

NUTRITIONAL COMPONENTS OF A PRIMARY HEALTH CARE
DELIVERY SYSTEM

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Task Force on the Nutritional Components of a Primary Health Care

Delivery System

Committee on International Nutrition Programs

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TASK FORCE ON NUTRITIONAL COMPONENTS OF A PRIMARY HEALTH
CARE DELIVERY SYSTEM

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NUTRITION COMPONENTS OF A PRIMARY HEALTH CARE DELIVERY SYSTEM

Currently, the USAID is providing technical assistance, financing or training to 45 integrated health delivery systems in 38 developing countries of the world. The target groups of AID-supported projects are primarily pregnant women, infants, and children under five years of age in city slums and rural poverty areas. According to AID definition, integrated health projects require the presence of health, nutrition and family planning components provided at a level that is affordable to the specific country. However, a survey conducted under the auspices of USAID revealed that only 18 of the projects included basic nutritional interventions as a part of their health care programs (Baumslag et al., 1978).

As a result of this survey USAID has been concerned with assisting these and other such projects in developing appropriate nutrition interventions and requested the Food and Nutrition Board's Committee on International Nutrition Programs to develop a methodology for introducing a nutrition component in AID assisted integrated health delivery systems.

The Committee on International Nutrition Programs (CINP) organized a Task Force to address this issue. Although the Task Force focused primarily on the nutrition component, it recognized from the outset that nutrition could not be considered in isolation but must be part of a movement to improve community life. It recognized further that such a program must, of necessity, involve the active participation of the community as was so eloquently expressed at the WHO International Conference on Primary Health Care held at Alma Ata, USSR in September, 1978. (WHO, 1978). In the words of a Declaration evolving from this conference:

"Primary health care is essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the

community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination. It forms an integral part both of the country's health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It is the first level of contact of individuals, the family, and community with the national health system; it brings health care as close as possible to where people live and work, and constitutes the first element of a continuing health care process."

The Task Force also considered the guidelines suggested for development of community based health care programs as defined in a joint IUNS/UNICEF/ICMR Working Conference held in Hyderabad, India in October, 1977 (Jelliffe and Jelliffe, 1977). According to these guidelines, the important characteristics of health care programs were described thusly:

- o Comprehensive in aim--containing, within limits, promotive, preventive, and curative measures--and focusing on those at high risk, especially pregnant and lactating mothers and young children.
- o Designed for local conditions.
- o Developed within economic and other characteristics peculiar to each community, particularly the nature and extent of human, material, and financial resources.
- o Integrated in a mutually supportive way with the health care system and other services designed for the improvement of productivity and well-being.
- o Cost-effective and of relevance to national goals as perceived by political and administrative leaders.
- o Incorporated in the national development planning process.

From the outset, the Task Force emphasized that the prevention and treatment of nutritional deficiencies and the improvement of food consumption

have traditionally been the responsibility of the health sector. The advent of the primary health care movement means more than the revival of old concepts as reflected in extending services to unserved or underserved populations. It is considered a distinct pragmatic program for the reduction of social ills, mainly in health and nutrition. It should be based on an expressed concern and active participation of the community, the identification of prevalent health and nutrition problems, and an approach to their solution through appropriate technology applied by community workers and traditional practitioners.

The Task Force recognized that there is no standard mix of services for reaching specific objectives. Each community is a true microcosmos and has its own social ecology, behavioral patterns, nature of problems, and availability of resources.

In analyzing the strategy to incorporate nutrition activities into primary health care and define the responsibilities of the community health worker, the members of the Task Force elected not to update the "state of the art" resulting from an annotated review of the literature but rather to express their experiences in delivery of health care services. At the same time, it felt that it was necessary to include in the report an analysis of evidence regarding the effects of incorporating a nutrition component within community health care programs.

The following report outlines a strategy for introducing the nutrition component, the range of activities that can be accomplished by primary health care workers, implementation of a nutrition component, training of primary health care workers, evidence of success of primary health care programs with a nutrition component, and finally research needed to improve the performance of primary health workers in promoting nutrition at the local level.

STRATEGY FOR INTRODUCING NUTRITION IN PRIMARY HEALTH CARE

Primary health care programs must be planned and undertaken by and with the community and must involve the fullest possible participation, organization, and action of the people. One of the most critical prerequisites is a truly representative community organization that can assume responsibility for health care and muster local resources to implement projects that will solve them.

The initial impetus to introduce change in a community system, however, most likely must come from the outside, because community members may be unaware that a problem exists. It becomes the role of a community change agent to convince the people that their children need not die in infancy and to gain their support in a program to reduce infant mortality. It is not infrequent, however, that a health activity other than that suggested by the change agent may have greater acceptance in the community. Efforts should be made to link both sets of activities using an effective "entry point" into the primary health care system. In this way, the wishes of the people will be satisfied, and a significant health problem can be resolved.

Because of the limited resources available for the health system, community members must be recruited as health care providers. Unless the community accepts a major part of the responsibility for its own health care and provides the manpower to achieve it, coverage by the health care system will be lacking in most developing countries.

Community programs are of special significance in nutrition and must be designed for the local situation. They must particularly take into account the village's cultural patterns--including indigenous methods of social cooperation and food habits-- the ecologic, geographic, and demographic circumstances, nutritional problems and their etiology, and the needs of "high

risk" groups. Biological, social, and economic techniques for identifying risk groups have been described (WHO, 1978a).

Information to guide the development of such programs can best be collected in the course of a "self-diagnosis" by the community, with technical advice from the appropriate supervisor. This diagnosis should be based on some form of household family register that would include an age census (either general or with special relation to young children and pregnant women), a simple nutritional assessment of vulnerable groups (e.g., weighing and examination for clinical signs), data on food in fields and stores (what is being grown including livestock, and by whom, and what is available in the local market). Ideally, the primary health care worker (PHCW) should be trained to collect and interpret the information so as to initiate and monitor appropriate measures. The PHCW will also send this information to the designated higher level of the health care system for further analysis.

The outcome of the community diagnosis will establish base-line information, suggest priorities for action and give an indication of community resources. The data collected will also be useful in later assessment of the expected impact of the program in terms of reduced rates of infant and early childhood mortality and improvement of nutritional status. This exercise can be considered an example of pragmatic planning because decisions are based on estimates resulting from available information, whatever its quality (Horwitz, 1978).

As a result, specific functions will be indicated for the PHCW who will operate under the direction of a community council or other existing traditional village organization. These activities will fall in the four areas mentioned--improving food supplies, food consumption, food utilization, and resources (See Figure 1).

