

# COMMUNITY ORGANIZATION

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OPERATIONS RESEARCH ISSUES

# COMMUNITY ORGANIZATION

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Primary Health Care Operations Research

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*Operations Research Issues: Community Health Workers*  
*Operations Research Issues: Community Financing*  
*Operations Research Methods: A General Approach in Primary Health Care*  
*Operations Research Methods: Cost-Effectiveness Analysis*

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## PREFACE

Primary Health Care Operations Research (PRICOR) is a project of the Center for Human Services and is funded by the United States Agency for International Development (AID) under a cooperative agreement (AID/DSPE-5920-A-00-1048-00). The Center for Human Services is a nonprofit, development services organization specializing in the design and management of programs that address the basic needs of people in developing countries and the United States. PRICOR's objective is to promote operations research as a tool to help program managers and policymakers find solutions to problems they encounter in designing and operating primary health care (PHC) programs.

This project's activities include: Funding and monitoring country studies; sponsoring workshops and conferences; conducting methodological and comparative studies; and disseminating the findings of sponsored research. PRICOR is particularly interested in research designed to overcome problems that limit the expansion of essential PHC services to high-risk populations in rural and peri-urban communities. Consequently, PRICOR has concentrated on operations research to find solutions to problems in four priority areas:

- Community health workers
- Community-based commodity distribution
- Community financing
- Community organization

Operations research provides a systematic approach to problemsolving. In operations research, rather than relying on the costly process of trial-and-error, a well-defined plan of analysis is used to select the best of several possible alternatives. A specific operational problem is first defined and analyzed. Alternative solutions are developed and evaluated to identify those that are most appropriate and feasible. Recommendations are then made for testing, or in some cases directly implementing, the best solution(s).

This is one in a series of five monographs on operations research that was prepared by PRICOR staff and consultants for researchers in the developing world who are interested in learning more about this approach and applying it to their own primary health care programs. The five monographs in the series are:

- Issue Papers
  1. Operations Research Issues: Community Financing
  2. Operations Research Issues: Community Health Workers
  3. Operations Research Issues: Community Organization
- Methodology Papers
  1. Operations Research Methods: A General Approach in Primary Health Care
  2. Operations Research Methods: Cost-Effectiveness Analysis

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## ABBREVIATIONS USED IN TEXT

AID	Agency for International Development (USAID)
APHA	American Public Health Association
CF	Community Financing
CHW	Community Health Worker
CO	Community Organization
OR	Operations Research
ORS	Oral Rehydration Salts
ORT	Oral Rehydration Therapy
PHC	Primary Health Care
PRICOR	Primary Health Care Operations Research
UNICEF	United Nations Children's Fund
WHO	World Health Organization

## INTRODUCTION

Primary health care is gaining acceptance as a strategy for bringing basic health services to all people in developing nations who do not have access to such services at this time. Primary health care programs can have a significant impact on health by focusing on a limited number of health problems that are preventable by means of simple, relatively low-cost interventions.

Diarrhea, respiratory infections, malnutrition, and contagious diseases are among the most serious health problems in developing countries. They result in high rates of infant, child, and maternal mortality and morbidity, particularly in rural areas and in the surroundings of urban centers, where organized health services are most limited. Ironically, much of this suffering is avoidable, because a few primary health care interventions could dramatically reduce these problems if ways could be found to reach the target populations--particularly women and children--with such needed primary health care services as immunizations, oral rehydration therapy (ORT), growth monitoring, family planning, malaria prophylaxis, water supply, environmental sanitation, and antepartum and perinatal care.

In 1978, the International Conference on Primary Health Care was convened at Alma-Ata in the Soviet Union. At this historic event attended by representatives of 134 nations, primary health care was endorsed as a strategy for making fundamental health services universally accessible to the world's population. The Declaration of Alma-Ata defines primary health care as:

. . . 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. . . . [Primary health care] addresses the main health problems in the community, providing promotive, preventive, curative and rehabilitative services accordingly . . . [it] includes at least: education concerning prevailing health problems and the methods of preventing and controlling them; promotion of food supply and proper nutrition; an adequate supply of safe water and basic sanitation; maternal and child health care, including family planning; immunization against major infectious diseases; prevention and control of locally endemic diseases; appropriate treatment of common diseases and injuries; and provision of essential drugs.(1)

Among those organizations helping to find ways to achieve this goal is the Agency for International Development, which has supported numerous primary health care projects around the world. These projects, extensively documented in a recent American Public Health Association publication, have demonstrated the efficacy of primary health care in reducing premature mortality and excess morbidity.(2)

The Agency for International Development has been particularly interested in finding ways to expand coverage of mothers and children in rural and periurban areas with such essential primary health care services as immunizations and oral rehydration therapy, among others. However, AID and other international donors have learned from experience that meeting this objective is not a simple matter.

### Role of Operations Research in Primary Health Care

A number of operational issues need to be resolved before primary health care can become universally available. For example, the Alma-Ata Conference report noted that:

Enough is already known about primary health care for much of it to be put into practice immediately. However, much still needs to be learned about its application under local conditions, and during its operation, control and evaluation problems will arise which will require research. These may be related to such questions as the organization of primary health care within communities and of supporting services; the mobilization of community support and participation; the best ways of applying (existing and appropriate) technology . . . the planning for and training of community health workers, their supervision, their remuneration and their career structure; and methods of financing primary health care.(3)

Recognizing the importance of research into the operation of primary health care delivery, the AID Office of Health funded PRICOR to help primary health care program managers and policymakers find solutions to such problems through operations research. PRICOR has defined operations research as a problemsolving process consisting of three phases:

1. Systematic analysis of the operational problem;
2. Application of the most appropriate analytical methods to identify the best solution(s) to that problem; and
3. Validation of the solutions(s).

Although operations research has not yet been widely used as an analytical and decisionmaking tool to improve health services in developing countries, it can be applied to examine a number of issues pertinent to primary health care service delivery.

For example, operations research can be applied to examine the advantages and disadvantages of different approaches to involving the community in the organization of a primary health care program, to assess existing organizations (e.g., farmers' cooperatives, development committees, and churches) to determine which would be most effective in helping to expand primary health care coverage, or to study community involvement in primary health care and identify ways to improve it.

This paper was prepared to help policymakers, program managers, and researchers identify problems in community organization that can be addressed by operations research. The paper is particularly relevant to those in developing countries who are actively involved in the planning or operation of primary health care programs that involve community organization, investigators working with primary health care, program managers, and health policy planners.

The specific objectives of the paper are:

1. To define community organization and explain why this subject is an important research topic;
2. To identify key operational problems and issues in community organization that can be addressed by operations research;
3. To describe a general approach to operations research that can be used to study such problems; and
4. To describe a number of recent operations research projects in community organization for primary health care to illustrate the application of operations research to this subject.

## NOTES

1. "Declaration of Alma-Ata," Primary Health Care, Report of the International Conference on Primary Health Care, Alma-Ata, USSR, 6-12 September, 1978, jointly sponsored by WHO and UNICEF (Geneva: WHO, 1978), pp. 3-4.
2. Primary Health Care: Progress and Problems, An Analysis of 52 AID-Assisted Projects (Washington, DC: APHA, 1982).
3. WHO and UNICEF, Alma-Ata 1978, op. cit., pp. 71-72.

CHAPTER I  
COMMUNITY ORGANIZATION: A RESEARCH PRIORITY  
FOR PRIMARY HEALTH CARE

## CHAPTER I. COMMUNITY ORGANIZATION: A RESEARCH PRIORITY FOR PRIMARY HEALTH CARE

### WHAT IS COMMUNITY ORGANIZATION?

Community organization for primary health care (PHC) may be defined as the processes and structures through which members of a community are or become organized for participation in health-promoting activities. When viewed as a process, community organization means the sequence of steps whereby members of a community come together, whether on their own initiative or on that of others, to participate in health-promoting activities. When viewed as a structure, community organization refers to a particular group of community members (e.g., kin groups or elders' councils) that work together for common health-related goals.

The term "community," itself, usually means a geographic community, a group of people living in the same geographic area, such as a rural village or an urban neighborhood. It may also mean a functional community, such as a religious, ethnic, or occupational group whose members interact but do not all live in the same geographic area. In all cases, members of a community are people who share some common identity, one that distinguishes them from members of other communities.

Often, the terms community organization and community participation are used loosely and interchangeably. For example, community participation was the term stressed in the report on the Alma-Ata conference and was defined as

the process by which individuals and families assume responsibility for their own health and welfare and for those of the community, and develop the capacity to contribute to their and the community's development.(1)

This definition is very similar to this paper's definition of community organization as a process. For the purposes of this paper we will try to distinguish community organization from community participation and will define community participation to be the actual taking part or involvement of community members in specific primary health care activities. These activities may include participation:

1. in decisionmaking during project planning or project implementation;
2. in implementation of services that are the heart of the project;
3. in research and evaluation in so far as is possible; and
4. in the benefits of the primary health care services (e.g., becoming immunized).

Concern for community organization did not originate with interest in PHC in the 1970's. The roots of the community development movement, in fact, date back to the 1920's.(2) After World War II greater attention was paid to community development and, in 1948, a successful pilot project in the Etawah District of India initiated a chain of events that brought the movement into prominence. In French-speaking Africa the movement was known as animation rurale.

The literature on community organization in the general development context is vast and contains valuable lessons and points of departure for persons working in primary health care. The now-classic work of Murray Ross provides background on the theory and

practice of community organization, as does the work edited by Lee Cary.(3) George Foster discusses the lessons the community development experience sets forth for community organization in primary health care.(4)

The literature on community participation and community involvement in primary health care is more extensive than that on community organization alone. This literature should also be consulted, with the realization that the terms "participation" and "involvement" are more general and all-encompassing than "organization."(5)

In the course of this general experience, several alternative--and even contradictory--approaches to (and definitions of) community organization have evolved. The three that follow are important for researchers and health planners alike to bear in mind.

#### 1. Community Organization as Existing Community Structure

In the broadest sense, community organization means the social, economic, and political structure and systems that exist within a given community. This includes, in the context of primary health care, the ways people in the community customarily carry out activities that influence their health--for example, traditional patterns for gathering and processing local medicinal herbs or for assisting a woman through childbirth.

#### 2. Community Organization as Externally Initiated Process: "External Agent" or "Top-Down" Approach

Among projects and programs funded by agencies external to the local community, community organization usually refers to the act of organizing community members, under the guidance of "community organizers" or other project personnel from outside the community, to meet the purposes of their particular project. This is the approach and definition usually used by Ministries of Health, international agencies, and many private voluntary organizations.

The typical pattern is for project personnel to visit each community in which a project may be implemented and to introduce the planned project to community leaders. Once community members express sufficient interest, planners identify a group that agrees to take on tasks and responsibilities related to implementing the project within that particular community. In some communities, this group is then referred to as the village health committee.

Project planners may state that the organizational process should be stimulated to occur through a "bottom-up" approach, but the initiative, overall management, and criteria for judging progress and success still come from outside the community. Whatever non-health benefits may accrue to the community from organizational activities are usually regarded by project staff as less important than meeting the explicit goals of the project.(6)

#### 3. Community Organization as Internally Initiated Process: "Inner Resource" or "Bottom-Up" Approach

This approach is based on the philosophy that communities must identify their own wants and needs and work cooperatively to satisfy them. Projects are not predetermined by external agencies, but develop as discussion in communities is encouraged, proceeds, and focuses on the real concerns of the people. If persons outside the community are involved in this process, they serve only as facilitators, or "teacher-learners."

As the community defines its wants and needs and seeks solutions, it may seek the aid of national governments or international organizations. But the emphasis of this approach is on the community working to solve its own problems. Direction is established internally, rather than externally. Development and implementation of a specific project is less important than development of the capacity of the community to establish the project. Technical change follows social movement and consciousness-raising\*, not vice-versa.(7)

Under the internally initiated approach, community organization for primary health care, then, refers to the processes whereby members of a community organize themselves to get better health care and improve their health as part of a larger effort to increase their power and achieve greater social and economic equality within the larger social system. This is the approach, and definition, espoused by communities that initiate their own development projects, and by some private voluntary organizations who refer to it as helping communities to help themselves.

Since PRICOR's priority is to help planners and program managers improve the effectiveness of their efforts, it is likely that more research applications will come from those involved in externally initiated community organization. However, the methodology described in this paper is also applicable to internally initiated efforts and PRICOR is also interested in promoting the use of operations research in these kinds of projects.

#### WHY COMMUNITY ORGANIZATION IS IMPORTANT IN PRIMARY HEALTH CARE

Because primary health care requires that community members make major changes in their behavior, community participation in PHC project decisions and other activities is essential for a project to achieve its goals. A project will be able to introduce health measures successfully only if it offers something that is culturally acceptable and affordable. Evaluations of PHC projects implemented during the past decade have revealed again and again that, in many countries, the rural people who are the intended beneficiaries commonly bypass the services and clinics established by those projects in favor of traditional practitioners, private-sector physicians, and even hospitals in distant towns.

Only if project interventions are tailored more carefully to prevailing beliefs and behavior and to the demand expressed by local communities will it be possible to begin improving utilization rates and the overall effectiveness of PHC projects. In projects initiated and funded largely by agencies external to the local community, involvement of community members in project decisionmaking and implementation is a major means for achieving the necessary fit between the project and its intended beneficiaries. For a useful discussion and illustrative case studies on this point, see the UNICEF-WHO Joint Committee on Health Policy study entitled "Community Involvement in Primary Health Care."(10)

Community organization is important for primary health care because of its value in maximizing community participation. There are also technical reasons why community

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\*The philosophy and methodology of consciousness-raising (conscientization or education for "critical consciousness") derive from the work of Brazilian educator Paolo Freire.(7) As applied to health care, this approach involves perceiving health and medical care within the total structure of society. Proponents of this approach argue that health "reform" cannot occur except within the context of broader social transformation.(8) The approach is perhaps best known and illustrated in the primary health care field by the writings of David Werner.(9)

organization is essential to primary health care. Many of the technical interventions that are part of primary health care must be carried out at the community level and do not even require direct involvement of modern medical practitioners. The objectives of primary health care are more than a matter of improving cultural acceptance and use of medical services. They include improving local water and sanitation, increasing the availability of essential medications and oral rehydration solution, and increasing food production, preparation, and consumption--objectives that depend on community participation.

Community organization is also important for other key elements of primary health care. A community organization actively involved in selection and support of community health workers contributes significantly to the effective performance of those workers. This point is commonly made throughout the primary health care literature. For specific references and further discussion, see the PRICOR monograph, Operations Research Issues: Community Health Workers.(11)

And, an effective community organization can play a major role in securing community financial contributions for selected health services. The PRICOR monograph, Operations Research Issues: Community Financing addresses this issue in more detail.(12) Also, experience shows that individuals are far more willing to pay for curative, than for preventive, care. Thus, effective community organization is especially important for preventive activities.

