayya, and C. B. Das Gupta. Design of Voluntary Health Projects. A Case Study of the Comprehensive Rural Health Project, Jamkhed. Systems Research Institute, India, 1978.
- 21 King, M., F. King and S. Martodipoero, Primary Child Care: A Manual for Health Workers, Oxford University Press, 1978.
- 22 King, Maurice, ed., Medical Care in Developing Countries (Nairobi and Other Places: Oxford U.P.) 1966.
- 23 Latham, L., M. Latham, and S. Basta, The Nutritional and Economic Implications of Ascaris Infection in Kenya, World Bank Working Paper # 271, Washington, D. C., 1977.
- 24 Legislation on Foreign Relations Through 1978: Current Legislation and Related Executive Orders Volume I, Committee on Foreign Affairs, U.S. Congress, Feb. 1979.
- 25 Levinson, F.J., The Morinda Experience: An Economic Analysis of the Morinda Experiment, Ph.D. Dissertation, Cornell University, 1972.

- 26 Morley, D., "Paediatric Priorities in the Developing World," London and other Places: Butterworths, pp. 170-194, 1973.
- 27 Newell, K.W., et., Health by the People, "A Comprehensive Rural Health Project in Jamkhed (India" by Aroles M. and R. Arole, World Health Organization, Geneva, 70-90, 1975.
- 28 Parker, R.L., Narangwal Nutrition Project: Measurement of Service Inputs and Activities. First Draft, Johns Hopkins University, 1976.
- 29 Puffer, R.T. and C. V. Serrano, Patterns of Mortality in Childhood, Pan American Health Organization, Washington, D.C., 1973
- 30 Pyle, D., "Preschool Nutrition Intervention Manual" Unpublished paper, Harvard Institute of International Development, 1978.
- 31 Ram, E.R., "Realization of an Integrated Health Service Programme in Rural India." Contact 44, 1978.
- 32 Robson, J.R., Malnutrition: Its Causation and Control, Gordon and Branch, New York, 1972.
- 33 Rowland, M.G.M., et al., "Bacterial Contamination in Traditional Gambian Weaning Foods," The Lancet, 1: 136-138, 1978.
- 34 Sivard, World Military and Social Expenditures. 1978. WMSE publication, Leesburg, Va., 11: 25-59.
- 35 Smith, R., et al., Manpower and Primary Health Care, University Press of Hawaii, Honolulu, 1978.
- 36 Taylor, C.E., et al., Malnutrition, Infection, Growth and Development: The Narangwal Experience. A Report to the World Bank. Johns Hopkins University, 1978.
- 37 Vemury, M. and H. Levine, Beliefs and Practices that Affect Food Habits in Developing Countries: A Literature Review, New York: CARE, Inc. 1978.
- 38 "Integration of Nutrition Activities in Basic Health Services" Section 2.2.1 of the WHO Program Review: Nutrition, 1971, WHO Publication Number EB 49/30
- 39 "A Guideline for Nutrition Activities Through Local Health Services for Joint WHO/UNICEF Strategy", 1974 WHO Publication, Number NUT/74.3.

- 40 "Interregional Consultation on Strategies for Nutrition Through Local Health Services, Teheran 1976" WHO Publication Number NUT/77.4: 6-9.
- 41 "Guidelines for the Training of Community Health Workers in Nutrition: Draft, 1979 WHO Publication Number NUT 79.6: 15-18.
- 42 Wray, J.D., "Maternal Nutrition: Breast-feeding and Infant Survival." Conference on Nutrition and Reproduction, Bethesda, Md., 13-16 Feb., 1977.