The responsibilities of the PHCW will be undertaken using intermediate technology, especially in nutritional assessment (NRC, 1979), food preparation, food storage and preservation, and improved water supply. Such actions will include routine information collection and periodic community assessment which will enable evaluation to be undertaken and priorities revised.

The functions of the PHCW will include home visiting--including kitchens and gardens--and special activities for indicated groups--e.g., a weighing clinic for young children combined with growth charts for the education of the mother and her neighbors (Morley, 1979). These services will be performed with the community under the direction of the community council and in correlation with the programs of other extension agencies.

The PHCWs need supervision from the health system and from the community. Supervision must include a review of records, discussion of cases, home visits, feedback of regional data based on reports previously submitted by the PHCW and most importantly continuing education. This will prevent isolation, keep up morale, insure two-way communication, and assist in more widespread community nutritional assessment as part of evaluation.

RANGE OF ACTIVITIES OF PRIMARY HEALTH CARE WORKERS

Nutrition activities in peripheral basic health services as outlined in 1971 by the WHO are shown in Table 1. These activities were described as minimum, medium, and optimum. A major question posed by USAID concerned the suitability of the interventions described or possible need for modification particularly in terms of providing basic nutrition interventions. The Task Force, thus concentrated on those activities that should be considered minimum interventions that would maintain the general health of a community.

The activities that can be undertaken by the PHCW will vary with the need as defined by the community, the experience of the worker, the availability of local resources for specific adequate technology, and the functioning of other human resources acting as extension agents for different fields of community development, as for example, agriculture. It seems clear that women will play major roles, not only because of the emphasis in infant feeding, but because there is increasing awareness of the role of women in national development (FAO, 1979).

While there can be no universal model and much depends on the health worker's ability to enlist the participation of the community, the following range of functions which can be undertaken by the PHCW are listed below. Suggested minimal activities are indicated with an asterisk (*).

(1) IMPROVED FOOD CONSUMPTION

Information Collection(*) The personal contact and home visits can allow for selection of information as part of an organized nutritional surveillance program and for some simple day-to-day observation of usual practices related to health, nutrition, and sickness.

Nutrition Surveillance(*) Collection by community members of growth data (mainly with growth charts) and of selected clinical signs (e.g., Bitot's spots, anemia), particularly from those young children and mothers known to be

at high risk. Such information is useful in identifying those who should receive treatment or nutritional supplementation and is also potentially useful in providing information for nutrition surveillance at a regional or national level.

Nutrition Education(*) This is envisaged as a two-way exchange of information and advice. It would be characterized by motivation based on the indigenous culture pattern, the use of locally available foods (or acceptable alternatives), and practical demonstrations carried out in local kitchens. The topics to be included would vary with need, but would usually include the advantages of breast feeding, home-prepared weaning foods, maternal diet in pregnancy and lactation, correct use of food supplements (when relevant), and selection of economical and nutritious purchased foods (when relevant).

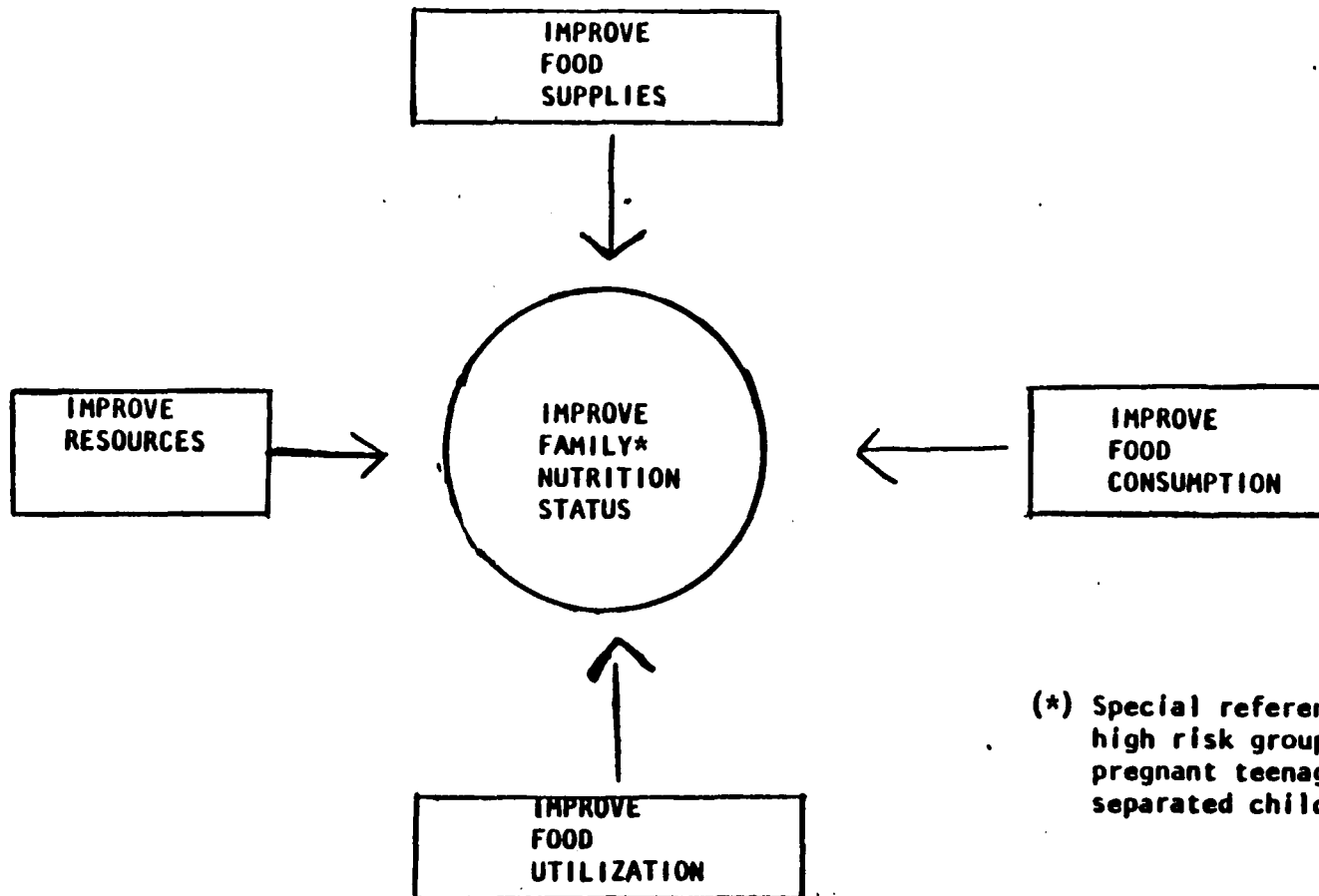
Nutrition Supplements(*) If programs to distribute nutritional supplements are to be included, they should be very carefully defined in regard to real need, target groups, indications for use, cultural acceptability and local availability of foods. A major objective should be their nutrition education message.