Finally, community organization is critical to community participation in achieving the goals of self-reliance and social awareness. As was stated in the "Declaration of Alma-Ata":

Community participation is the process by which individuals and families ... come to know their own situation better and are motivated to solve their common problems. This enables them to become agents of their own development instead of passive beneficiaries of development aid. They therefore need to realize that they are not obliged to accept conventional solutions that are unsuitable but can improvise and innovate to find solutions that are suitable. They have to acquire the capacity to appraise a situation, weigh the various possibilities and estimate what their own contribution can be. While the community must be willing to learn, the health system is responsible for explaining and advising, and for providing clear information about the favourable and adverse consequences of the interventions being proposed, as well as their relative costs.(13)

Similar arguments for community participation have been articulated since the beginnings of the PHC movement. In 1971, for instance, the WHO/UNICEF Joint Committee on Health Policy commissioned a study to describe successful attempts to adapt health care to the needs and resources of developing countries. The resulting report ultimately provided the background for WHO's and UNICEF's formal adoption of primary health care as the main strategy for addressing the health problems of developing countries. The report concluded that inadequate community involvement in providing health care was a major reason for the continued ill health among the underprivileged 80 percent of the world's population. It stated:

Most health care delivery systems have failed to make care accessible and acceptable to the people who need it....As the acceptance of many health measures may involve a change in living habits, the community itself must decide on the measures, help in carrying them out, and evaluate their success.

Organizing the delivery of health care so that part of it "belongs" to those it is designed to serve has enormous advantages. Local resources can be tapped and the community's view of the nature of the system can be radically changed. Ideally, this component of health care delivery should be under the control and administration of the community itself....(14)

In summary, the use of community organizations to maximize local participation in primary health care has the potential for improving both a project's effectiveness during implementation and its ultimate impact. Although few primary health care projects to date have developed truly effective community organizations, such organizations offer the following advantages.

#### 1. Improved Project Planning and Design

Community organizations can assist in translating general project goals into locally meaningful ones and, where necessary, can help modify the initial project design. Thus, PHC services and activities will be culturally acceptable and also affordable in terms of community resources.

#### 2. Improved Project Implementation

Community organizations can enhance project implementation because they facilitate:

Support from the local power structure. Effective involvement of community leaders contributes to their actively supporting the project rather than only giving it lip-service, or even subverting it.

More accurate assessment of needs. During the planning stage, ongoing input from community members can help the project staff understand how well the project is meeting community needs and make appropriate adjustments.

Decreased dependency on limited external resources. This can occur if community members believe the benefits of the project are sufficiently valuable that they are willing to contribute their own scarce resources of time, labor, goods, and money.

Better use of the community's unique indigenous knowledge and resources. This includes incorporation of community resources (e.g., traditional practitioners) and knowledge (e.g., of the best time and place for service delivery), much of which may be unknown to people outside the community.

Better use of the indigenous health care system. Better communication between the indigenous (traditional) and the modern health care workers enables the project to take advantage of the strengths of the indigenous system and its practitioners.

Recruitment of appropriate community members for the position of community health workers. Community members can assist in identifying those best suited to serve as community health workers.

Enhanced performance of community health workers. This includes appropriate support and supervision for both paid and volunteer workers.

Increased service coverage. Health workers selected from the community, and possibly also compensated by the community, may be able to extend project services to more community members, and do so more quickly, than could workers from outside the community.

Increased service utilization. Community input in defining needs and establishing priorities helps insure that the services offered respond to local preferences and constraints. This is essential to enhanced use of project services.

Active participation of community members in preventive and related health-promoting activities. This includes group activities (e.g., village sanitation activities) as well as behavioral changes in individuals and households (e.g., new dietary practices).

### 3. Integrating Primary Health Care With Other Community Concerns

The involvement of the community is essential to achieving 1) long-term support for primary health care and 2) mutual reinforcement between health care and other community development activities. Building community support for the goals of primary health care helps assure that achievements of a primary health care project will be sustained after the project itself has been completed. Building community skills and self-confidence in undertaking new activities that promote socioeconomic development contributes in turn to improved health.

### IMPORTANCE OF OPERATIONS RESEARCH ON COMMUNITY ORGANIZATION

There is strong theoretical and empirical evidence that effective community organizations have great potential for helping maximize community participation, which is essential for extending primary health care in the developing countries. Many Ministries of Health and international development organizations have rewritten their policies to add the directive that primary health care projects "will include community participation." Throughout the developing world, many multimillion-dollar projects now feature plans for using community organizations in primary health care.

However, no clear reliable answers are available as yet on precisely how such organizations should function. Experience has shown that health planners still lack the operational knowledge necessary to design projects that can overcome existing constraints and successfully stimulate community members to participate in organized health improvement activities on an ongoing basis.

The primary health care projects in which community organization efforts, or even community participation in general, have been systematically monitored or evaluated are relatively few. Nevertheless, a sizable literature has accumulated regarding community organization in development generally, and is beginning to build up on community organization in primary health care in particular.

From this literature, it is clear that community participation is much more difficult both to organize and to maintain than many health specialists had anticipated.\* Though many national and international agencies express commitment to participatory approaches to helping the rural and urban poor, they have made relatively little progress in translating ambitious plans into effective action.(17)

All too often project planners have been over-optimistic in their assumptions on the willingness of community members to change their behavior and to accept added work in the name of health improvement. To many villagers and urban poor, conditions making

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\*PHC case studies that support this conclusion include reports by APHA, UNICEF, and others.(15) Many similar conclusions emerge from case studies of projects in other development sectors.(16)

for ill health are normal and accepted facts of life rather than conditions to eradicate. Many poor people, moreover, have little free time to give to collective health activities, even if they perceive them as important. One consequence is that project personnel have had considerable difficulty motivating community members to participate in organization activities as set forth in project plans. Most operational problems in community organization are related to this lack of realistic understanding about what is feasible, given the existing values and organizational patterns within the "target" communities.

Community organization efforts are also hampered because many planners have not had sufficient time or motivation to study the lessons of the past. All too frequently, organizational activities are planned and launched without any attempt to learn from past experiences in community organization--that is, to build on the successes and avoid repeating the mistakes of earlier projects.

Thus, in spite of the large number of primary health care projects that have attempted community organization activities, relatively few have succeeded, or have sustained their success. Furthermore, most successes have been small-scale projects (e.g., single community and pilot projects), rather than the national and other large programs that currently consume most of the funds being spent on primary health care.

In general, small projects have usually enjoyed a greater availability of resources at the community level, including technical expertise, drugs and other supplies, and overall financing; their staffs have been able to be more flexible in adapting project plans to actual and changing circumstances; and they are more likely to have been headed up by dedicated and charismatic leaders. In contrast, national and other large-scale programs have been sorely hampered by bureaucratic norms, regulations, and funding problems, which result in lower priority being placed on the time-consuming work of communicating effectively with rural villagers and urban poor people.(18)

Experience has also shown that community organization is more difficult than community participation. More projects have tried to achieve community participation in some general way (e.g., involvement of mothers in baby weighing or in learning oral rehydration) than community organization in the more explicit sense. There have also been more successes in bringing about such participation than in identifying or creating an organization that accepts continuing responsibility for health improvement activities.

Careful, systematic research on community organization is thus important for closing this gap between the present realities and the greater potential for primary health care. It is especially important for closing the gap between the bureaucracies responsible for primary health care programs and the poor whose health they are trying to improve.(19) Operations research can make an important contribution to identifying effective community organization strategies through its emphasis on systematic problem analysis, solution development, and solution testing.

Because of the tremendous cultural, economic, and political variation that exists from one community to another--even within the same region of a country--there will never be a single "best way" to organize community participation. Indigenous forms of social organization vary greatly from one culture to another, just as beliefs and behavior related to the causes and cures of disease also vary greatly. This means that a strategy for organizing participation in health care activities that works in one community will not automatically work as well in another.

What is needed then is: first, to carefully document, as well as to further employ and test, those general principles that have been demonstrated to work well; second, to carry

out research at the local level in various parts of individual developing countries in order to determine what specific strategies are most likely to succeed in that particular area; and third, to conduct research aimed at helping the national and other large-scale primary health care programs learn from the successes of the small-scale projects and develop strategies that they can carry out effectively.

Operations research is not meant to replace anthropological, behavioral, or other social science research. On the contrary, research in these other disciplines is often essential in providing data and information that is required for understanding problems in community organization and in designing appropriate solutions. Nevertheless, because the implementation of effective community organization in PHC is a formidable management task involving many operational problems, operations research is a methodology that can be appropriately used for developing the best solutions to many of these problems.

The following chapter describes issues related to community organization in primary health care that are amenable to operations research. Chapter III presents a general approach for conducting operations research on such issues.

#### NOTES

1. "Declaration of Alma-Ata, Primary Health Care, Report of the International Conference on Primary Health Care, Alma-Ata, USSR, 6-12 September, 1978, jointly sponsored by WHO and UNICEF (Geneva: WHO, 1978), p. 50.
2. Lane C. Holdcroft, The Rise and Fall of Community Development in Developing Countries, 1950-1965: A Critical Analysis and Annotated Bibliography (East Lansing, MI: Michigan State University, Department of Agricultural Economics, Rural Development Paper No. 2, 1978); David C. Korten, "Community Organization and Rural Development: A Learning Process Approach," Public Administration Review (September-October, 1980), pp. 481-482.
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4. George Foster, "Community Development and Primary Health Care: Their Conceptual Similarities," Medical Anthropology, Vol. 6, No. 3 (1982), pp. 183-195.
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CHAPTER II  
OPERATIONAL PROBLEMS RELATED TO COMMUNITY ORGANIZATION

## CHAPTER II. OPERATIONAL PROBLEMS RELATED TO COMMUNITY ORGANIZATION

A review of experience in various developing countries with PHC programs involving community organization (CO) indicates that there are certain problems that operations research can help resolve. This chapter provides a framework for identifying important research problems related to community organization and the variables that need analyzing in search of solutions.

The chapter is divided into four sections: 1) a presentation of the nine common issues or "problem clusters" related to community organization; 2) an explanation of a systems approach to analyzing community organization problems; 3) a discussion of how to identify the variables that could be of interest in developing solutions to operational problems in community organization; and 4) a listing of the most common variables for each of the problem clusters.

### COMMUNITY ORGANIZATION PROBLEM CLUSTERS

As the previous chapter indicated, both national and international organizations are exploring ways to foster community organization and community participation to insure that PHC programs are meaningful and viable. Countries and localities differ in the approaches they take to promote and develop organizational relationships, the objectives and strategies they chose for organizational involvement, and the incentives and support they require to sustain the participation of community members and organizations. Operations research can provide significant help in making decisions in these areas.

Experience has shown that those who develop PHC programs using a community organization approach must often deal with some or all of the following nine sets of issues, or "problem clusters."

1. Initiating contacts with the community
2. Setting community organization objectives
3. Determining community organization strategies and functions
4. Determining community organization structure
5. Identifying appropriate incentives
6. Managing the community organization
7. Providing appropriate supervision and support
8. Implementing community organization activities
9. Monitoring and evaluating community organization performance

The first five issues relate primarily to planning decisions; the last four primarily to operational decisions.

### SYSTEMATIC ANALYSIS OF COMMUNITY ORGANIZATION PROBLEMS

The nature of an operational problem in community organization will vary somewhat, depending on whether the researcher is studying a problem in an ongoing PHC system or trying to provide relevant data for designing a new PHC system. For example, maintaining incentives for continued involvement of a community organization in a PHC program is a common problem, but the researcher will take a different approach in analyzing the problem of incentives in an ongoing program than in analyzing the incentive scheme for a program that is being designed. In either case, the general problem must be carefully described, smaller operational problems defined, and priorities set for solution development. This approach to problem analysis is described in more detail in chapter III.

A review of relevant information that has already been prepared is helpful at the start of a major problem analysis effort. For example, evaluations, surveys, and site visit reports often identify operational problems. If there are no experiences in using community organization approaches in health programs in the country, the researcher may want to examine information from programs in other sectors, such as agriculture, where community organization may have been utilized. Analysts may need to supplement these data with new information. Quade suggests an investigative reporter approach to problem analysis, interviewing people to answer the key questions about the problem: who, what, when, where, how, and why.

When beginning work on a study, the analyst should interrogate the sponsor and all other persons associated with the problem situation who seem likely to be able to help. In particular, he seeks answers to such questions as

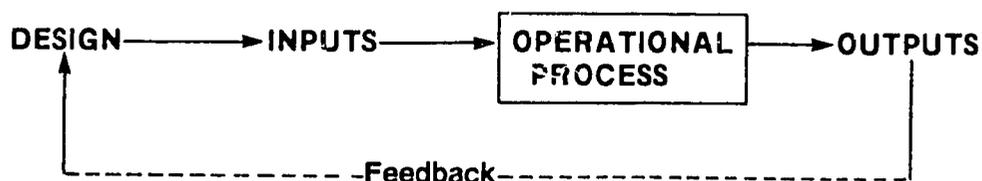
1. How did the situation arise? Why is it a problem?
2. Who are the people who believe it to be a problem?
3. Why is a solution important? If an analysis is carried out, what will be done with it? Will anybody be able to act on the recommendations?
4. What should a solution look like? What sort of solution is acceptable?
5. Is it the right problem anyway? Might it not be just a manifestation or a symptom of a much larger or deeper problem? Would it be better to tackle this larger problem if there is one?
6. Analytical resources are always limited; at this stage does it seem that there would be a return from the study effort that would be justified, or would the analytic effort be better applied elsewhere?(1)

This type of problem analysis may be sufficient. But a more systematic approach may be required in conducting operations research on community organization. In this approach, analysts view the overall strategy of community organization in PHC as a system that absorbs inputs according to some plan or design and then processes them to produce outputs. (See figure 2-1.) Johnson, et al., suggest that:

The best way to view a system is by describing the flow process, analyzing each segment, and investigating the relationships and contributions of the parts to the whole. In this way it is possible to direct attention and study to those segments which fail to optimize their contribution to the total system.(2)

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**Figure 2-1.--A Simple System**



The authors give this description of a system.

A system will be defined as an array of components designed to accomplish a particular objective according to plan. There are three significant points in this definition. First, there must be a purpose, or objective, which the system is designed to perform. Second, there must be a design, or an established arrangement of the components. Finally, inputs of information, energy, and materials must be allocated according to plan. . . . These same ingredients are basic to every system. . . . However, the emphasis in the systems concept differs slightly. Information, energy, and materials are classified in terms of whether they are used 1) to create the system or 2) to operate the system.(3)

Operations research is concerned with both the design and operational processes, particularly with identifying problems and assessing possible solutions. The inventory of nine problem clusters listed at the beginning of this chapter serves as a starting point in the description of a system for planning and implementing community organization in primary health care. A relationship among these problem clusters is implied, but a systematic analysis requires that the relationships be made explicit and defined in terms of cause and effect. For example, what is the relationship between the functions a community organization is to carry out and the incentives for participation? This is where a system description is useful.