Supplements may be used as preventive measures as for example oral vitamin A or iron or remedial, that is for issue during limited periods of time for young children with flattening weight curves or arm circumferences inferior to the norms, or for pregnant and lactating women with weight loss or inadequate lactation.

Nutritional Treatment(*) Severe protein-energy malnutrition, with complications, may often need treatment in hospitals (if such exist), although there are inherent risks in hospitalization such as cross-infection in crowded children's wards. Affected children can often be treated in Nutrition Rehabilitation Units or similar feeding centers that also educate mothers, or in homes.

TABLE 1. NUTRITIONAL ACTIVITIES IN PERIPHERAL BASIC HEALTH SERVICES

	MINIMUM PROGRAMME	MEDIUM PROGRAMME	OPTIMUM PROGRAMME
Nutritional surveillance	<p>Clinic: observation of PCM weight for age classification (under 5)</p> <p>Home visits: observation of PCM</p> <p>or:</p> <p>check for signs of locally most important deficiency (for instance vitamin A) and treat</p>	<p>Clinic: weight for age serial records</p> <p>Home visits: observation of PCM, follow-up</p> <p>Check for signs of other</p>	<p>Additional:</p> <p>Periodic screening of pre-school population weight for age records</p> <p>Screening for Hb of mothers and infants</p> <p>Screening for xerophthalmia and other deficiency conditions known to be of health importance locally</p> <p>Dietary histories of vulnerable groups?</p>
Nutrition education	<p>Advise mothers (ad hoc) on supplementary feeding and weaning, especially quantities and frequencies</p> <p>If non-cereal staple, advise on local protein sources (advise on greens)</p>	<p>Additional:</p> <p>advise mothers on complementary foods, amounts and preparation</p>	<p>Additional:</p> <p>advise mothers routinely on principles of child feeding and diets during pregnancy and lactation at clinic and home visits</p>
Control of infectious diseases	<p>Immunization of children at clinic whenever possible</p> <p>Advise on food and fluid intake during infectious events, especially diarrhoea - advise on sanitation in the home especially for infant food; check any recent deaths</p>	<p>Immunization of all children that can be reached</p> <p>Simple oral rehydration service, also for home use</p>	<p>Full immunization programmes, home sanitation</p> <p>Oral and intragastric rehydration station, referral possibility for severe cases</p>
Nutritional supplements	<p>Distribution to pregnant women vitamin A to newborns and identified cases of night blindness/xerophthalmia; available supplementary foods (protein-rich) to young children/infants</p>	<p>Prevention programme for iron deficiency anaemia in pregnancy. Vitamin A to newborns and deficiency cases, milk powder or often supplements to moderate PCM with advice on use.</p>	<p>Preventive programme for iron deficiency anaemia</p> <p>Periodic administration of vitamin A to infants and pre-school children</p> <p>Supervised supplementary feeding programme with checks on development.</p>
Nutritional recuperation		<p>Refer moderate cases of PCM for nutritional recuperation and education programme, if available. Refer severe cases to hospital or health centre ward</p>	<p>Development of full nutritional recuperation and education services with referral and follow-up system</p>



(* Special reference to locally high risk groups (including pregnant teenagers, handicapped, separated children, elderly, etc.).

FIGURE 1: FOUR MAIN AREAS OF ACTIVITY FOR PRIMARY HEALTH CARE WORKERS

Child Spacing(*) The role of the PHCW may be to distribute acceptable contraceptives and to promote breast-feeding. The contraceptive effect of breast-feeding is associated with lactational amenorrhea which is promoted by frequent breast-feeding including nighttime feeding, on-demand suckling, and no use of bottles or pacifiers (Subcommittee on Nutrition and Fertility, Unpublished data). The availability of information on growth (such as "road to health charts") allows setting a specific target weight which should be achieved by the most recently born child before the mother becomes pregnant again (Morley, 1979). For children in less well-nourished families, this ensures a longer period of time prior to the arrival of the next baby.

(2) IMPROVED FOOD UTILIZATION

Food utilization is used here to cover the body's ability to absorb nutrients and to avoid deviating them wastefully as a result of infections.

Increased Food Absorption The PHCW can assist by emphasizing milling, grinding, sieving and cooking practices that make weaning foods more digestible(*) and absorbable.

Infections: General Gastro-intestinal, insect-borne and other infections of nutritional consequence can be reduced by assistance in insuring an adequate water supply, simple but effective waste disposal, and by village-level approaches to decreasing insect breeding.

Infections: Specific

Prevention

Health education (*) (geared to personal hygiene and major infections). Recent studies have shown that weaning foods are the major source of infection in some countries. Contamination may be more

due to the mother's inability to wash her hands as well as her utensils than to a contaminated water source.

Appropriate immunization (*) (especially against whooping cough, diphtheria, tetanus, measles, poliomyelitis, and tuberculosis).

Antimalarials (*) to all in affected areas, but especially for pregnant women and children during the weaning period.

Treatment

Varying levels of treatment may be advisable and feasible. A simple form of oral rehydration (*) which can be administered within the home is essential (1b).

(3) IMPROVED FOOD SUPPLIES

The PHCW must be aware of the extreme significance of the state of supplies of major foods in the community, and should work closely with other extension agents (e.g., from agriculture) to bring about increased local food production where needed. The PHCW can collect information on the local food situation including foods grown (animal and vegetable) and those imported into village shops. This information can be used for nutritional surveillance as well as agricultural planning for the region. Armed with specific data on the numbers of malnourished children in the community, the PHCW can be a strong force in motivating a community to work together to improve agricultural production and food storage.

(4) IMPROVED RESOURCES

The PHCW should encourage and assist in special activities bringing economic benefit, especially to women, and should encourage economically helpful communal ventures such as village-level food processing (Jelliffe and Jelliffe, 1977).