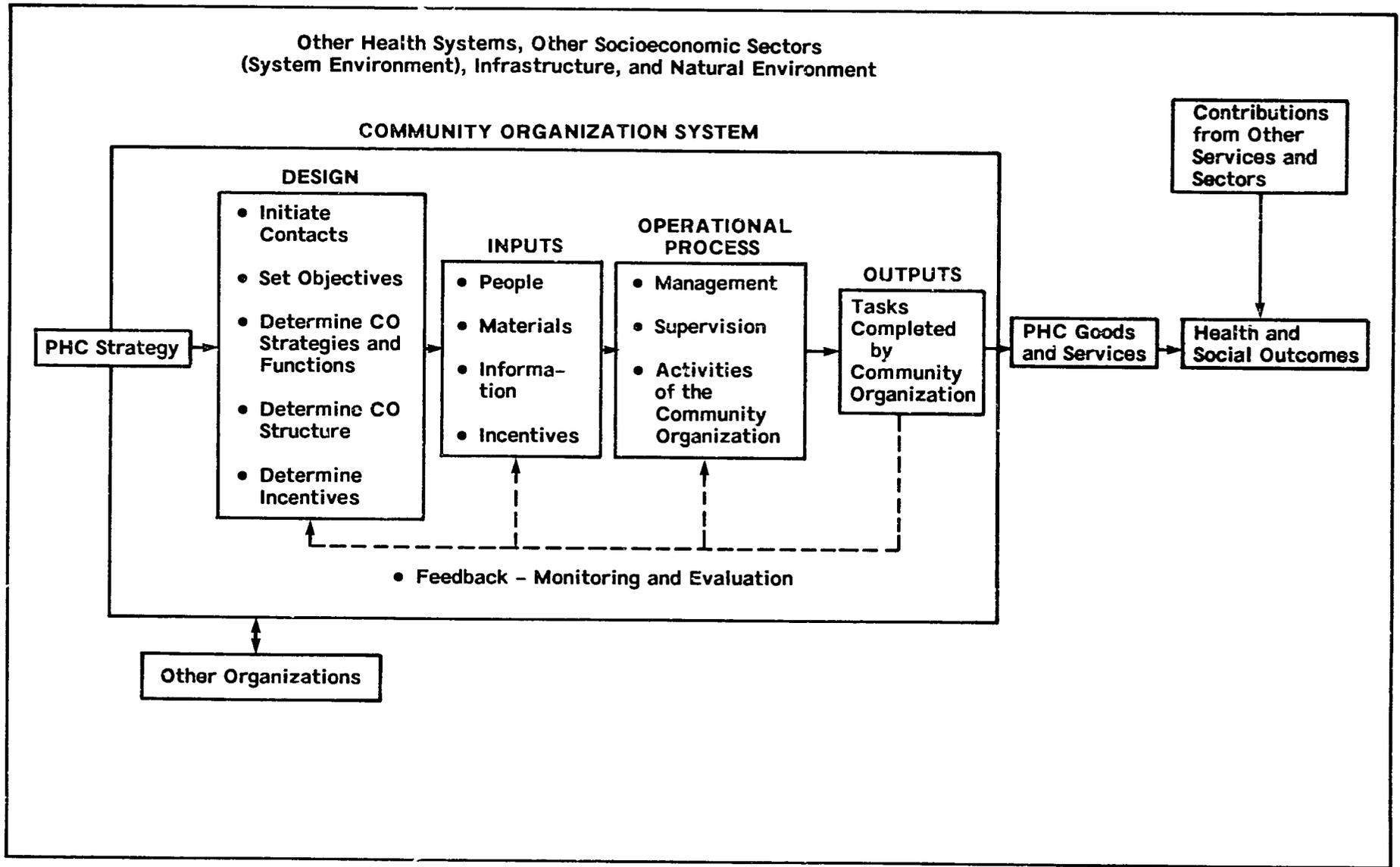
Figure 2-2 is a diagram (or model) that illustrates how a system for community organization in primary health care might function. The diagram shows the relationship of the important problem clusters within a rectangle that defines the "boundaries" of the system. The five problem clusters that are primarily related to planning decisions are shown in the "design" box, and those that are primarily related to implementation are shown in the "operational process" box. In practical terms, all nine problem clusters will have to be addressed in both planning and operational phases of the system.

The larger rectangle represents the environment within which the community organization system operates. This environment is made up of other health systems (private, social security, etc.), other socioeconomic sectors (agriculture, transportation, etc.), infrastructure (roads, communications systems, etc.), and natural forces (climate, terrain, etc.) that affect the system in one way or another.

The system for planning and implementing community organization in health may originate with the primary health care strategy, which is often developed outside the community; for example, by the Ministry of Health. The strategy may require the involvement of community organizations or significant community participation in the tasks required to successfully implement primary health care. Before that can happen the community organization program (or system) must be planned. Decisions have to be made, for example, on how participation should be organized, what organizations should be involved, and what should be their structure and function. These problem clusters are interrelated, so that a decision in one part of the system (for example, what incentives to offer for performing certain tasks) must be considered in relation to the other parts.

After the system has been designed, it is ready to operate by drawing inputs from community and noncommunity sources. The most significant inputs are money, labor, and materials. The outputs of the system are the completed tasks (e.g., community health workers selected, funds raised, members motivated, etc.), that are essential to increasing the availability and utilization of the goods and services. These, in turn, would lead to improved health status. The transformation of inputs to these outputs depends on the operational process. Problems related to the operation of the system include management of the community organization itself, supervision (both internal and external), and the

Figure 2-2.--Diagram of a System for Community Organization in Primary Health Care



actual implementation of a whole host of activities that these people or organizations will carry out. Providing feedback to the decisionmakers on the actual operation of the community organization system enables them to make necessary adjustments to the plan.

It is important to point out that figure 2-2 is a general description of a community organization system and its key variables. Moreover, the diagram applies either to a situation in which a formal community organization is established to promote primary health care (e.g., village health committee, health cooperative) or to one in which community participation is organized without the contribution or utilization of formal organizations. The system description of any given PHC community organization can be expected to vary from this general model.

### IDENTIFYING THE KEY VARIABLES OF A PROBLEM

When decisionmakers attempt to solve operational problems they are usually confronted with a large number of variables which affect the system. The most relevant variables that make up a problem can be divided into two categories: those that are controllable and those that are uncontrollable. The controllable variables are also called decision variables because they are under the control of the decisionmaker (e.g., which functions are to be carried out by the community organization, what incentives will be provided to motivate community members to participate).

There are several types of uncontrollable variables. One of the most important types to consider are the constraints. Constraints tend to limit the range of choices available to a decisionmaker. Some constraints are external to the community organization system such as the weather, which may limit a program to a particular time of year. Some constraints impose restrictions on either the inputs that may be used in the system (e.g., the cost of the program shall not exceed \$10,000) or on the outputs of the system (the number of children vaccinated shall not be less than 10,000). Some authors use the term "facilitating factors" for those factors which tend to expand the range of choices available or which favor a certain decision choice (e.g., the existence of a volunteer organization ready and able to carry out certain new tasks).\*

Figure 2-3 illustrates common variables related to the problem of incentives. Thus, in looking for a solution to a problem, one of the first tasks of the operations research analyst is to identify the most relevant decision variables and constraints. The operations research approach to problemsolving is described in more detail in chapter III, but at this point, a brief example may help to explain the relationships among these variables and demonstrate why it is important to identify them. (See also figure 2-2.)

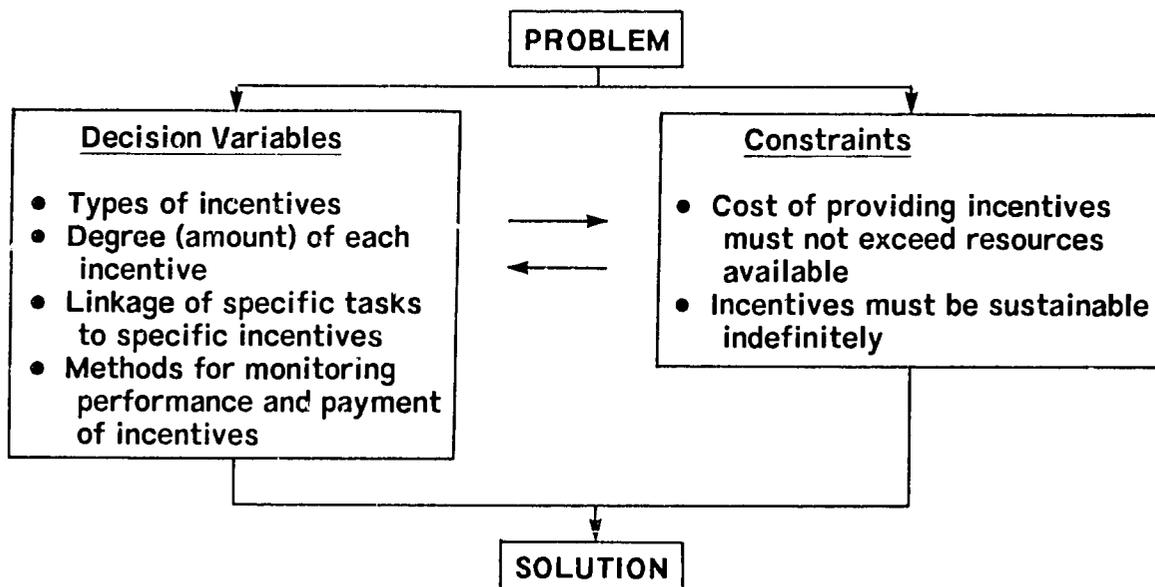
In looking for a solution to an operational problem the analyst usually begins with an objective, a statement that describes what the solution should accomplish or how the system should perform. If the operational problem is one of incentives, the objective might be stated: to determine the package of incentives for members of a community organization that will maximize their performance in helping to expand PHC services.

Given that objective, the analyst needs to identify all of the relevant decision variables that can be manipulated to effect desired changes. For example, the PHC program managers and the community organizations can decide which incentives to use

\*For an indepth discussion of the categorization of variables that are important in operations research, see the PRICOR monograph Operations Research Methods: A General Approach in Primary Health Care, by Stewart Blumenfeld.

and in what amount. They can decide to relate specific incentives to the performance of specific tasks (e.g., free health services will be provided in return for a certain amount of labor donated for construction of latrines). The analyst then seeks the value for each decision variable that will best achieve the stated objective. For example, exactly how much free health services will need to be offered in exchange for a desired amount of donated labor.

Figure 2-3.--Some Variables Related to Incentives



The analyst should identify the important constraints that may affect the solution (e.g., the season of the year when villagers would be available to provide free labor, or the maximum financial resources available to provide incentives).

To summarize how these variables are related to one another: in selecting an incentive package, an objective may be to select one that maximizes the performance of the community organization in helping to expand PHC services. A constraint may be the maximum amount of financial resources available. One of the decision variables would be the types of incentives to provide. The value of a decision variable in this example would be the actual amount of a particular incentive to provide for performing a certain task (e.g., one free community health worker visit for each hour of labor contributed). An optimal solution to this problem would be the package of incentives which maximizes performance of the community organization in expanding PHC services within financial resource constraints.

Thus, in conducting operations research on a problem, the analyst needs to state an objective and identify the relevant decision variables and constraints. Those are the elements on which the research will concentrate to identify an optimal solution.

## INVENTORY OF OPERATIONAL PROBLEMS, DECISION VARIABLES, AND CONSTRAINTS

This section identifies the most common decision variables for each problem cluster to provide a better understanding of the range of factors affecting each issue or problem and as an aid to identifying potential operations research topics related to community organization in primary health care. It briefly discusses the significance of each problem cluster, lists common decision variables, and identifies some common constraints. Finally, it summarizes what past experience has shown for each problem cluster.

This section does not discuss in detail the specific operations research methods which may be used to solve the problems or make the decisions--- although some examples are given. Rather, the intent of this section is to identify the types of decisions suitable to operations research and to show how these decision clusters relate to the community financing system.

The first five problem clusters discussed are primarily related to design decisions.

### 1. Initiating Contacts With the Community

The approach that is taken in first establishing a relationship with the community will be critical to the ultimate success or failure of the PHC program. On the one hand, community leaders might approach PHC program managers requesting help in establishing a program in their village. On the other hand, PHC program officials might go into a community seeking help from existing community organizations in extending primary health care to that community.

In establishing this relationship, a number of operational issues will arise. What are the major health needs in the community? How should local leaders be identified? What methods should be used to find out how decisions are made in the community?

The schedule for initiating local activities is also an important issue. Project planners should generously allocate time and resources to this phase because building community trust and gaining insight into local problems and opportunities often take longer than anticipated. Too often, programs encounter difficulty in later stages because planners failed to work patiently enough at the beginning.

The most important constraints affecting these decision variables are the resources and skills available to program developers for initiating these contacts. In some situations, the quality of existing leaders may impose upper limits on community organization objectives. The community's past experience, good or bad, with PHC programs also inhibits or facilitates future program efforts.

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## INITIATING CONTACTS WITH THE COMMUNITY

### Common Decision Variables

- *Methods for initiating contact with communities: Program managers must decide how they will first make contact with the community. Possible approaches are through political leaders, through representatives of national voluntary organizations (e.g., Red Cross), and through other established community leaders (e.g., religious leaders).*

- Amount of time and other resources to devote to initial community organization efforts
  - Analysis of social network: Methods for determining how decisions are made in the community must be chosen. Possible methods are: focused group discussion, key informant interviewing, participant observation, and network analysis (e.g., sociograms).
  - Leadership identification: Methods for identifying local leaders, both formal (e.g., political, religious) and informal (e.g., opinion leaders, innovators) might include: focused group discussion, key informants, participant observation, network analysis.
  - Needs assessment: Organizers must decide how to determine the community's PHC needs, both those as determined by health professionals and those as perceived by the community. Possible assessment methods are: health surveys, analysis of health records, opinion surveys, focused group discussion, key informant interviewing, and historical review of community's support for health-related programs.
  - Securing community commitment for PHC: What is the best way to secure community commitment for participation in PHC activities? Some approaches could be: demonstration of some easily implemented PHC service (e.g., immunization), involvement of influential persons in tailoring the program to perceived needs, public education meetings sponsored by existing local organizations, recruitment of key leaders who in turn recruit their followers.
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What has been tried and learned. A review of community organization literature shows a consensus on three important points.

1. "Front-end" organizational work is critical. Considerable staff time and careful effort must be devoted to initial organization (or "mobilization") work. Organizing community participation is labor intensive and requires a substantial commitment of personnel, including community development specialists in addition to health professionals. Often, where community organizations have failed to follow through as planned, it has been because of inadequate initial communication.

2. There is often a failure to learn from past experience. All too frequently, organizational activities have been planned and launched without any attempt to study past experiences in community organization. A systematic review of the relevant literature and discussion with key actors in similar projects can help project personnel build from the successes and avoid repeating the mistakes of earlier projects.

3. There is no single "best way." Because of the cultural, economic, and political variations that exist from one community to another--even within the same region of a country--there will never be a single "best way" for organizing community participation. Indigenous forms of social organization vary greatly from one culture to another, just as beliefs and behavior related to the causes and cures for disease also vary greatly. This means that a strategy for organizing participation in health care activities that works in one community will not automatically work as well in another community.

## 2. Setting Community Organization Objectives

There are a number of different levels on which objectives may need to be set by program managers and by community groups and leaders. One level has to do with the objectives of the PHC program itself. Community organization efforts will be more successful if the community is involved in setting the PHC program objectives. Another level has to do with the specific objectives of the community organization effort. Program managers and community leaders must also be concerned with the process for establishing those objectives.

Improved health is the implicit objective of primary health care, but communities may have different health objectives. An urban community with workers in textile factories may have prevention of work-related lung disease as its principal health objective. A rural community with high infant mortality from diarrheal disease may emphasize oral rehydration and improved water and sanitation.

Economic objectives are also important. Generating enough revenue to operate the system, reducing the cost of health care to consumers, recovering some of the recurrent costs of primary health care for the Ministry of Health are examples of economic objectives. Program developers must consider and decide who should set the objectives, and if there are conflicting objectives, what methods to use for resolving differences.

The most important constraints and/or facilitating factors are the financial and organizational resources available (both within and external to the community), the susceptibility of certain health problems to solution, and the willingness of external sources (e.g., donors) to provide resources for objectives that the community does not consider priority.

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### SETTING COMMUNITY ORGANIZATION OBJECTIVES

#### Common Decision Variables

- Decisionmakers: What groups or persons should choose and set objectives?
  - Methods for setting objectives: The process for setting objectives must be selected. The decisionmakers (i.e., program managers and community leaders) must decide whether the process will involve discussion, group consensus, a constituency-based approach, mandate, negotiation, and/or compromise.
  - Organizational objectives: What should be the specific objectives of the community organization effort? Some typical objectives might be to recruit a certain number of community health workers, to raise a certain amount of money, or to manage the PHC program.
  - Primary health care objectives: What specific diseases should be attacked? What should be the health promotion objectives? Who should be the target groups?
  - Economic-financial objectives: What is the type and amount of resources that the community organization should bring to the PHC effort?
  - Equity objectives: Who should be the contributory groups; the beneficiary groups?
-

What has been tried and learned. Past experience suggests that:

1. Elites often benefit most. Organizational efforts must be based on the recognition that communities are not homogeneous, egalitarian, or free of conflict, and that the local elites are often likely to co-opt project benefits. (A major, but unintended, impact of the earlier community development and cooperative movements was the strengthening of the position of the traditional elites rather than the hoped-for extension of benefits to the poor.) Special attention must be given to potential project impacts on disadvantaged segments of the community.

2. Differences in priorities. The priorities of the community and those of outside agencies (e.g., Ministry of Health, donors) are not always the same. Skill and sensitivity is needed to integrate and synthesize these priorities (if appropriate). One way that compromise has been satisfactorily reached is for the two parties to agree that the outside agency will provide a higher percentage of contributed resources for services that relate to its favored objectives and that the community will allocate a higher percentage of its contributed resources to activities that meet community priorities.

3. Community objectives may change over time. The community's perceived needs may change with time, sometimes because of its experience with a program. For example, it may place a higher priority on improved sanitary facilities once it has used them for a period. It is important to monitor these changes, especially if there was initial conflict in setting objectives.

### 3. Determining Community Organization Strategies and Functions

In determining strategies for achieving each community organization objective, several questions need answering. What is the traditional role of various organizations in the community and what are the functions and activities that each would carry out best? The community will want to know the intended relationship between them and the PHC project. Will they have much say in project plans and priorities? Or will they have a more limited role, such as approving the sites and the working hours of local clinics?

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## DETERMINING COMMUNITY ORGANIZATION STRATEGIES AND FUNCTIONS

### Common Decision Variables

- Strategies: *The decisionmakers (again, program managers and community leaders) must identify the alternative strategies that might be used to attain an objective related to community organization. For example, if one objective was to mobilize financial support from the community for PHC, would it be best to use existing organizations to raise funds, or to form a new health cooperative, or simply charge fees for health services provided? Or would it be best to use some combination of these strategies?*
- Community organization functions: *Especially in the case where specific community organizations are involved in the PHC program, the decisionmakers must decide what functions each organization should have. For example, if a mothers' club is to be involved, what should be its functions--to motivate mothers to bring their children for care, to provide volunteer help for clinics, or to raise funds?*

- *Activities and tasks: Once the best strategies and functions are selected, the program managers and the community must identify the best mix of activities and tasks for each specific strategy or function. For example, if members of a mothers' club were to help out at child welfare clinics, would they assist in recordkeeping, give health education talks, collect fees, or weigh the children?*
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The chief constraint is the capacity of community organizations or community members to carry out these functions because of their lack of experience or training. Prior training and experience in similar activities will, of course, be an important facilitating factor.

What has been tried and learned. Experience shows that:

1. Moderation is required in allocating tasks and responsibilities. In many projects, community organizations have been overloaded, assigned far more responsibilities than they can effectively carry out. Often, the village health committee set up by the project consists mainly of the same people that make up numerous other village development committees (e.g., the village water committee and the village irrigation committee). Sometimes project staff overlook this fact and the conflicting demands this poses on committee members' time and resources.
2. Activities that require sustained effort may be more difficult to organize. Many communities have shown a willingness to contribute time and resources to discrete, one-time activities (construction of wells, health huts, immunization campaigns). It has been more difficult to organize communities to develop and sustain the effort required of ongoing activities (support of health workers, maintenance of latrines).
3. A newly created organization is generally less able to handle a variety of tasks than is an existing one. In either case, its role must be meaningful to community members for it to be effective. All too often, project staff fail to think through exactly the kind of input they expect from community organizations.
4. Start with activities that will be successful. It is important to begin the project with those activities that offer a good chance of success. In this way the community gains confidence in its new role.

#### 4. Determining Community Organization Structure

Based on the desired objectives and functions, PHC program managers and the community must determine and agree on the appropriate structure for community involvement. Should the structure be "tailored" to each community's needs, or will the structure be standardized or uniform? Is there an appropriate existing organization that is already carrying out similar functions?

Local or national government policy may constrain the types of organizations that can be developed. At times, legislation specifies the composition of such community groups as Advisory Boards. Existing local leaders may insist on controlling any new organizations. However, the existence of organizations that have experience in performing the required functions could greatly facilitate the process of identifying and developing the required organization.

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## DETERMINING COMMUNITY ORGANIZATION STRUCTURE

### Common Decision Variables

- **Form:** Will the involvement of the community be informal (i.e., unstructured or a one-time only village meeting) or formal (e.g., a cooperative, a community corporation, or some other organization with bylaws)? If it is to be a formal organization, will it be an existing one (traditional or modern) or must it be newly created?
  - **Constituency:** Will the membership in the organization be based on shared geographic, administrative, employment, health problem, or other interests?
  - **Scale:** What should be the size of area or population the community organization will represent?
  - **Leadership:** The selection process must be chosen. The duties of leaders must be specified.
  - **Decisionmaking process:** Will the decisions be made by executive committee, by an assembly of members, or by some other mechanism? What will be the periodicity of meetings, and the mechanisms for resolving issues (e.g., consensus, majority rule, executive decision or fiat)?
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What has been tried and learned. Most community organization experts agree that:

1. Building on existing structures is usually more effective than creating a new organization. Community organization tends to be more effective and self-sustaining over time when it builds upon existing community structures, provided they are respected and participatory. Project startup difficulties can be reduced by using a structure with which community members are familiar.(4)

2. Multi-purpose organizations are usually more successful than single-purpose organizations. Multi-purpose community organizations have tended to be more effective than specialized single-purpose organizations (e.g., a village development committee as opposed to a village health committee). Although there may be exceptions, this experience appears especially true in small-scale projects. It may be less true in large-scale programs in which competing bureaucracies have difficulty coordinating an intersectoral approach, or in the case of national organizations that have as their goal the raising of funds to combat specific diseases or health problems.

### 5. Identifying Appropriate Incentives

Whether a community organization becomes involved in primary health care on a sustained basis depends ultimately on incentives for participation. Do people in the project area recognize and appreciate the benefits of primary health care? Health care workers have a professional bias and often forget that their recommendations may not be a priority for their clients. The shortcomings of PHC projects are often related to their

having unrealistic expectations about people's willingness and ability to alter behavior. Program managers must carefully consider how much time and labor the residents are expected to contribute to community organization activities. If there is a limited tradition of cooperation and self-help, they must ask whether the individual's returns are great enough to get voluntary contributions. They must also ask how extensively the residents must change their daily behavior to achieve PHC goals and if the perceived benefits of these changes outweigh the costs.

A second issue is the so-called "free-rider problem". Even when project interventions are acceptable to individual community members, they may not want to join in activities as a group to support those interventions. This occurs when community members can get the benefits whether or not they themselves participate.(5)

An example of this problem could occur in a water sanitation project. Every family in a village might benefit if each built a latrine, ending pollution of the village water supply. But no family is likely to build a latrine by itself--the effect on water quality is too small. In fact, each family has an incentive not to build a latrine. It is best off if everyone else builds one, while it retains old waste disposal practices. Such a family is a "free-rider"--it gets the benefits of cleaner water without having to bear the costs of providing it. Because of this phenomenon, PHC project staff cannot always expect people to join voluntarily in health activities that benefit the community as a whole.

The most common constraint is that communities have limited resources available to apply toward incentives. If the community perceives substantial benefits arising from participation in primary health care, this will facilitate the provision of adequate incentives.

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## IDENTIFYING APPROPRIATE INCENTIVES

### Common Decision Variables

- Incentives for whom: Will the organization or PHC program have to provide incentives to community leaders, to community residents, organizational members, or volunteer workers?
- Types of incentives: What is the appropriate incentive(s) for either community leaders, residents or organization members--monetary pay, prestige, power, extra privileges (e.g., access to training), better health, increased economic productivity, reduced uncertainty or anxiety regarding health matters, or other psychic rewards? Further, will certain members or residents have to be subsidized, or even compelled, to participate?
- Degree of incentive: What is the amount of each incentive needed to secure the desired participation?

---

What has been tried and learned. Those developing PHC projects have found that:

1. More attention must be given to incentives for participation. Project planners have usually been overly optimistic in their assumptions as to the willingness of

community members to alter behavior and accept added work in the name of health improvement. Whereas health planners tend to see health work as all-important, to many villagers and urban poor, conditions making for ill health are normal and accepted facts of life rather than conditions to eradicate. They usually will not invest their scarce time and resources in organizations that do not provide them with economic or, at least, psychological rewards.

Many poor people, moreover, have little free time to give to collective health activities even if they perceive them as important. Experience shows that when project planners have not given much thought to incentives for participation, project staffs have had considerable difficulty motivating community members to participate in activities as set forth in project plans.

2. The project must deliver what it promised. If a community has contributed resources (e.g., by constructing a health hut) on the understanding that its own health priorities will be addressed, and later it finds that other priorities have been substituted, the community will lose interest and ignore the health program or services and refuse to support them further.

#### 6. Managing the Community Organization

In some situations a community might actually manage the entire PHC program in its community. In other cases the community organization will only manage one or more activities related to the PHC program. Regardless of the objectives, the activities of the organization will have to be planned and "controlled." Control does not necessarily mean control by outside agencies but rather establishing the policies and procedures necessary to insure that results measure up to expectations.

The experience and skills of organizational leaders and members will determine the type of management that is feasible. Objectives established for the organization may have to be scaled down if the management capability is not available and cannot be increased sufficiently through training.

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### MANAGING THE COMMUNITY ORGANIZATION

#### Common Decision Variables

- Administrative framework: *Should the management structure be functional or hierarchical in type?*
  - Planning methods: *What should be the process for setting goals, objectives, and strategies? Should the style be authoritarian or democratic?*
  - Management controls: *Which of the following management controls should be used: policies, procedures, budgets, audits, inventory system, staff meetings, workplans, reports, security?*
-

What has been tried and learned. Although relatively little has been written about the management aspects of community organizations in developing countries, there is consensus that:

1. The self-reliance of the community should be reinforced. Even if delays are involved, the management structure and approach selected should strengthen the community's sense of responsibility and its capacity for initiative.

2. Both personal qualities and training are important for effective leaders. Effective leadership qualities, on the part of both community leaders involved in the project and project staff working with them, are critical for the success of community organization. It cannot be assumed that community leaders or project staff automatically possess these qualities. Charisma and other inherent personal qualities are important, but appropriate training can enhance leadership skills and may be essential in large-scale programs.

## 7. Providing Appropriate Supervision and Support

This problem cluster is concerned primarily with the supervision and support provided by sources external to the organization, as opposed to the internal management and control of the organization. Assistance may be required for materials and supplies, training, staffing, and technical advice. What kind of assistance and how best to provide it may be different operational problems to solve.

On the one hand, community organizations do need project assistance, and the failure to give enough training, equipment, and technical advice can cause them to languish. On the other hand, community organizations should develop the capacity to stand on their own, and there is the risk that too much assistance will make them permanently dependent on outsiders. Providing community organizations with sufficient support without making them wards of the project is one of the most difficult tasks facing PHC personnel.

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## PROVIDING APPROPRIATE SUPERVISION AND SUPPORT

### Common Decision Variables

- Type of supervision system to employ: Program managers must decide whether performance reviews, field visits, audits, reports, and/or external evaluations should be used.
- Persons responsible for supervision: Should community members or officials from government or private health agencies supervise PHC activities and workers?
- Schedule for supervision: What will be the frequency of supervisory activities?
- Incentives for supervision: Will they have time to add support and supervisory activities to their current workload? If not, what incentives (material or psychological) are required?
- Materials: What types of material support (buildings, drugs, other supplies) and in what amount should the outside agency provide?

- Personnel: What types (supervisory, professional health workers, others) and what numbers of personnel should the outside agency contribute to the effort?
  - Training: Will training be required? If so, what should be the type, length, location, and frequency?
  - Sources of support: How much support should come from government, community, families, or others?
  - Duration: For how long will resources be required? What should be the sequence for phase-in or phase-out of assistance?
- 

Again, resources available from external sources will constrain the types and amounts of supervision and support that can be made available to the community organization process.

What has been tried and learned. Experience has shown that:

1. Ongoing support and supervision is essential. The mere creation of a village health committee does not insure or sustain community participation. Typically, there is a surge of activity at the beginning of a project: health committees are created, community health workers are selected, and health posts are constructed. Subsequently, activity diminishes and health committees often lapse into inactivity. Ongoing supervision and support by project staff (including provision of training, equipment, and technical assistance) is essential for maintaining participation. Sometimes there is a risk that too much assistance will cause overdependence on outsiders and reduce the likelihood that project achievements will be sustained.

2. Outside support has to be tailored to the activity. It may be necessary to specify the type and degree of external support required for each activity. Some types of organizational activity may require a certain amount of external support without which the activity cannot take place.

3. The motivation of and incentives for support and supervisory personnel must be considered. Often project planners are over-optimistic about the support that supervisory personnel will be willing to give to the project, and especially to community organization activities. Many people identified by projects as supervisors do not have the time or the necessary motivation to give the support that project planners anticipate unless some sort of incentive--material or psychological--is provided.

4. Central-level support is important. Community organization for primary health care requires various forms of support (e.g., policy, financial, and logistical) from the central government. A country's prevailing political and administrative system is a major determinant of whether or not organizational activities at the community level can be successful.

5. Importance of roles for local and national power structure. A well-defined role in support and supervision must be given to the local and national power structures (among other reasons, to avoid their being threatened by, or attempting to subvert, community organization activities). It is also important for project staff to adjust for factional cleavages and for the fact that community leaders may not fairly represent all members of the community.

## 8. Implementing Community Organization Activities

Apart from fostering support for the PHC program, the major purpose of the organizational effort is to achieve the successful implementation of a number of essential activities. The activities to be carried out must be decided when considering strategies and functions (see no. 3, above). However, in their implementation a number of decisions must be made.