IMPLEMENTING HEALTH AND NUTRITION ACTIVITIES AT THE COMMUNITY LEVEL

In considering the whole series of responsibilities of the PHCW there is some doubt whether one can realistically expect them to perform effectively without overloading them. The list of activities can be seen as the theoretical ideal versus the essential minimum. Perhaps more significant, communities vary in accordance with the nature and extent of the problem (reflecting their social ecology), the people's experience, the availability of resources, and the order of priorities set by the village council. In practice, not all the problems will be present nor will they be of the same magnitude. The village health workers can organize their daily activities following priorities. Still supervisory assistance may be needed in planning the programs, assessing their results, determining new priorities and modifying program components to suit changing conditions. Such decisions, however, should be carried out in conjunction with the members of the community.

A common pattern is that of two PHCWs--one female and one male--in a community, with tasks often related to traditional roles. The female deals preferably with food consumption and utilization, i.e. maternal and child health, nutrition, immunization, family planning, foods habits, and personal hygiene. The male is involved with environmental sanitation, food supplies, improving community resources and relations with other extension agents. This proposed distribution of activities does not imply that female PHCWs cannot deal with issues of food production; in some areas, particularly in the countries of Africa, mothers are usually in charge of the home garden. It follows that the local situation will determine the number of PHCWs needed and the tasks assigned to them.

In general a PHCW would have broad responsibilities for perhaps 500 to 2000 people (or 100 to 400 families) with an average of 17% of children less

than 5 years of age. This requires a well-organized framework. Such health care workers would make monthly or bi-monthly visits to all families within the area of responsibility and would be paid for this service. In some circumstances volunteer workers may be responsible for perhaps 10 to 20 families (or in some countries 20 to 50 or even 100), the differences reflecting the number of activities entrusted to them. These workers have other employment and receive no pay. The need for incentive is apparent. It may take the form of status, title, added training in ancillary prestige tasks, or rewards such as presents for attaining certain goals.

Traditional practitioners may be good liaisons provided they are given some basic training. Indigenous birth attendants should have priority in efforts to attract them to the primary health care system. Because of their relationship with mothers and children they have important knowledge of family life and can influence it favorably. A series of healers trusted by the people in times of illness and distress, as counselors and psychotherapists, can also help the PHCW, provided they are trained and assigned clear-cut responsibilities. In general, all traditional health workers can help in improving the nutritional status of the people (Lambo, 1963).

In many cases, mothers are the most reliable village health agents for the prevention and treatment of disease. They should become active in the primary health care system as auxiliaries of the community health worker (Rhode and Northrup, 1978; Rhode, et al., 1975). With proper instruction they clean, feed, stimulate, and assist in the treatment of their children in hospitals and thus may take the place of nurses in many activities (Esquivel, 1980).

The tasks ascribed to these assistants must be specific to ensure good results since the position is usually unpaid. A modest payment to liaisons has proven successful in some cases.

The methodology of surveillance by the health worker needs to be well established, aiming at covering every household. Tasks and schedules should be clearly defined. The initial cost of a family register sheet as described is worthwhile. It may be maintained by the liaison and provide a key to the community. It documents births, deaths, main problems and needs, and justifies priorities. All of these activities fit with the concept of monitoring and surveillance provided that the information collected is used by the PHCW for immediate action while it is being transmitted for consolidation and analysis at higher levels in the health care system.

The time required of a PHCW can be estimated by the number of births per year, the number of antenatal visits, the time for planned events such as "health rallies" for weight measurements and immunizations on a routine basis (Berggren et al., 1981) nutrition education, and an allowance for unanticipated events. The minimum responsibilities in the area of nutrition relate mainly to food consumption and utilization and can be delivered as a component of health care services.

It seems more effective to have community health workers that provide the same broad range of services rather than a number of workers performing specific activities.* The nature and dimensions of the community's problems and the number of persons at risk will determine the activities required for treatment and/or prevention. Although there is no consistent evidence, there appears to be a synergism of programs, (Latham, 1975). The effectiveness of such programs has been demonstrated (Taylor et al., 1978; Kielman et al., 1978; Parker et al., 1978).

* Although the task Force favors the integrated approach to community health care, it recognized that there is a range of opinion regarding "integrated" versus "vertical" programs. There is strong opinion that certain programs such as family planning, vitamin A therapy, and malaria eradication might better function as vertical programs requiring, for a limited time, specific workers for the specific task at hand.

The PHCW needs a referral system for patients requiring complex care either at a health center and/or a hospital. The main constraint usually is the lack of an effective means of reaching rural areas. Good roads and transportation are more the exception than the rule. Although the efficacy of a transfer system has been questioned (England, 1978), it is essential to ensure that cases requiring a higher level of care have the opportunity for appropriate services. PHCWs must know precisely what they can do, how to do it, what they should not do, and when to refer a patient to a health center or hospital. Diagnostic procedures and treatment guidelines must be simple and easy to apply.

Primary health care workers also need supervision. This function has the dual role of "counseling-educational and disciplinary-administrative" (Fendall, 1977). Both are important; however, better results are obtained when the supervisors behave more as educators than as inspectors. When supervisors understand the conditions under which the workers carry out their duties and the nature of PHCW training, they can be more effective in choosing the right course of action for the circumstances (Storms, 1979). Accordingly, the upgrading of those PHCWs who have performed especially well may be considered.

Although the need for guidance in problem-solving situations is paramount, it must be recognized that supervision of the management of services generally has been neglected. Supervision should not be considered in isolation or as a separate activity. A PHCW system, particularly a volunteer system, without regular reasonably detailed supervision, can be expected ultimately to be a failure. Supervisors should be given extensive training in how to supervise in a creative and supportive fashion. In addition, PHCWs should receive instructions during their training as to what to expect from their supervisors and how to use their supervisors most effectively.

TRAINING COMMUNITY HEALTH WORKERS IN NUTRITION

For the successful performance of their duties in nutrition, adequate training of community health workers as distinct members of the health care systems is essential. Training should concentrate on the use of specific skills to reach pre-determined objectives and should be based on modern concepts of the teaching-learning process adapted to the responsibilities that the PHCWs are to fulfill. PHCWs should not be considered transitory substitutes for physicians and nurses but distinct members of the health system.

It has been recognized for many years that educational methodologies in several fields of the life sciences have been ineffective, because required skills that should be learned were not considered in curriculum planning. In order to prepare professionals in nutrition or other sciences, clearly defined objectives must be established in terms of the tasks that the trainee should be able to perform at the end of the training period. An educational objective is "a statement describing the expected results of learning experiences as they manifest themselves in the performance or behavior of the learner" (WHO, 1977).