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### IMPLEMENTING COMMUNITY ORGANIZATION ACTIVITIES

#### Common Decision Variables

- Personnel: *Who should carry out the activity?*
  - Schedules: *When and how often should the activity be carried out? Daily, monthly, periodically, once only?*
  - Location: *Where should the activities be carried out? At organizational meetings, homes, market place?*
  - Methods: *How should the activities be carried out? For example, if it is an educational activity, should the media be used? Should visual aids be prepared?*
- 

#### What has been tried and learned.

1. Often details of implementation are neglected. It is not uncommon to find good general plans developed for community organization but to also find the attention to the details necessary for successful implementation to have been neglected. Thus the personnel charged with carrying out the activities must be sure that there is adequate detailed planning for personnel, schedules, site preparation, and methods.

2. Role playing and rehearsals increase chances of successful implementation. Role playing in which personnel become familiar with how to deal with problem situations is very effective. Equally useful are rehearsals in which personnel are able to improve their coordination and solve potential problems prior to actual implementation.

## 9. Monitoring and Evaluating Community Organization Performance

An important component of the community organization effort is that it be monitored and evaluated systematically. Projects often fail to pay much attention to how well community organizations are working or, more importantly, what steps the project can take to encourage better performance. A clear and simple monitoring system should be included in the project's design.

The resources and skills of external evaluators or community organization leaders will influence the quality of the evaluation process. Careful planning in early project development will facilitate the institution of an adequate, reliable, and useful system for monitoring attainment of project objectives and for identifying trouble spots early on.

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## MONITORING AND EVALUATING COMMUNITY ORGANIZATION PERFORMANCE

### Common Decision Variables

- Topics for monitoring and evaluation: Program managers must decide the important components to evaluate, e.g., CO planning, CO management processes, communication channels, mobilization of resources, provision of support, supervision, attainment of objectives (service utilization, behavior change, health status change, equity, financial), degree of community participation (kind, level, breadth).
  - Scheduling of evaluation: What should be the frequency of the evaluation process? Annual, mid-project or end of project?
  - Nature of monitoring: Should the monitoring depend on periodic reports from the community or periodic visits by supervisors?
  - Evaluators: Who should carry out the evaluation? Community organization leaders, community organization members, external evaluators?
  - Evaluation methods: Should the methods include reports, surveys, focused group discussion, or key informants?
- 

The important constraints here will again be resources available for conducting evaluation and the level of education and expertise of program managers and community groups.

What has been tried and learned. Again little has been written about methods for monitoring and evaluating community organization. Nevertheless, some suggestions that those active in the field have offered are:

1. Evaluation of community organization work must be called for in the initial, overall project evaluation plan. When community organization activities are not included in the evaluation plan at the outset, evaluators tend to ignore this aspect of the project, or give it only cursory, superficial attention.

2. Project achievements are likely to be sustained and longer-lasting if community members participate in monitoring and evaluation activities. Evaluations are usually conducted by evaluators external to the community and, too often, the results are shared only with the funding agencies. When evaluations do focus on community organization, they typically recommend that the organization be more active, but often this is not communicated to the organization members, or it is not communicated to them effectively. When community members participate in evaluations, or in evaluation research, they are more likely to act on the recommendations that concern them.

3. Data that project staff ask a community organization to supply for monitoring purposes should be kept to a minimum. Project monitoring plans often overlook community organization, but sometimes they err in the opposite direction and specify that the community should supply large amounts of information. Usually community members will not have time or motivation to provide so much information. Demands for information should be only for the minimum amount that is most essential.

4. Participation itself should be evaluated. Most evaluations measure project activities or the attainment of program objectives. Few measure the degree of community participation in the program.(6)

This chapter has served as an introduction to the identification of operations research topics by presenting the major problem clusters or components related to community organization in primary health care. This was followed by a listing of some of the decision variables and constraints that might be considered either in developing solutions to problems or in designing community organization strategies. Chapter III focuses on designing operations research studies in community organization: how to set priorities among problems and how to develop and test solutions.

#### NOTES

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3. Ibid., pp. 91-92.
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CHAPTER III  
DESIGNING AN OPERATIONS RESEARCH STUDY  
ON COMMUNITY ORGANIZATION

## CHAPTER III. DESIGNING AN OPERATIONS RESEARCH STUDY ON COMMUNITY ORGANIZATION

PRICOR defines operations research as a systematic, problemsolving process for use in planning, consisting of three phases: problem analysis, development of solutions, and testing of those solutions. This chapter describes that process briefly, with examples of ways this approach can be applied to operational problems in community organization. Summaries of PRICOR-funded projects in community organization can be found in Appendix A. The PRICOR monograph, Operations Research Methods: A General Approach in Primary Health Care, by Stewart Blumenfeld, provides a more detailed description of operations research methods.

Operations research can make management decisionmaking easier and more rational. It can reduce reliance on costly trial-and-error approaches through the use of systematic procedures for selecting the "best" course of action. PRICOR staff and advisers have been developing a practical operations research approach that incorporates the essential features of traditional operations research yet remains flexible enough to be applied to the significant operational problems identified in the preceding chapter. The general operations research approach is summarized in figure 3-1.

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**Figure 3-1.--Steps in a General Approach to Operations Research**

### **PHASE I: PROBLEM ANALYSIS**

1. Define the problem.
2. Analyze the problem, divide it into smaller operational problems, and collect needed data.
3. Set priorities and select the problems for study.

### **PHASE II: SOLUTION DEVELOPMENT (for each operational problem)**

1. Specify the objective for the solution to each problem.
2. Identify the controllable (decision) variables and the uncontrollable factors (constraints and facilitating factors) of each problem.
3. Select and construct an appropriate model for solving each problem.
4. Collect required data.
5. Use the model to develop the optimal solution(s) for each problem.
6. Conduct sensitivity analysis of each solution.

### **PHASE III: SOLUTION TESTING AND EVALUATION**

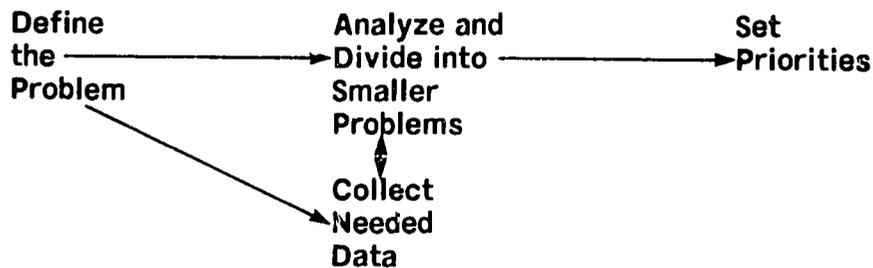
1. Design a test of the solution(s).
  2. Conduct the test and collect needed data.
  3. Evaluate and modify/adjust the solution(s).
  4. Integrate the solution with the larger system.
- 

The steps in this process are described briefly in the following sections and are illustrated with examples. As operations research is an iterative process, the steps are not necessarily sequential and, depending on the nature of the study, some may be repeated several times and others may not be undertaken at all.

## PHASE I: PROBLEM ANALYSIS

The steps in this phase are illustrated in figure 3-2 and described below.

Figure 3-2.--Steps in Problem Analysis



### Step 1. Define the Problem

Problem analysis usually begins with the identification of a discrepancy between what should be, and what is, occurring. For example, villagers should be supporting their health workers, but they are not; essential drugs should be available in the rural areas, but they are not. Information identifying a problem could come from observations, evaluation reports, discussions with program managers, and other sources.

**Example:** A village-based primary health care program in the hypothetical Asian country of Tinari is not meeting its objectives. This program was designed to operate with heavy community participation, under the leadership of village health committees, in such activities as building dispensaries, selecting and remunerating community health workers, and replenishing revolving drug funds. However, community interest in the program has diminished, and the village health committees rarely meet. The villagers say that their priority health needs are not being met, that the health workers are poorly trained and are unable to provide services competently, that needed drugs are usually lacking at the dispensaries, and that the Ministry is not providing adequate support.

### Step 2. Analyze the Problem, Divide It Into Smaller Operational Problems, and Collect Needed Data

Problem analysis often begins with a systematic description of the problem to define such things as its scope, magnitude, seriousness, characteristics, and probable causes. Some problems, such as "What kind of community organization pattern should we choose or how can we improve community participation?" are too big to tackle all at once. They need to be broken down into more manageable problems, such as those listed in chapter II (initiating contacts with the community, setting objectives, identifying appropriate incentives, etc.).

One way to proceed in problem analysis is to describe how community organization should work, thinking of it as a system of related parts. The system may be ongoing or one that is being designed. Figure 2-2 in chapter II presented a general, graphic representation of a system for community organization. The model shows that the

system's contribution to PHC goals depends not only on the smooth functioning of its parts (incentives, management, supervision and support, etc.), but also on other factors in the environment (community resources, health care provided by traditional practitioners, etc.). The general system for community organization can be described in this graphic manner, and each of its component parts, or subsystems, analyzed to identify significant operational issues or problems.

For example, in which aspects of the PHC program can community members participate most effectively? How should the community be approached? Which existing organizations would be most effective? What tasks should they perform?

Researchers need to collect and analyze data to describe the operational problems accurately. Since data collection can be costly and time consuming, analysts should examine existing data first and then draw up a list of the remaining data that need to be collected. If possible, researchers should try to collect data for problem analysis and solution development at the same time. The data may come from a variety of sources, including PHC records, minutes of village health committee meetings, supervisors' notes, surveys, interviews, observations of health-seeking behavior, and case studies.

**Example:** The Department of Community Health from the Tinari Medical School is asked to study the problem of poor community participation in the PHC program. A joint research team is formed with the Department of Sociology, and a plan is developed to collect data needed for problem analysis. Some of the data are expected to be used for developing solutions. The data may also be used as a baseline for comparison with effects produced later, when solutions are implemented.

The team decides to collect data by means of 1) a sample household survey of health-seeking behavior and opinions regarding the primary health care program; 2) interviews with key informants (a sample of village leaders, community health workers, and health professionals); 3) service utilization records from a sample of dispensaries; 4) focused group discussion with a sample of village health committees; 5) a study of a sample of dispensary drug inventory and financial records; 6) a study of the health worker supervisors' records; and 7) a study of socioeconomic data from the national census bureau.

Using this data, the team prepares an overall description of current community involvement in the PHC program, which identifies the operational problems that need to be solved. These may include such things as establishing new objectives and priorities for the village-based PHC system; the role of the health committee; the community's role in the selection, training, and remuneration of the health worker; the community's role in financing the PHC program; and community-government partnership in supervising and supporting the community-based PHC program.

### Step 3. Set Priorities and Select the Problems for Study

Sometimes a number of problems will emerge from the analysis. Obviously, they cannot all be studied at once; priorities need to be set. The analyst can do this in a number of ways. One is to identify those problems that are expected to have the greatest effect and study them first. Another is to identify the logical sequence of decisions. For example, before deciding on incentives, program managers must establish which services to provide. Decisionmakers from both the community and from the relevant external agencies must help determine which of the operational problems to study and in what order.

**Example:** After its initial analysis and after consultation with a group of Ministry of Health officials and village representatives, the team concludes that there are five interrelated problems that need to be studied and for which solutions must be found: 1) setting appropriate objectives (the health priorities, the PHC program objectives, and the objectives for community participation); 2) selecting the strategies and community activities that will insure attainment of the objectives for community participation; 3) deciding what community organization(s) could best carry out these activities; 4) identifying the incentives that are necessary to insure community participation; and 5) determining the support and supervision to be provided by each partner (community and government). A requisite for the solution for each problem must be that it is agreed upon and supported by both the community and the Ministry of Health.

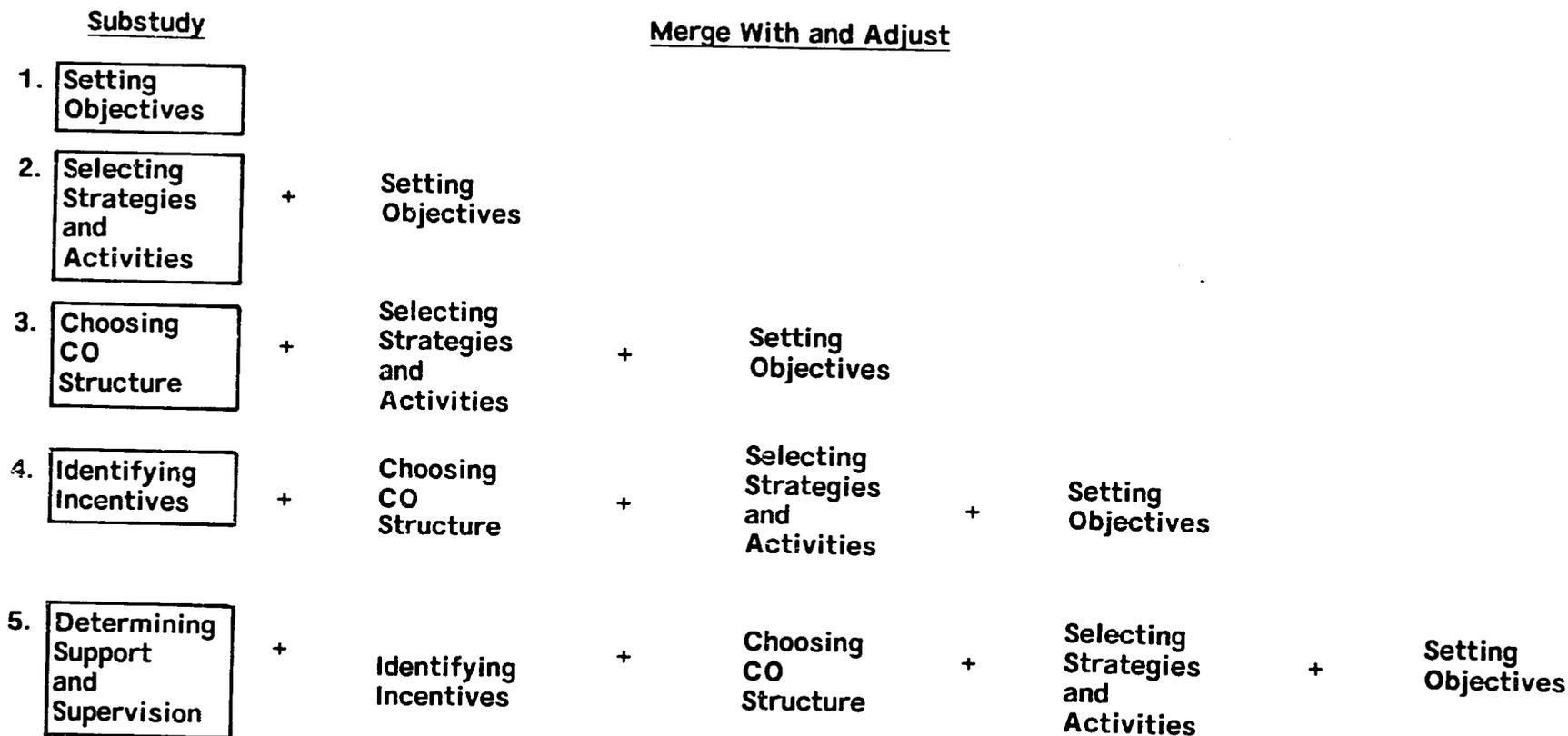
The team recognizes that each problem will merit individual attention and that each will require a significant level of effort. It also recognizes that the development of a solution for one problem cannot be done in isolation from the other interrelated problems. The team therefore develops a research plan in which each problem is analyzed and a solution developed in five sequential but interrelated substudies as shown in figure 3-3.

Thus, in substudy 1 the problem of setting appropriate objectives would be analyzed and a solution developed. In substudy 2 of this plan the problem of selecting strategies for community participation and of selecting activities the community might perform will be studied. However, during this second substudy the research team will have the opportunity to reconsider the objectives set in substudy 1 and make changes based on the feasibility of strategies to attain them. The team would proceed similarly through substudies 3 and 4. Finally in substudy 5 the research team would analyze the problem of support and supervision in the context of all the previous problems studied and solutions recommended. Again there will be the opportunity to modify and adjust all the previous recommendations based on a consideration of the interrelationship of all the problem clusters and to develop an integrated and internally consistent plan.

At this point the Ministry of Health asks the research team to develop a comprehensive plan to redesign the primary health care program. It is agreed that a working group composed of members of the research team, ministry officials, and community members from one nearby district of 50,000 population would be formed to develop the plan. The ministry officials and community representatives would be the decisionmakers with the research team acting as data collectors, data analysts, facilitators, and guides in the operations research process.

The group proceeds, then, with the first substudy which is the analysis of the problem of setting appropriate objectives and of developing a solution to the problem. The group realizes that it must break this problem down further. Objectives must be set for the primary health care program and for any community participation in the program. It decides to use a research plan similar to that described previously, that is, study the primary health care program objectives first and then study community organization/participation objectives, as shown in figure 3-4.

Figure 3-3.--Example of a Research Plan

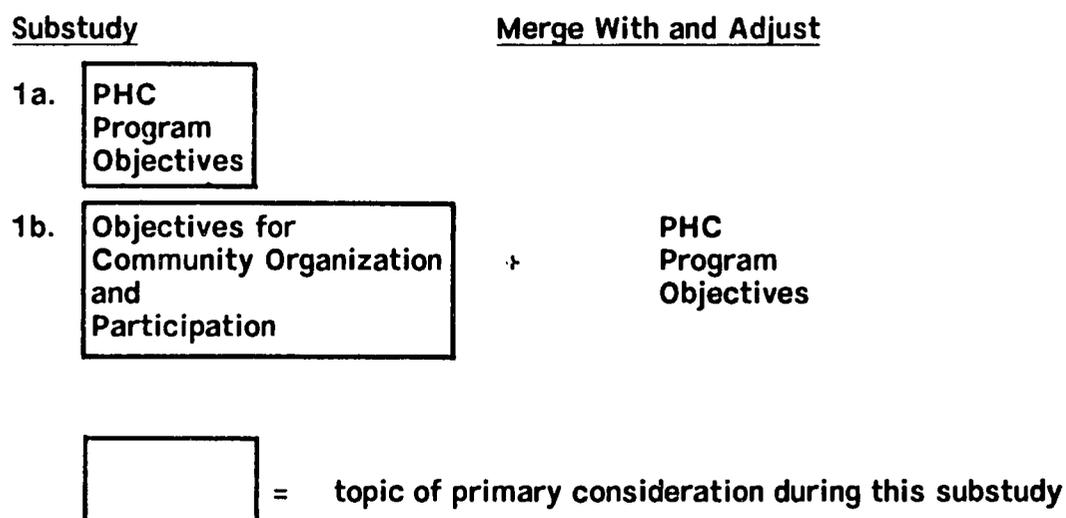


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= Topic of prime concern during this substudy.

Figure 3-4.--Example of a Research Plan for Studying Objectives



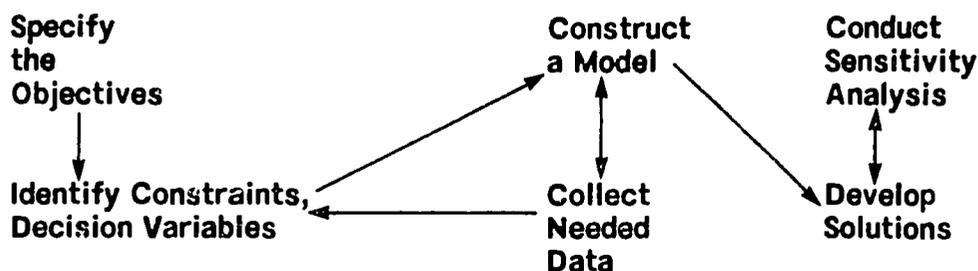
**PHASE II: SOLUTION DEVELOPMENT**

As researchers and program planners attempt to solve the problems associated with community organization for primary health care, they should always consider these questions:

1. What has worked successfully in the past?
2. What structures or relationships already exist that could form part of the solution?
3. Could these structures and relationships function as they are?
4. If not, how would they have to be modified to meet program objectives?

The steps in developing a solution for each operational problem are illustrated in figure 3-5 and described below.

Figure 3-5.--Steps in Solution Development



## Step 1. Specify the Objective for the Solution to Each Problem

To begin the solution process, the analyst must specify the characteristics of the desired solution in as quantitative terms as is feasible. A general objective for community organization might be to insure the availability of essential health services by strengthening the community's sense of responsibility for its own health and increasing the community's participation in the provision of needed resources. Objectives in operations research are usually of two types: 1) Those that retain things of value (input minimization, e.g., minimize cost); and 2) those that obtain things of value (output maximization, e.g., maximize coverage). One cannot attempt to achieve both objectives at the same time (i.e., one cannot concurrently achieve highest output and lowest input).

For example, one might set as the objective for the solution to a malaria problem: select the best mix of malaria control activities that will maximize the reduction in the prevalence of malaria in children under 10 years of age. In operations research terminology, such a statement of the characteristics of solution is called the objective of the solution.

If the operational problem is one of defining the objectives for community organization and participation, the solution objective might be stated as: to select those program objectives that can be most efficiently achieved through a community organization or participation approach.

**Example:** The Tinari research team works with both community leaders and health officials to develop a consensus on the characteristics of an acceptable set of PHC program objectives. All finally agree that the most reasonable objective for the process of setting PHC program objectives would be to identify that set of objectives which maximizes the physical, mental, and social well-being of the community. This is then the objective for the solution to this problem.

## Step 2. Identify the Controllable (Decision) Variables and the Uncontrollable Variables of Each Problem

The performance of a program can be represented by a simple equation:

$$P = f(C, U)$$

which means that performance (P) is a function (f) of a set of controllable (C) variables and uncontrollable (U) variables. Such an equation is sometimes called the objective function. It is a statement of the relationship between actions that decisionmakers may take and the outcome of those actions. Often, the objective for the solution is to maximize the (P) of this objective function.

The controllable variables are also called decision variables. They are under the control of the decisionmakers who must set a "best" value for each. For example, they may have to decide on the most appropriate organizations to involve in developing a PHC program, the specific goal of each organization, or the duties of organizational leaders or members. All of the decision variables for which values have to be set must be identified.

One important type of uncontrollable variable is the constraints which analysts must take into account when developing a solution. For example, the community's population may be widely dispersed, or it may be clustered in compact villages. Constraints limit the range of choice and, for that reason, should be identified.

Uncontrollable variables that favor certain choices are called facilitating factors. For example, if community organizations already exist and are active in other development activities, this is a facilitating factor. Constraints and facilitating factors have values, or magnitudes, and analysts must also determine these.

One example that may help show how these variables are related to one another concerns an incentive problem. The objective may be to find the incentive package for supporting community health workers which maximizes their performance. A constraint may be that a village cannot afford to provide more than \$100 per year per health worker. One of the decision variables might be how much money a health worker will receive each year from the community. The value would be a specific amount of income or salary to be paid to the worker (e.g., \$65). The optimal solution would specify the value for the monetary incentive that will maximize health worker performance but within the constraint of \$100 per health worker (i.e., the value must equal to or less than \$100).

**Example:** Once the solution objective (or goal) for the set of objectives has been agreed upon, the Tinari working group identifies the relevant decision variables and constraints. The group determines that the decision variables include the entire range of objectives that could feasibly be considered as objectives for a PHC program. For example, "immunization of children under five" would be one feasible objective and therefore would be a decision variable. What can vary about immunization and what needs to be decided is the amount of immunization to be provided or the "value" of immunization to provide (e.g., should the objective for immunization coverage be 50 percent or 80 percent of children?). The "values" for other feasible objectives might be zero, that is, the group may decide that resources are too limited to provide any services to meet that objective.

Where the objective is to maximize health benefits (an outcome), there must be a constraint on inputs. In this case, two constraints agreed upon were 1) that the government could not provide more than \$2 per capita in annual funding for the community based PHC program, and 2) that the total cost of the program could not exceed \$40 per household (approximately \$8 per capita).

### Step 3. Select and Construct an Appropriate Model for Solving Each Problem

Operations research uses a wide range of data analysis procedures to arrive at solutions to problems, but its distinctive feature is the development of solutions through the use of models. Models are representations of reality expressed in symbols that may be graphic (maps, diagrams, flowcharts) or mathematical (a cost-effectiveness equation, a linear program).

In operations research, the analyst selects or develops a model that fits the problem being studied and then uses it to find the best, or optimal, solution to the problem. The model allows the analyst to enter different values for the controllable variables, so as to find the best solution given the constraints. For example, an analyst might use a matrix to rate different strategies for community participation according to certain criteria (acceptability to the community, expected effectiveness, cost). By giving each strategy a score for each criterion, the analyst can identify the strategy with the highest total score.

This process of modeling is far more rapid than conducting field experiments, and far less expensive as well. These are its principal advantages; but there are limitations, too. Models only approximate reality, and thus they must be constructed carefully, because an inappropriate or unrealistic model will produce inaccurate results.

Operations research specialists working in industrial situations usually try to develop mathematical models which can represent the problem situation and provide the optimal solution to the problem. When confronted with problems arising in social action programs like health care it is often not possible to use mathematical models. The reason is that the systems and the problems are too complex. The quantitative relationships between many of the important decision variables and the objective of the solution cannot be determined. As a result the analyst is not able to construct a mathematical model capable of solution. One important exception is the case where the analyst or decisionmaker is trying to select one of a number of possible alternative program strategies. If the costs and effects of each alternative can be accurately estimated, one can use cost-effectiveness analysis to choose the best alternative.\*

After a problem in a complex social system like community organization is analyzed and alternative solutions developed, the selection of one alternative is very often made by some kind of individual or group consensus process (e.g., Nominal Group Technique or Delphi). Some researchers call these processes "mental models," which implies that, through the reasoning process, the person or group is able to consider all the complex factors involved in the problem and reach a conclusion, even though it would be impossible for them to explain all the steps they followed in reaching their decision.

A number of very useful OR tools can be used for solving problems in community organization--both for problem analysis and developing alternative solutions. Appendix B is a list of a number of the tools that can be used at each step of the OR process.

**Example:** The Tinari research group employs the Nominal Group Technique to develop a full list of feasible objectives. Each member of the working group is asked to list and rank the objectives they consider to be appropriate for the PHC program. The group leader asks each member in turn to state an objective from his or her list and writes it on a flip chart. After all the objectives are listed, they are discussed. Then a preliminary vote is taken on the rank ordering of the objectives. There is further discussion and then a final vote taken which results in a list of 16 objectives ranked as follows.

Rank order

- |   |                            |    |                                  |
|---|----------------------------|----|----------------------------------|
| 1 | First aid                  | 9  | ORT and control of diarrhea      |
| 2 | Selling of essential drugs | 10 | Malaria control                  |
| 3 | Immunization               | 11 | Control of communicable disease  |
| 4 | Maternal care              | 12 | Improve environmental sanitation |
| 5 | Growth monitoring          | 13 | Treatment of chronic disease     |
| 6 | Nutritional rehabilitation | 14 | School health                    |
| 7 | Family planning            | 15 | Mental health services           |
| 8 | Improve water supply       | 16 | Care of the handicapped          |

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\*For further explanation of cost-effectiveness analysis see the PRICOR methodology paper, Operations Research Methods: Cost-Effectiveness Analysis by Jack Reynolds and K. Celeste Gaspari.

This list is quite different from the original set of objectives of the PHC program. Health officials understand now the desire of the community for first aid and essential drugs. The community understands more about the health impact of such preventive services as immunization and growth monitoring.

The process of setting objectives could stop here. However the working group decides that it needs further information about the cost-effectiveness of different strategies for reaching each objective. They want to know what each of the three strategies (high, medium, and low effort) will cost and what each will produce before actually choosing the final set of PHC program objectives.

The group adjourns for one month. During this time the research team prepares a set of multiple-criteria utility assessment tables to assess various strategies for attaining each of the 16 objectives in relation to the criteria (or objective function) of physical, mental and social well-being. An example of such a table is shown in table 3-1.

#### Step 4. Collect Required Data

Each model has certain data requirements. If some of the needed data are not in hand, they would have to be collected. As in phase I, data could come from a variety of sources.

**Example:** During the next month the research team collects information on three potential levels of effort for each of the 16 objectives: a high level effort having the most impact on physical, mental, or social well-being but also having the highest cost; a low level effort having minimal impact but lowest cost; and an intermediate or mid-level effort. The team estimates the cost for each strategy using existing financial records.

#### Step 5. Use the Model to Develop the Optimal Solution(s) for Each Problem

At this point, the relevant data on the constraints, facilitating factors, and decision variables are put into the model in place of the abstract symbols. By using different (but always realistic) values, the analyst can develop and evaluate several possible solutions. The one that best meets the objectives given the constraints is the "optimal" solution.

**Example:** After one month the Tinari working group reconvenes. Again, using the Nominal Group Technique, the group reaches consensus on the weights to apply to each of the criteria (physical, mental, and social well-being). That is, they first decide how important each of the well-being criteria is to the community. Physical well-being is the unanimous first choice. They assign it a weight of 1.0. Then the group discusses the relative weight of the next choice--mental well-being. It receives a weight of 0.4. Social well-being receives a weight of 0.3. These weights are entered into each of the 16 matrices. Next, the group sets the utility values for each objective. Using a scale of 0-100 they estimate the expected utility to the community of a low level of first aid on physical well-being (15), on mental well-being (50) and on social well-being (20). They repeat this process for a medium level of effort and a high level of effort. While the working group sets the values for the remaining 15 objectives, one of the analysts computes the weighted utility of each row by multiplying the weight by the utility. For example, the weighted utility of a low level of first aid effort on physical well-being is 15 ( $1.0 \times 15$ ). The weighted utility of a low level of first aid effort on mental well-being is 20 ( $0.4 \times 50$ ). The analyst adds the resulting scores in each column to get

Table 3-1.--Multiple-Criteria Utility Assessment of PHC Program Objectives

PHC OBJECTIVE

Criteria	Weight	First Aid			Nutritional Rehabilitation		
		Intensity of Effort			Intensity of Effort		
		Low	Medium	High	Low	Medium	High
Physical Well-Being	x	a	d	g			
Mental Well-Being	y	b	e	h			
Social Well-Being	z	c	f	i			
Total Utility		xa +yb +zc	xd +ye +zf	xg +yh +zi			
Cost		\$	\$	\$			
Cost-Utility Ratio		$\frac{\$}{xa+yb+zc}$	$\frac{\$}{xd+ye+zf}$	$\frac{\$}{xg+yh+zi}$			

**Table 3-2.--Completed Multiple-Criteria Utility Assessment Table  
for Two Potential PHC Program Objectives**

**OBJECTIVES**

Criteria	Weight	First Aid			Nutritional Rehabilitation		
		Intensity of Effort			Intensity of Effort***		
		Low	Medium	High	Low	Medium	High
Physical Well-Being	1.0	15	20	25	0.5	0.75	1
Mental Well-Being	0.4	50	60	75	0.5	0.75	1
Social Well-Being	0.3	20	30	40	0.5	0.75	1
<b>Total Weighted Utility*</b>		41	53	67	0.85	1.275	1.7
<b>Cost**</b>		\$50,000	\$75,000	\$100,000	\$15,000	\$20,000	\$30,000
<b>Cost-Utility Ratio</b>		\$1,220	\$1,415	\$1,493	\$17,647	\$15,686	\$17,674

\*Note that these are values assigned by a hypothetical group and do not represent PRICOR's assessment of the utility of these efforts.