Educational objectives have been viewed and classified in different categories, such as attitudes (affective domain), skills (psychomotor domain), and knowledge (cognitive domain), (Bloom, 1956; Krathwohl, 1964; Mager, 1975; Davies, 1976) thus referring to the intellectual process of learning (Guibert, 1977). A more precise taxonomy has also been described that includes institutional objectives (e.g., within a center for health sciences), intermediate objectives (developed within a department), and instructional or specific objectives (those devised for a short learning period) (Ibid).

The training process involves several interrelated phases: (a) planning, for defining the objectives of the program, e.g., the competencies in nutrition that health workers require; (b) management of available resources, especially human resources, to achieve desired results; (c) evaluation, for critically gauging whether the learning objectives and goals have been reached.

Future trends in education should specifically emphasize the "teaching-learning system", (McKenzie, 1970; Segall, 1975; Katz and Fulop, 1978) rather than expecting, as in the past, that the spoken and written word from the educator would correctly impart practical knowledge. What is essential are changes in the student's behavior as a result of the teaching-learning process.

Teaching the Trainers

The key to successful training of primary health care workers is the trainers themselves. They may belong to different health professions, but they should be versed in nutrition as a biological and social discipline. They should be able to identify the competences that community health workers require and to impart the required skills using simple and easily reproducible techniques. Unfortunately, universities and other centers of higher education have rarely given health professionals the appropriate knowledge or orientation to perform this task. Three recent worldwide reviews of university curricula undertaken under the auspices of the International Union of Nutritional Sciences (1975-1978) revealed a disappointing lack of interest in nutrition in many institutions (IUNS, 1975). Either a paucity of instruction was found for physicians, pharmacists, and dentists, or if sufficient hours were devoted to the subject, it was rare that behavioral objectives were formulated to permit them to impart practical information to families or to PHCWs.

The case of nurses is of particular importance because frequently they are intrusted with the responsibility of training PHCWs. A survey recently completed in 47 countries, in which 255 schools took part, examined the nutrition programs in schools for nurse auxiliaries (two years training or less). Even when up to 22.5% of teaching hours (an exception) were devoted to the subject, most of the instruction was theoretical with limited practical application. As a result, nurses ill-prepared in nutrition were serving as prime instructors of students; dietitians and nutritionists played little or no role in the educational process (IUNS, 1959). Textbooks and educational aids were often unsuitable; little of the training was directed to preventing prevailing malnutrition and improving the nutritional status of the people nor did training relate to governmental policies and programs.

These inadequacies have long been recognized in the teaching of nutrition for professionals in the health and social sciences (Horwitz, 1961). There are at present trends toward improving the learning process (Segall, 1975; Darby, 1977), but no general model can be recommended. The curriculum for each cadre of workers must be formulated according to the needs of the country as well as the available resources within each institution. The principles for planning must be carefully identified and learning objectives defined; both must be consonant with the food and nutrition policy of the country.

In addition to the lack of nutrition content in the training of health care workers, there is also a serious lack of content regarding the teaching/learning process and the process of working with groups and communities. Inasmuch as the PHCW is a teacher of community members and high level health professionals are teachers of low level professionals as well as individuals and families in the community, this deficiency is serious. Training in communication skills, in an awareness of why people behave as they

do, and in methods for influencing that behavior must be a part of the curriculum of all health care worker training programs. The training of both trainers and PHCWs should be practical and experiential, as well as theoretical, providing actual experience in communicating ideas about nutrition.

Training is most successful when carried out in a real life setting by teachers who understand the ecologic conditions, cultural characteristics and social structure of the areas where the village practitioners will serve and who have experience in the tasks the learners will be expected to perform (Barnes and Jenkins, 1972).

Some Characteristics of Nutrition Training for Primary Health Care Workers

As stated, modern concepts in the teaching-learning process are also pertinent to nutrition training for PHCWs. There is agreement that training should not be discipline-centered, but problem-solving and task-oriented. The educational approach should be learning by doing under supervision. Although a minimum of theoretical information must of necessity be included in the curriculum, major emphasis should be placed on activities utilizing such information. This approach will lead to the mastering of skills for reducing the adverse effects of malnutrition and improving food supplies and food consumption at the village level. For this purpose learning objectives and performance indicators should be related to each other and tasks explicitly defined that are clear and relevant to the nutrition problems of the community and the needs of the people.

"The key word to educational program development is relevance - relevance to the health requirements of the community, as determined by epidemiological surveys of diseases and sociological studies of the knowledge, attitudes, expectations, and demands of the community with regard to health. The

education of each category of health personnel should have as its fundamental purpose the preparation of the trainee for effective service within the constraints of available resources and facilities." (WHO, 1979). Educational methodology that stimulates the active participation of students is far more useful than that which merely induces passive memorization of instruction.

Training should be practical and imaginative in order to convey simple messages effectively and to induce changes in behavior of the trainees (WHO, 1980).

Suitable training manuals and resource materials in nutrition are required for both trainees and trainers. These materials should be directed to the literacy levels of the PHCWs. Pictorial manuals should be devised for illiterate trainees. When possible the use of real models (a malnourished child, a lactating mother, for instance) should be encouraged.

Ideally, the teaching-learning process could motivate primary health care workers to study by themselves at their own pace using self-instructional packages that are updated regularly. In addition to the expense of such a system, however, there is not enough experience in preparing such educational materials nor enough data related to different cultural backgrounds. Those available should be adapted to local conditions, and whenever possible, translated into a suitable language (WHO, 1980a). Learning tools should be field tested so that they will respond to learners' needs and fit the cultural situation (Guibert, 1977).

Continuing education is important in maintaining the effectiveness of community health workers--to improve their competence in performing daily tasks and to encourage them to undertake new tasks (WHO, 1979). As far as possible, training programs should be developed at or near the communities where problems are prevalent and tasks are to be carried out--at the village, in the homes, the health center, school or other local institution.

There is no evidence that effectiveness of health care providers is predicated on age, sex, or marital status (Storms, 1979). Different cultures will apply diverse criteria for selection and appointment. In general, the most preferred workers are those who live in the village and are able to motivate the people and build up their confidence through effective performance and trust. Even older children could be considered as has been done in the Child-to-Child Program. The choice, however, will depend upon local attitudes and conditions.

EVIDENCE OF SUCCESS OF PRIMARY HEALTH CARE PROGRAMS WITH A NUTRITION COMPONENT

Evaluation of structures, actions, and outcomes (including costs) of nutrition interventions through the primary health care system is more the exception than the rule (Karlin, 1977). Of 140 programs surveyed, analysis of nutritional status data was reported in only 23 percent and cost data were estimated in only 15 percent (Austin, 1978). In another series covering 200 reports, 43 were selected for more in-depth examination; of these, 23 had been planned with a control group for appropriate measuring of outcomes. In many cases project goals have been too general, and objectives were either not stated or are not measurable. The planning process often did not include specific indicators to assess results and indeed, the degree of accuracy of many indicators is still questionable. Best results have been obtained in field research, carefully designed and implemented (Beaton and Ghassemi, 1982).