\*\*Cost for effort for a district of 50,000 persons (10,000 households).

\*\*\*Utility values for nutritional rehabilitation are low because the rehabilitation program would only benefit those children under five identified to have severe malnutrition (about 1 percent of the population).

the Total Weighted Utility and divides this figure into the cost to get the Cost-Utility Ratio. For example, the Total Weighted Utility of low intensity first aid is 41 (15 + 20 + 6) and the Cost-Utility Ratio is \$1220:1 (\$50,000/41). Table 3-2 shows completed multiple-criteria utility assessments for two of the 16 objectives.

This having been done, the working group is left with the task of selecting the optimal mix of objectives given the constraint that the total program cost must not exceed \$6 per capita or \$400,000 per district of 50,000 population including resources that might be raised within the community through payment schemes or other financial mechanisms. Although the problem could now be solved using a computer, this is not available to the team. Therefore the group begins to look at various combinations of objectives, observing the total utility of the combination while always keeping the total cost below \$400,000. Finally the Nominal Group Technique is again used to list and rank the combinations considered. The result is the selection of the preferred combination of objectives for the program.

#### Step 6. Conduct Sensitivity Analysis of Each Solution

The solutions that emerge from the procedures described above should be subject to "reality" testing to insure that they are reasonable, politically and culturally acceptable, and compatible with solutions developed for other operational problems (e.g., incentives paid to community health workers). Sensitivity analysis allows the analyst to see how the results might change if the objectives, decision variables, or constraints were changed, for example, by 5 or 10 percent. (Note that this is a "paper" exercise, not an actual field test of the solution.) After indicated adjustments, the researcher is ready to recommend the best solution to the decisionmaker.

Example: The Tinari group reviews the multiple-criteria utility tables and considers the impact on the results of what might be considered reasonable changes in either the weights, the utility values, or the costs. They also consider the cultural and political acceptability of the various combinations. After this is done the Nominal Group Technique is used to choose the final combination of preferred objectives. The combination chosen is shown in table 3-3.

Table 3-3.--Final Set of Objectives  
Chosen for the PHC Program

<u>OBJECTIVE</u>	<u>LEVEL OF EFFORT</u>	<u>COST</u>
First Aid	Medium	\$75,000
Sale of Essential Drugs	Medium	75,000
Immunization	High	20,000
Maternal Care	Medium	50,000
Growth Monitoring	Medium	20,000
Family Planning	Medium	50,000
ORT	Medium	20,000
Malaria Control	Medium	50,000
Treatment of Chronic Illness	Low	<u>30,000</u>
	Total Cost	\$390,000

At this time there is broad consensus on the objectives for the PHC program. For the first time there is a sense of optimism and collaboration between community

leaders and health officials. They realize that there may have to be modifications made in this set of objectives, either later on during the next steps of the planning process or at the end of the first year of the program's operation. However, they now feel that they have a workable process and framework with which to negotiate and choose the best modifications.

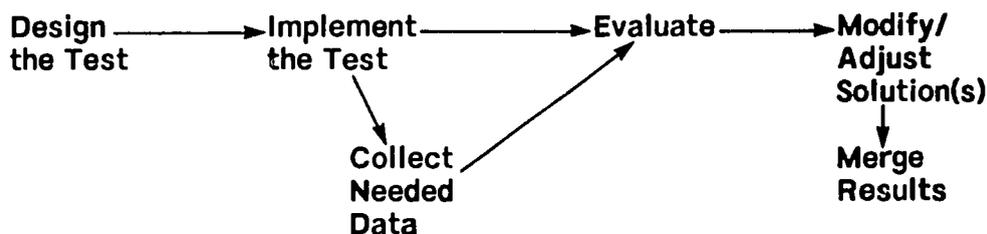
After finishing the problem analysis and solution development for the setting of PHC program objectives, the working group moves on to each of the remaining problems as outlined in figures 3-3 and 3-4.

Other operations research tools can be used for these different problems. For example, for the process of choosing the best community organization structure for the PHC program, the research team prepares a series of scenarios for each of the community organization alternatives. These scenarios depict how these organizations would function, their costs, their effects, and their likely political and social consequences. These scenarios are discussed and modified by the working group. Afterwards the Nominal Group Technique is used and the working group decides that the best structure would be a community health care corporation that would be controlled and financed primarily by the community but with a partial government subsidy in money and personnel.

PHASE III: SOLUTION TESTING AND EVALUATION

The steps in this phase are illustrated in figure 3-6 and described below.

Figure 3-6.--Steps in Solution Testing and Evaluation



Step 1. Design a Test of the Solution(s)

Once the decisionmakers select the solutions they prefer, an actual test or trial may be called for to validate the solution(s). The test may be of one or several possible solutions, and it may be designed in several ways: as an evaluation study with controls, as a pilot or demonstration project to test feasibility, or as a modification in program operations to be evaluated and adjusted over time. For example, different community organizations might be used to implement a particular strategy to determine which organization is the most appropriate for that task.

Whatever the form of the field test, however, it has to be designed carefully to insure that the findings will be accurate and applicable to other communities in the region or country.

**Example:** A six-month period is required for the working group to complete the operations research leading to a package of solutions to the five major problems that were identified early in phase I. This package actually represents a plan for a revised PHC program for the district. The government requests that the district be used as a pilot test area and that the research team supervise the implementation of a one-year test of the new program. This is to be a nonexperimental test design which will evaluate how well this new program can function. The management and research plan necessary to implement the test is developed.

#### Step 2. Conduct the Test and Collect Needed Data

The tests are then implemented according to the evaluation protocol. Data on actual performance, including support provided, services utilized, population covered, and other key indicators are collected to evaluate the solutions.

**Example:** The field test of the new PHC program is carried out in the district. Monthly reports are analyzed by the Tinari working group to monitor progress. After six months, the research team conducts a mid-term evaluation and presents findings to the working group. A number of important changes are made in the community organization scheme.

#### Step 3. Evaluate and Modify/Adjust the Solution(s)

On the basis of the findings from the test, the theoretical solutions are modified or adjusted. If the modifications are significant, further testing may be required.

**Example:** After a full year, the Tinari pilot program is operating smoothly. Only minor modifications are necessary in some of the program objectives due to an underestimation of costs.

#### Step 4. Merge the Resulting Information

Sometimes several changes in the system are made at the same time. If this happens, the researcher must "put the system back together" to assess the effect of changes made in one part of the system on the rest of the system. For example, would a change in the incentive strategy require a change in the level of government or community support for the PHC program? The analyst must merge the various changes to insure that the system as a whole will continue to function productively.

**Example:** After one year of testing and modifying the solutions to the five problem areas originally identified, analysts develop a set of recommendations and guidelines for incorporating community participation and community organization activities into the Tinari national PHC program.

#### A FINAL NOTE

Certain problems do not lend themselves to following the above steps in exactly the order described. For example, analysts may need to collect data before selecting an analytical model. The steps and methods may overlap, or a number of steps might be repeated. Analysts may also research a number of operational problems simultaneously. Thus, these steps should be seen as a general guide to the process of operations research and should be employed with flexibility.

APPENDIX A  
SUMMARIES OF PRICOR-SUPPORTED STUDIES  
IN COMMUNITY ORGANIZATION FOR PRIMARY HEALTH CARE

## APPENDIX A: SUMMARIES OF PRICOR-SUPPORTED STUDIES IN COMMUNITY ORGANIZATION FOR PRIMARY HEALTH CARE

This appendix describes several studies that PRICOR has approved for funding and illustrates several ways that operations research can be used to study problems of community organization for primary health care.

### KOREA: Model Primary Health Care Program in Korean Rural Communities Utilizing Village-Level Self-Care Substructure

Despite improved economic conditions, the Government of Korea recognizes that significant unmet health needs persist. Some of these are inadequate obstetric care, low immunization levels, and a need for more accessible acute care and family planning services, especially in rural areas. In response to these needs, the government promulgated special regulations for the health care of rural Koreans. This legislation included support for the training and deployment of professional nurses as community health practitioners to deliver PHC services in remote rural communities. Several hundred health practitioners have been assigned since 1981. Their role includes maternal and child health, family planning, prevention of communicable disease, minor medical treatment, health education, and environmental health.

The Department of Nursing of Seoul National University, which has responsibility for training health practitioners, analyzed the problem of practitioner effectiveness and productivity before beginning this study. It determined that productivity could be enhanced if existing non-health community organizations could be used as substructures for PHC services provided by health practitioners. Prior to this study, health practitioners had provided PHC services only within the structure of health centers or through home visiting.

This is an unusual PRICOR study in that the phase I problem analysis and the phase II solution development were completed before the development of the study proposal. However, questions remained about which kinds of community organization involvement would be most effective. Moreover, the quantitative effect of any increased productivity associated with a new structure for health practitioner services needed to be measured.

Basically, this study is a phase III quasi-experimental field test of three possible solutions to the productivity problem: 1) the current or standard community health practitioner service delivery pattern (control group); 2) service delivery involving formal community organizations (experimental group I); and 3) service delivery involving non-formal community organizations (experimental group II) as substructures for delivering health practitioner services.

For experimental group I, the formal organization involved is the BansangHoe (a regular monthly meeting of villagers). For experimental group II, organizations include mothers' clubs, 4-H clubs, church groups, and agricultural cooperatives. These organizations are being used as the system of communication and referrals, for collection and dissemination of health information, and for the delivery of health service. Leaders of these non-health organizations are being trained to function as health communicators, self-care facilitators, and minimum care givers.

The objective of the solution is to maximize: 1) improvement in health indices; 2) the productivity of community health practitioners in terms of services delivered; and 3) efficiency in terms of costs incurred and coverage attained. The decision variable is the type of community organization participating in the program.

For this quasi-experimental field test study, a sample of five townships in each of three counties was chosen by non-random methods based on certain essential study criteria. Data with which to evaluate each solution's impact on the objectives is being derived from two sources: a household survey and community health practitioner written records. The household survey was done as a baseline at the start of the field test and again at its conclusion. Standard statistical tests are being used to compare results in the three counties.

The field test is being conducted in three distinctive stages. Stage 1 is the household survey and collection of baseline data. Stage 2 is the implementation and process evaluation. The process evaluation is an ongoing intermediate formative evaluation that focuses on how well the programs are working and on suggesting remedies for improving them during this trial period. The last stage is that of the final evaluation, repeat household survey, and analysis of results.

The Department of Nursing hopes to learn from this study whether the productivity of community health practitioners and the coverage of the population with essential PHC services can be improved by involving community organizations. It also hopes to determine the types of organization that are most useful for assisting in the PHC effort.

For more information, contact Dr. Yeo-Shin Hong, Department of Nursing, College of Medicine, Seoul National University, 28 Yunkeun-Dong, Chongno-Ku, Seoul, Korea.

#### INDIA: An Operations Research Study of Financing and Organizational Problems of Health Cooperatives

India has one of the largest and most varied groups of health cooperatives in the world. A basic premise of the health cooperative is education of its members. It enables the poor to engage in self-help activities, and it replaces the individualistic Western consumer model of predominantly curative services with a community model where preventive services play a fundamental role.

This study focuses on phases I and II of the operations research methodology. Its purpose is to analyze systematically the problems that health cooperatives in India confront according to the co-op leaders themselves, to analyze alternative solutions, and to identify the best solutions.

The objectives of analyzing the organizational problems are: 1) to identify the best ways to achieve community control and participation; 2) to find the best ways to recruit health co-op members; 3) to identify the best methods of reconciling professional staff and cooperative membership differences, specifically regarding the choice of health services; and 4) to identify the best ways to achieve the transition from externally initiated PHC programs to genuine community control.

A representative sample of eight successful health co-ops will be selected for study on the basis of their geographical location, their relationship to other organizations and co-ops, their size, and the number of years they have been in operation. Failed co-ops will not be considered because sufficiently detailed or valid information cannot be obtained retrospectively. A pretest will be conducted on a ninth co-op in order to revise study instruments and procedures.

Data will be collected through structured interviews and focused group discussions. Each co-op will be ranked according to certain dependent variables, including the degree of financial autonomy, the percentage of target population served, preventive and

curative services provided, consumer satisfaction, membership participation and retention, and the socioeconomic status of the co-op members relative to the target population (to measure how well the co-op has succeeded in enrolling lower status community residents). By definition, the eight co-ops in the study sample have achieved a degree of consumer control. This study will analyze the degree of internal control achieved and the means by which they achieved it.

A preliminary report will be the basis for a workshop of co-op leaders and government officials. Recommendations of the workshop will be included in a final report for distribution to health co-ops and government health officials in India, and in abbreviated form to labor unions, community health programs, and other groups interested in starting health cooperatives.

For more information, contact Dr. Henry Elkins, Management Sciences for Health, 165 Allandale Rd., Boston, MA 02130, or Dr. Varghese Kurien, Institute of Rural Management, Anand, Gujarat, India.

#### MALAWI: Community Organizations

The main causes of morbidity and mortality in Malawi are communicable diseases, malnutrition, and complications of pregnancy. Most of these occur in the at-risk population groups: children under 5 and women of childbearing age.

Following the 1978 international conference in Alma-Ata, Malawi took steps to implement a PHC approach to address these health problems. This early health care effort revealed the need to identify the community organizations that could best increase community involvement in primary health care. Involving the community in the planning and implementation of local health care activities would improve the relevancy of health services by utilizing the knowledge, skills, and resources of the community members.

The operational objective is to identify the best organizations to participate in primary health care and to determine the best mix of tasks for each of the involved organizations. The goal is to maximize continued community participation in PHC activities.

In phase I the problem will be analyzed through the use of a model that describes the interrelationships between external agencies and community organizations. The model will help identify the steps that have been taken by various external agencies in order to achieve the different degrees of participation. The model will also help indicate the problems, constraints, and facilitating factors associated with each approach.

Data will be collected by reviewing and compiling existing data on community participation, by conducting household surveys, and by interviewing key informants. In phase II an overall strategy for community organization in primary health care will be developed by means of a group consensus process involving all relevant decisionmakers and using results from the phase I analysis.