Although the close interrelations between malnutrition and morbidity and mortality, particularly in children under five, has long been recognized (Puffer and Serrano, 1973; Beisel, 1977) there is a dearth of information on the evaluation of nutrition interventions based on indicators that are sensitive to and specific for a particular program. Programs of food fortification to reduce the incidence of iodine (Rueda-Williamson et al., 1966; Fierro-Benitez et al., 1966; DeMaeyer et al., 1979) and vitamin A deficiencies (Arroyave, 1978; IVACG, n.d.) in developing countries are outstanding exceptions.

The real impact of food supplementation and other interventions on chronic undernutrition—especially on children at risk of malnutrition—has not as yet been scientifically proven at the national level or in large populations. In the words of Habicht and Bernman, "our appraisal of the present state of knowledge is that the health need, much less the effectiveness of

indiscriminate large-scale nutrition intervention programs is suspected but unknown, and require validation through well controlled intervention trials." (Habicht and Berman, n.d.).

In recent years a series of analyses of several programs have been made in order to document and evaluate the impact of nutrition intervention in reducing morbidity and mortality and improving nutritional status, as reflected in better growth and development of newborns and children under five (Habicht and Butz, 1977; Drake et al., 1980; Gwatkin et al., 1980; Beaton and Ghassemi, 1982). Taken together the results of these studies seem to indicate that nutrition interventions can be effectively integrated with primary health care to reduce morbidity and mortality, the latter by one third to one half or more in one to five years after initiation of appropriate services.

In one study in which nutrition intervention and health care activities were carried out separately, food supplementation alone contributed significantly to the decrease of perinatal and one to three year old mortality (Kielman et al., 1978). Neonatal and postneonatal mortality were reduced only moderately. Supplementation brought about effects similar to that of medical care in diminishing early childhood mortality. Nutrition interventions also resulted in a reduction in the proportion of malnourished children, although the effect was statistically significant only in children at or above seventeen months of age and had a less effect than some socio-environmental factors: high caste, being male, and cool season. Still, weight and height for age have been shown to be significantly improved in villages where nutrition services (including education) were provided in comparison with the same indicators in control villages (Alderman et al., 1978). In these studies all children residing in the project villages were analyzed for growth and mortality rates which strengthened the credibility of the results.

It seems, therefore, that early childhood mortality is a sensitive indicator of the effect of nutrition interventions when the sample size is large enough to adjust for differences in age-specific death rates. As an indicator of nutritional status, mortality appears to be more sensitive during the perinatal and neonatal periods and later during early weaning and the second year of life (Kielman et al., 1978). On the basis of secondary analyses of the data collated from four field trials, morbidity and mortality in contrast are considered rather poor and insensitive indicators in older preschool children (Bancroft and Bailey, 1965; Ascoli et al., 1967; Gordon et al., 1968; Scrimshaw et al., 1968; Baertl et al., 1970; Swaminathan et al., 1970). Thus infant mortality may ultimately prove to be a useful indicator where medical care is otherwise adequate (Habicht and Butz, 1977).

The reduction in the incidence of severe protein-calorie malnutrition--so closely associated with infections and infant and early childhood mortality (Puffer and Serrano, 1973)--seems to measure adequately the outcomes of food supplementation programs. There is no clear evidence, however, that prevention of moderate and mild malnutrition has a significant impact on morbidity and mortality (Beaton and Ghassemi, 1982).

Infant birthweight and infant survival can be improved by nutrition interventions aimed at the mothers. Supplementing the diet during pregnancy--particularly of overtly malnourished mothers--decreases the number of low birthweight babies and their risk of dying. However, this outcome has been demonstrated only in a very few carefully planned experimental studies (Lechtig et al., 1975; Taylor et al., 1978). Moreover, low birthweight is not exclusively the result of maternal malnutrition. In developing countries, short gestational age and infections during pregnancy may lead to similar outcomes. In developed societies, low maternal weight, alcoholism, smoking,

and other non-nutritional determinants may also induce low birthweight (Garn et al., 1978; NRC, 1982). "Depending on the cause of low birthweight against which intervention is successful, one will have a more or less effect on infant mortality for equivalent improvement in birthweight. Therefore, increased birthweight brought about through improving maternal nutrition will not necessarily affect infant mortality" (Habicht and Berman, n.d.). Interventions should, therefore, be directed to specific causes.

Food supplementation in early childhood can induce growth and development and thus improve the nutritional status of malnourished children (Yarborough et al., 1978). In general, however, anthropometric indicators lead rather frequently to an underestimation of change in nutritional status and are less effective in dealing with individual children than with populations because of the substantial variation in such measures which is not necessarily related to change in nutritional status (Drake et al., 1980).

The outcomes of experimental studies do not guarantee that nutrition intervention alone will affect a significant number of children in a population group. There are constraints on growth due to nondietary factors that correspond in magnitude to the deleterious effects of diarrhea on growth (Martorell et al., 1975; 1975a). On the other hand, stunted children, as a result of chronic undernutrition, will be unable to catch up completely for all growth loss, because catch-up growth is a function of the extent to which maturation is delayed (Martorell et al., 1959).

In a series of intervention programs, anthropometric improvement, mainly weight gain, was shown to be relatively small. It has been suggested that a substantial part of the additional energy intake is applied to a "deadaptation" process such as restoration of basal metabolic rates toward normal and/or an increase in physical activity that may affect cognitive

development and body composition changes. Some of these changes, however, may have greater significance than growth per se (Beaton and Ghassemi, 1982).

From an operational standpoint, the active and informed participation of the community seems to have induced more consistent positive outcomes in terms of program objectives. However, firm evidence is lacking. In most cases, aggregate statistical analyses have been used for determining cost effectiveness and cost efficiency of health and nutrition interventions. No attempt has been made to study the relationship between community demand and the supply of services. The need for research on the behavior of natural leaders, power groups and the interactions among them as they influence decisions and actions is justified.

Costs of health-nutrition projects, including investments per capita and per person at risk, as well as capital and recurring expenditures, have not been measured in a consistent manner. In those cases where they have been systematically determined, the results vary substantially. In one series, costs ranged from 0.5 to 2.0% of the annual per capita gross national products of the countries concerned. It is suggested that this level of investment would justify not only replication of the health-nutrition activities but their implementation in larger areas. Per capita costs per year in several of the same projects ranged from a low of fifty cents to a high of six dollars (Gwatkin et al., 1980).