A field test will be conducted by the Ministry of Health and coordinated with other involved agencies. As primary health care is introduced into three districts of Malawi, three different strategies of involving the community in the implementation of primary health care will be tested.

One of the main strengths of this project is the high degree of involvement of Malawian decisionmakers. The project includes the Ministry of Health, the Department of Community Services, and the Center for Social Research. This top-level involvement increases the possibilities for utilization of findings. A final paper will be prepared for use within the Ministry and for distribution to any agency involved in community participation.

For more information, contact Mr. F. S. Chizimbi, Ministry of Health, P.O. Box 30377, Lilongwe 3, Malawi.

### HAITI: Integrating Oral Rehydration Therapy Into Primary Health Care Through Community Organization Efforts

The Government of Haiti has mounted a nationwide campaign to reduce mortality from diarrhea and dehydration. The national program is multisectoral in nature, encompassing the use of commercial outlets, the health care system through the Department of Public Health and Population, other agencies involved in community development and community education, and the community and its resources.

This study will be carried out in the Petit Goave health district of southwest Haiti, where dehydration due to diarrhea has been identified as the primary cause of morbidity in children under age 5, and as the second most important cause of death (after malnutrition).

The study will use an operations research approach in developing and testing an optimal strategy for community organization in rural Haiti that maximizes the contribution of community leadership, groups, and individual members in combating diarrheal deaths and disability through the appropriate use of oral rehydration therapy and related practices (breastfeeding, reduced bottle feeding, and village water sanitation). Community organization efforts in intervention communities will be compared with standard approaches in control communities.

All three phases of the operations research process will be conducted. In phase I (problem analysis) several techniques will be used to identify problems and constraints relevant to increasing the appropriate use of oral rehydration therapy (ORT) in the home. The techniques include interviews, observation, Nominal Group Technique, the Delphi approach, social network analysis, and cost analysis. A house-to-house survey will be conducted among: 1) communities selected for community organization ORT intervention; and 2) an equal number of similar control communities that will receive normal ORT program efforts. The results of the survey will serve as a baseline for the fieldtesting period.

In phase II, a strategy for community participation in combatting diarrheal disease and dehydration will be developed from the results of phase I using a group consensus process. The model will be subject to revisions before advancing to phase III.

In phase III, the strategy will be tested with the existing contingent of health workers, extension staff, educators, community leaders and groups, village health workers, and traditional healers found in the area. There will be quarterly monitoring of ORT use patterns in each of the intervention and normal service communities. The field test will also include testing and revision of training and educational materials and techniques. A workshop will be held following the field test, and a final report will be based on the workshop findings. Feedback sessions with health workers, child caretakers, shop owners, and healers will be held routinely to identify further problems and constraints and to revise the models.

For more information about this project, contact Dr. Michel Cayemittes, Association des Oeuvres Privees de Sante (AOPS), P.O. Box 1213, Port-au-Prince, Haiti, or Dr. William Ward, School of Public Health, University of South Carolina, Columbia, SC 29208.

### LIBERIA: Oral Rehydration Therapy Operations Research Study

The problem of diarrhea and resulting dehydration in the under-two age group has been identified as a priority in Liberia. This problem is currently being addressed through oral rehydration therapy activities in several PHC projects under the coordination of the Ministry of Health and Social Welfare. This study will attempt to determine the most effective means of promoting the appropriate use of ORT by caretakers in the home.

During phase I, information on available resources and constraints in the selected communities will be collected by various means, including a review of existing data, key informant and focused group interviews, observation, village, institutional and household surveys, and tests of various ORT mixtures.

The pilot tests will be carried out during this phase of the study to determine which oral rehydration solution mixtures are most appropriate and acceptable in the rural Liberian setting.

The PHC system in Liberia is still under development and no community organization for primary health care has taken place in the study areas. Therefore, in phase II the study team will develop several strategies for community organization for the dissemination of ORT information which may include village meetings, women's groups, schools, and mother-volunteers. If health workers are present in the communities selected, these workers will also be included in the information dissemination strategy.

Approximately 16 villages will be selected for field testing on the basis of similarity in size, language, culture, and economic base. They will be divided into an equal number of experimental and control sites. Emphasis in the pre and posttest data collection will be on changes in such dependent variables as mothers' knowledge and attitudes toward oral rehydration therapy, ability to prepare ORT solutions, and use of ORT.

A final report will be prepared, and a workshop will be conducted for recommendations and discussion of study results.

For more information, contact Dr. Moses K. Galakpai, Department of Preventive Medicine and Public Health, A. M. Dogliotti College of Medicine, University of Liberia, Monrovia, Liberia.

APPENDIX B  
OPERATIONS RESEARCH TOOLS FOR PROBLEMSOLVING  
IN COMMUNITY ORGANIZATION

## APPENDIX B: OPERATIONS RESEARCH TOOLS FOR PROBLEMSOLVING IN COMMUNITY ORGANIZATION

The following are some of the data collection methods, analysis or decision tools, and research designs that can be used in developing solutions to operational problems in community organization. The codes of various tools and methods are matched with the steps of the OR approach in which they might be used.

<u>Codes</u>	
<ul style="list-style-type: none"> <li>* BSG Brainstorming</li> <li>* CEA Cost-Effectiveness Analysis</li> <li>CFA Cash Flow Analysis</li> <li>CGA Contingency Analysis</li> <li>CPM Critical Path Method</li> <li>* DLP Delphi</li> <li>DTB Decision Tables</li> <li>DTR Decision Trees</li> <li>EXP Experimental Designs</li> <li>FEX Function Expansion</li> <li>FLW Flowcharts</li> <li>GAM Gaming</li> <li>GNT Gantt Charts</li> <li>IDL IDEALS Strategy</li> <li>IMD Interaction Matrix Diagramming</li> <li>INS Intent Structures</li> <li>IPX Impact-Incidence Matrix</li> <li>* IVW Interviews</li> </ul>	<ul style="list-style-type: none"> <li>LGF Logical Framework</li> <li>* MCU Multiple-Criteria Utility Assessment</li> <li>MPA Morphological Analysis</li> <li>* NEX Non-Experimental Designs</li> <li>* NGT Nominal Group Technique</li> <li>OBT Objective Trees</li> <li>* OCA Organizational Climate Analysis</li> <li>OVD Oval Diagramming</li> <li>PPB Planning, Programming, and Budgeting</li> <li>PPM Program Planning Method</li> <li>* QEX Quasi-Experimental Design</li> <li>* QTN Questionnaires</li> <li>SCN Scenarios</li> <li>* SDM System Definition Matrix</li> <li>* SVY Surveys</li> <li>SYN Synectics</li> <li>TRD Tree Diagrams</li> </ul>

\*Particularly useful for community organization problems.

### Phase I

1. Define the problem: BSG, NGT, IVW, SVY, QTN, OCA
2. Analyze the problem: IMD, MPA, SDM, TRD, OVD, FLW, CFA, IPX, PPM, CAM, GNT
3. Set priorities and select problems for study: NGT, DLP, PPM, CPM.

### Phase II

1. Specify the objective for the solution: NGT, OCA, FEX, OBT, INS, PPM, LGF, MCU
2. Identify decision variables and uncontrollable variables: IMD, BSG, DTR, IDL, LGF, CPM
3. Select appropriate model: NGT, OCA, SYN, IMD, MCU, SCN, NGT, DLP, DTB, GAM, DTR, CGA, CFA, IPX, CEA, PPM, IDL, PPB, CPM, GNT, LGF
4. Collect needed data: SVY, IVW, QTN, OCA
5. Use model to develop solution: SYN, IMD, MCU, SCN, NGT, DLP, OCA, DTB, GAM, DTR, CGA, CFA, CEA, PPM, IDL, PPB, CPM, GNT, LGF
6. Conduct sensitivity analysis: same as phase II, step 5.

### Phase III

1. Design test: NEX, QEX
2. Conduct test and collect data: SVY, IVW, QTN
3. Evaluate/modify the solution: same as phase II, step 5
4. Merge resulting information: same as phase II, step 5.

It is important to note again that the OR process is a very iterative one. Work on phase I and phase II may occur simultaneously. Many of the tools may be used in any of the three phases either sequentially or concurrently (e.g., PPM).

### REFERENCES

Peter Delp, Arne Thesen, Juzar Motiwalla, and Neelakantan Seshadri, Systems Tools for Project Planning (Bloomington, IN: International Development Institute, Indiana University, 1977). All the tools noted above (except EXP, NEX, and QEX) are described in this book. In addition a bibliography is provided for each tool.

Andrew Fisher, John Laing, and John Stoeckel, Handbook for Family Planning Operations Research Design (New York, NY: The Population Council, 1983). Good description of designs for the testing phases of OR studies (EXP, NEX, and QEX and their subtypes).

## GLOSSARY

This glossary was compiled to aid the reader in understanding the meaning given to certain terms used by PRICOR.

**ALTERNATIVE:** An opportunity for choice between two or more solutions, one of which--but not more than one--may be chosen.

**COMMUNITY:** A group of people having common organization or interest or living in the same place under the same laws.

**COMMUNITY FINANCING OF PHC:** The mobilization of resources by a community to support, in full or in part, basic preventive and curative health services for its members.

**COMMUNITY HEALTH WORKER:** A person indigenous to the community who provides basic preventive and curative health services to members of the community. Also called village health workers. These include promoters, community health auxiliaries, health agents, health guides, health visitors, among others.

**COMMUNITY ORGANIZATION FOR PHC:** The processes or structures for achieving community participation in primary health care.

**COMMUNITY PARTICIPATION:** The involvement of community members in the planning or implementation of community activities.

**COMPONENT:** A part of a system.

**CONSTRAINT:** A requirement or restriction on a system that reduces the freedom of decision.

**CONTROLLABLE FACTORS:** (See decision variables.)

**COST-EFFECTIVENESS:** A technique for comparing the costs and the effectiveness of alternative ways of achieving the same objective.

**CRITERION:** A characteristic, rule, or test by which an object or event is judged.

**DECISION:** The act or process of choosing among alternatives.

**DECISION VARIABLE:** A variable in a decision problem that can be controlled by the decisionmaker.

**DEMAND:** The type and quantity of service or commodity wanted or requested.

**DEPENDENT VARIABLE:** The variable being predicted or explained (the "effect" in a cause-effect relationship).

**EFFECTIVENESS:** The degree to which program or system objectives are achieved. Usually, outcomes are compared to some standard, such as the objectives that were set originally. For example, the program reached 90 percent of its target.

**EFFECTS:** The changes in knowledge, attitudes, and behavior (practices) among individuals, families, or communities as a result of a program, project, or activity.

**EFFICIENCY:** The achievement of objectives without wasting resources; the relationship of output to input. For example, in two programs that use the same amount of resources, program A, which screens 10 mothers/day, is more efficient than program B, which screens 5 mothers/day.

**EVALUATION:** A judgment of worth. In practice, a process for making judgments about selected objects, processes, or programs by comparing them to specific value standards (e.g., objectives) for the purpose of deciding among alternatives.

**FACILITATING FACTOR:** An uncontrollable factor that favors certain choices (e.g., people's willingness to pay for primary health care).

**GOAL:** A desired impact. In primary health care, a state of health that is desired or expected to be achieved through an activity, project, or program; for example, to reduce infant mortality.

**IMPACT:** A change in the status (e.g., health, standard of living) of individuals, families, or communities as a result of a program, project, or activity. For example, a reduction in infant mortality by 15 percent.

**INDEPENDENT VARIABLE:** A variable that is used for predicting or explaining other (dependent) variables (the "cause" in a cause-effect relationship).

**INDICATOR:** An observable phenomenon that is substituted for a less observable phenomenon (e.g., weight according to age in a child as an indicator of health/nutritional status).

**INPUT:** The types and quantities of resources (labor, money, material, etc.) used in a program, project, or activity; sometimes called effort.

**INTERVENTION:** In health, an activity aimed at modifying a train of events so as to produce a more desirable outcome. For example, measles vaccination is an immunologic intervention between virus and host.

**MATRIX:** A mathematical or graphical representation in two dimensions of the relationship between a number of variables.

**MEASURE:** A number assigned to an object or event. Measures can be expressed as counts (45 visits), rates (10 visits/day), proportions ( $\frac{45 \text{ primary health care total visits}}{380 \text{ total visits}} = .118$ ), percentages (12 percent of the visits made) or ratios ( $\frac{45 \text{ visits}}{4 \text{ CHWs}} = 11.25$ ).

**MODEL:** A simplified representation of the real world. In operations research, models are usually graphic (maps, diagrams, flowcharts) or mathematical (formulas, equations).

**OBJECTIVE:** An effect that is desired or expected to be achieved by an activity, project, or program (e.g., to increase the use of growth charts by 50 percent).

**OBJECTIVE FUNCTION:** A statement or equation which expresses the relationship between the actions that a decisionmaker may take and the outcome of those actions or between the decision variable and the objective of the solution.

**OBJECTIVE OF THE SOLUTION:** A statement of the characteristics of an acceptable solution, usually expressed in quantified terms; for example, maximize the number of children that can be immunized with a particular program budget.

**OPERATIONAL PROBLEM:** A specific question, issue, or dysfunction in an operating system that limits the attainment of system objectives. It is a problem within the operating system as opposed to an environmental, health, or other nonsystem problem.

**OPERATIONS (or OPERATIONAL) RESEARCH (OR):** The application of science to the solution of managerial and administrative problems; a systematic, problemsolving process consisting of three phases: problem analysis, development of solutions, and testing of those solutions.

**OPTIMIZE:** To operate a system so that the system criterion is at its optimum value. For example, to minimize costs or maximize utilization.

**OPTIMUM:** The best, or more favorable, value that can be achieved given the constraints.

**OPTION:** An opportunity for choice between two or more courses of action.

**OUTCOME:** The results of a program or activity, usually its effects or impact, but may also include outputs.

**OUTPUT:** The types and quantities of goods and services produced by an activity, project, or program. For example, 750 packages of oral rehydration salts distributed.

**PRIMARY HEALTH CARE:** A strategy for making basic health services universally accessible to the world's population.

**PROBLEM:** (See operational problem.)

**PROCEDURE:** A series of predetermined tasks or actions to carry out an operation, such as a physical examination.

**PROCESS:** A linked series of actions or operations that are directed to a specific purpose, such as a health education session.

**PROGRAM:** A set of organized activities designed to reach a goal.

**SENSITIVITY ANALYSIS:** An analysis that shows how a solution is affected by changes in one or more of the variables that influence it.

**SUBSYSTEM:** A system within a larger system.

**SYSTEM:** A set of discrete, but interdependent, components designed to achieve a set of goals.

**SYSTEMATIC ANALYSIS:** Analysis carried out following orderly procedures.

**SYSTEMIC ANALYSIS:** The identification of the components that make up a system and an assessment of their interrelationships.

**SYSTEMS ANALYSIS:** A generic term to cover the application of a wide spectrum of methods (including OR) to problems or entities that are conceptualized or modeled in the form of systems.

**UNCONTROLLABLE FACTORS:** Factors that are not under the control of the decisionmaker.

**VALUE:** Estimated or assessed worth; in OR, the number assigned to a decision variable, such as the price set for ORS packages.

**VARIABLES:** The factors of a decision problem whose value may change.