In general, however, the data base for most projects do not permit a valid assessment of cost effectiveness. This is a matter that warrants further investigation so that nutrition planners have factual information in selecting the appropriate mix of health-nutrition activities for each ecologic setting (Parker et al., 1978).

Taken together, the projects show some constraints that should be considered in future studies:

1. Most of them either lack control groups or the method of evaluation does not lend itself to assessing differences between control and experimental groups.
2. Samples, in general, were small, useful only for scientific research and even then not always large enough for some of the outcomes to be statistically significant.
3. Little or no attention has been given to the socioeconomic determinants of malnutrition, and whether changes in present structures could not have contributed to similar or better outcomes in relation to objectives. Changes in beliefs and behaviors have not been considered as factors for inducing better growth and development and reducing morbidity and mortality in early childhood. Studies have concentrated mainly on providing direct services and measuring results on the basis of aggregate statistics.

In the words of Drake et al.:

"Interventions directed at only improved consumption and/or reduced diseases are, in fact, operating at only one level of a very complex system. The underlying economic, political, social, and physical components of the total environment do more to determine overall consumption and disease rates than can any intervention. If these components remain stable, analysis can proceed according to traditional precepts--but they never do." (Drake et al., 1980).

o Community participation, although mentioned as essential for successful development, has become in practice more complex to achieve than expected, for it ultimately implies a redistribution of power and resources and this may be opposed by natural leaders. When economic incentives are introduced, the system seems to work (Echeverri and de Salazar, 1980).

The fundamental issue is whether, with the available results stemming from experimental projects (limited as they may be), there is a solid base for extrapolating to larger social settings in developing societies. The high incidence of ill-health and malnutrition and the inference of their usual association in deprived families may well justify certain specific actions. This is a political decision and as such is not always based on scientific evidence; often it reflects value judgments. Whether or not governments so decide, new research on the outcomes of nutrition interventions and more effective indicators to measure them is warranted.

Some would argue that better knowledge is needed about the specific variables that bear most heavily on the incidence of malnutrition, be they biologic, economic, or behavioral. To identify their interdependence and assess the favorable or adverse effects under field conditions would be useful for the formulation and implementation of nutrition interventions.

Should the decision makers attempt to incorporate nutrition components into primary health care at the national or regional levels, the basic problems of planning, organization, and administration of services become paramount. Specific issues include design of facilities, the existence of an infrastructure for effective accessibility and patient referral, the provision of supplies at the right time and place, adequate budgeting and financing (including recurring costs affordable to the community)., monitoring of actions and evaluation of outcomes. All are of significance to ensure successful interventions (Taylor, 1978).

RESEARCH NEEDED TO IMPROVE PHCWs PERFORMANCE IN NUTRITION

There is an evident need for more cost-effective measures in primary health care to reduce malnutrition. Among others operational research is needed in four basic areas:

- A) Research geared to improve the content of the message in nutrition so that PHCWs know what to teach to individuals, families and groups.
- B) Research on appropriate technologies for improving the nutritional status of mothers and children at the community level.
- C) Research on the social determinants of malnutrition and on measures to reduce their adverse effects.
- D) Research on better methods for evaluating the outcomes of programs with a nutrition component.

A brief comment on each follows:

A) Research geared to improve the content of messages in nutrition so that PHCWs know what to teach to individuals, families and groups.

- 1) In the field of educating people about adequate diets, priority should be given to the weaning period of life i.e., supplementing breast-feeding with solid foods. Some specific areas are:
 - a) Nutritional needs during and after weaning and how to meet them by using appropriate technology and locally available foods.
 - b) Diets normally imposed during weaning with attention to:
 - o deficiencies and inappropriate local customs, e.g. stopping breastfeeding during infant diarrhea
 - o feasibility for rural and urban mothers under different economic circumstances

- o appropriate use of locally available foods vis-a-vis the usual cooking facilities (Fuel sometimes may be a problem and may be as expensive as the food itself).
- o time utilization by the child's caretaker in food preparation

c) Existing and new methods for producing weaning foods. Simple and appropriate techniques are needed.

2) Studies on the effects of the nutritional status of women on fetal outcome and child-rearing practices. For educating mothers appropriately, the PHCWs need technologies for:

- o monitoring pre-pregnancy weight, weight gain, fetal outcome, and birth weight
- o monitoring nutritional status of mothers vis-a-vis their reproductive capacity
- o identifying mothers and children at risk of malnutrition by field indicators

B) Research on technologies for improving the nutritional status of mothers and children at the community level.

1) In the area of food availability there is a need for better methods for growing basic staples in the home garden plot as a nutritious blend of foods as for example double cropping and intercropping. Besides providing a better balanced diet, this system protects the family against failures in the production of a single staple crop. Research is also needed on how to manufacture agricultural tools in the villages so as to facilitate the work of women in the family garden or in the fields. Also, extension courses on the technology of marketing produce handicrafts, and housecrafts are required for both literate and illiterate mothers.

- 2) In the area of food conservation, involving:
 - a) Food storage at village and home levels. Improved methods are needed that are resistant to rodents, insects and others pests, and of low cost using local materials. Although present estimates are faulty, post-harvest food losses account for 10-30% of total production--twice as much perishable as durable food is lost (McDowell, 1977; NRC, 1978).
 - b) Food drying to a low moisture content either by exposure to the sun or by a fuel firing procedure to facilitate storage and reduce contamination, particularly by molds and bacteria. Simpler, more effective, and lower cost equipment is needed to reduce losses and insure food supplies for families and communities.
 - c) Food cooking. Methods for improving solar cookers or "hot boxes" should be investigated within the local situation in order to reduce the housewife's workload and time spent on fuel collection and shopping.
 - d) Food processing. Research in very inexpensive manual extruders may be warranted, Similarly, low cost small hand mills for grinding cereals and legumes are required in many households.
- 3) In the area of food utilization, studies should be developed for:
 - a) Water storage. For personal hygiene and effective health education, inexpensive methods of storing clean, safe water, such as jars and cement-lined baskets, or for piping water collected from the roof into the home are essential. For wells, chlorinators that are effective, inexpensive and easy to install and control by the PHCW should be designed (Echeverri and de Salazar 1980).

- b) Excreta disposal. Systems for safe disposal of excreta should also be improved in order to reduce the transmission of infections by breaking the fecal-oral cycle, the most prevalent cause of morbidity-inducing malnutrition in developing societies. Latrines must be clean and fly-free through fumigation or other inexpensive technology in order to control the spread of infection in the community (Watt and Lindsay, 1948; Lindsay et al., 1953; Schneider et al., 1978; Mata, 1975).
- c) Prevention of infections by specific immunizations. There is a considerable body of evidence indicating that infectious diseases exert a major and adverse impact on nutritional status (93, 94). Immunization of children less than one year old with DPT, BCG, measles, and polio vaccines, particularly while they are adequately nourished, is one component of programs to prevent specific infections of populations at risk. Still, there is need for research on the immunizing capacity of BCG and measles vaccines in malnourished children (Chandra, 1975; Zeigler and Zeigler, 1975). However, for tropical countries, studies on equipment to ensure the safety and effectiveness of vaccines--especially those based on live attenuated virus--from the production site to the recipient can be very useful. The so-called "cold chain" represents one form of appropriate technology to this end. Nevertheless, cheaper methods and tools must be explored (Lloyd, 1977; King, 1978).
- d) Control of food contamination. Simple devices such as cupboards to protect food and clean dishes to avoid insect contamination should be considered.

e) Monitoring and assessing nutritional status. There are methodologies carefully tested in developing countries for assessing the nutritional status of populations with acceptable accuracy and reliability (NRC, 1979). However, the need for more effective, cheaper, and simpler tools that are acceptable to the community is apparent. Hence, the significance of appropriate technologies for:

a) Anthropometric studies.

- o Assessment of weight. Research is required on a durable, light-weight, inexpensive, and sufficiently accurate portable scale for use by indigenous birth attendants, community health workers, and mothers for weighing newborn babies and infants in the home. Better scales for preschool and school children as well as adults are also needed. Weights to check the scales should be designed for appropriateness and low cost.
- o Assessment of height or length. This measurement is often inaccurately recorded by health and auxiliary workers. Development of a low-priced and transportable instrument for determining length is warranted. Infantometers are usually delicate and expensive. There is a need to provide a simple wooden model, made locally, which can be used easily in rural hospitals and village health centers.
- o Arm circumference. Although the coloured "traffic light" sign arm tape is utilized commonly in many countries, it is necessary to determine culturally acceptable "auspicious" colors to denote an excellent arm size and a color which is "inauspicious" to denote failing growth.

- o Weight charts. Similiar studies are required when devising weight charts, i.e., different shades of color to denote correct growth along the "road to health" and less favorable colors above and below denoting overweight or low weight gain (Morley, 1979).

A growth chart for monitoring weight gain in pregnancy by birth attendants, village health workers, and mothers must be designed and tried in the field.
- o Fat folds. Low-cost calipers are needed which could be used in conjunction with the arm circumference measurement to screen patients into categories regarding their nutritional status.
- b) Clinical signs. Technologies for the diagnosis of nutritional deficiencies.
 - o New methods for assessment of anemia, e.g., pictures of anemic and non-anemic tongues, the use of a color swatch that matches the conjunctival colors with those of different red shades in the charts, (Ghosh and Mohan, 1978), or others that are reliable and adaptable to field conditions.
 - o Methods for identifying children with clinical rickets in the community. Those available that measure the wrist circumference or its width, correlating the results with a standard, although useful, could be improved through investigation on intermediate technology.
 - o New simple and inexpensive methods for early diagnosis of xerophthalmia. Certain dyes have been tried (Vijayaraghavan et al., 1978; Kusin et al., 1979), but better techniques are

needed. PHCWs should be trained to recognize Bitot's spots and to ask effectively about night blindness as well as to take preventive measures for children with measles, diarrhea or other illnesses that substantially increase the risk of xerophthalmia.

o Technologies for blood collection, preservation, and transportation for the diagnosis of nutritional deficiencies. Wherever laboratory facilities are within reach of the community, biochemical tests such as hemoglobin levels become a distinct possibility. Hence, it is important to develop newer techniques for the collection and preservation of blood samples by the village health worker, with an apparatus that is low-priced and reliable.

o Methods for the appropriate collection of specimens for the identification or isolation of bacteria and parasites that are agents of prevalent infectious diseases that may be susceptible of prevention and treatment by village health workers.

C) Research on the sociocultural determinants of malnutrition and on measures to reduce their adverse effects.

a) Studies are needed on specific nutrition disorders prevalent in rural and urban communities of developing countries. They should focus on maternal and family behavior which may aggravate or prevent such disorders, as well as implications of such behavior. Such studies would include children that are well nourished, and research should identify the attitudes and practices of those families that cope with environmental stresses in such a way as to

avoid malnutrition. Other problems worth studying are: the management of diarrheal disease at the community level, including oral rehydration therapy; vitamin A deficiency and iron deficiency. Research into nutrition-related behavior and its social ecology in a community is highly location-specific, although some general patterns are demonstrable. These studies could be significant for formulating national and regional nutrition policy, but are absolutely necessary for the design of effective and locally appropriate training of primary health care workers (Northrup, 1980).

In general, this area of investigation should include a strong component of nutrition education and its attendant changes in values, beliefs, and behavior for reducing chronic undernutrition and specific nutritional deficiencies. A basic flaw in health education programs, nutrition included, is a narrow emphasis on communications techniques at the expense of knowledge (or beliefs and practices) of target groups. Health educators do not take seriously the question of what people believe and do, and lack interest in finding out. Unless communication techniques are tailored to the specific practices, social forms, and values of a particular target group, no effective change will occur (Foster, 1980). Research should include food habits and values that are beneficial as well as those that may be considered detrimental.

- 2) Research on community structures focusing on natural leaders and power groups and patterns of interactions among them as they influence community decisions and actions to deal with prevalent health and nutrition problems. These studies are important for

motivating and mobilizing the people to the attainment of agreed upon goals, i.e., community organization. Such information is important for training PHCWs who are not aware of behavioral patterns and the dynamics of the decision-making process. As conditions change, they are unable to adapt concepts and measures to deal with new situations.

- 3) Research on how change is brought about by the village health workers for improving the nutritional status of the people. Typical studies would include how PHCWs introduce appropriate measures and technology taking into account traditional beliefs and practices, and how community demand is stimulated as a result of effective education.)

C Research on better methods for evaluating the outcomes of programs with a nutrition component.

In discussing what the evidence shows regarding successful nutrition interventions (see pages 22-28), the need for further studies on better methods of evaluation and more sensitive and specific indicators is well justified.

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