

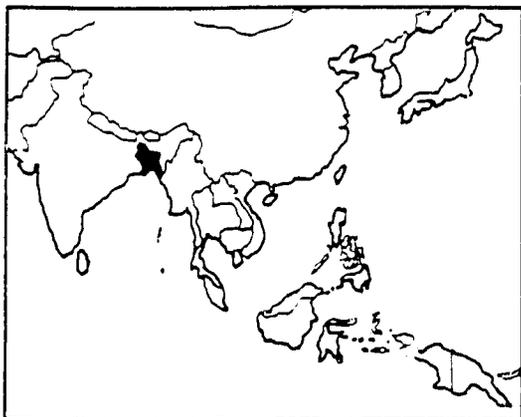
Extended Summaries
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Study Summary

DETERMINANTS OF HEALTH CARE UTILIZATION IN RURAL BANGLADESH



Government health services, the only source of organized health care in the rural areas of Bangladesh, though free of cost and managed by trained professionals, do not seem to provide services that attract the rural people. Reports from the government as well as private sources indicate that primary health care (PHC) facilities are greatly under-utilized, despite the tremendous health needs and repeated efforts by the government to improve these services. On the other hand, a great majority of the sick people are found to use private sources

of care ranging from graduate physicians of modern medicine to traditional faith healers.

From June 1985 through March 1986, researchers from the Johns Hopkins University School of Hygiene and Public Health and the Christian Commission for Development in Bangladesh (CCDB) jointly conducted an operations research (OR) study in the Companiganj thana, to identify changes which could be made to improve the utilization of PHC services.

Companiganj is a sub-district in the southern part of Bangladesh with a population of 120,000. Except for its smaller size than the average, the socio-economic conditions of the people, their ethnicity, customs, beliefs and problems are representative of other rural sub-districts in Bangladesh. The Companiganj Health Project (CHP) was a demonstration model for delivery of comprehensive health and family planning services carried out from 1973 to 1980 as a joint venture between the Government of Bangladesh and the CCDB. Comprehensive preventive, promotive, curative and family planning services are delivered through two well-equipped hospitals and seven sub-center clinics, each serving approximately 17,000 population. Preventive and promotive services are delivered through two sets of field workers, male and female, who make routine, scheduled home visits. The service delivery program followed by the CHP represents the PHC system of the government at present, and all services are delivered practically free of cost.

The study included the first two phases of operations research methodology, problem analysis and solution development. The third phase, solution validation, was not included due to time constraints.

In the problem analysis phase of the study, the researchers sought to identify and understand the determinants of medical care utilization. They first analyzed three sets of data from the CHP facilities; births, deaths, and

major illnesses. For each event, socio-demographic characteristics of the individual, the nature of the illness, and health service utilization were given special attention.

Medical care providers were classified into four major categories: (1) the formal primary health care (PHC) services; (2) Daktars, the semi-trained unlicensed practitioners of modern medicine; (3) the indigenous medical practitioners; and (4) the homeopaths.

A series of bivariate and multivariate analyses of the data were done, with utilization of health care services and choice of providers as the dependent variables and a set of user and health system factors as the independent variables. (Table 1).

Table 1. Independent (explanatory) variables used in the analyses

Variables	Indicator
Age	Age groups in years
Sex	Male or female
Religion	Muslim or Hindu
Socio-economic status	Size of land holding
Education	Years of education
Occupation	Type of work, profession, etc.
Type of disease	Doctor's diagnosis
Severity of disease	Duration of incapacity
Distance	Distance from patient's home to source of care
Travel time	Time (Mts) from home to care source
Waiting time	Time (Mts) at the site of care
Expenses of treatment	Total cost of treatment including cost of medicine and fees.
Number of practitioners	Number of other practitioners available in each sub-sub-sector
Season	Month of occurrence of the episode
Preference	Preference for source of care
Visit by male worker	At least one male worker visit
Visit by female worker	At least one female worker visit

In the solution development phase of the study, community members, health care providers, and local officials participated in a structured group process that elicits information from informants through questionnaires (Delphi technique). The participants completed questionnaires aimed at identifying the components of the under-utilization problem and obtaining suggestions regarding solutions. Based on the results from this initial questionnaire, a revised questionnaire was developed and distributed to the same participants. This process continued for four rounds until consensus had been reached on some alternative solutions to the problem.

The researchers then took the variables that were found to be predictors of utilization and choice of provider from the problem analysis and categorized them into constraints, facilitators, and decision variables. In light of these, various components of the existing FHC system were analyzed and specific problems were identified. These, along with the results of the Delphi survey, were then used to develop program recommendations.

ANALYSIS OF DATA FROM THE CHP

Data were collected from the CHP's records on births, deaths, and major morbidity. The patterns of utilization for each were analyzed along with the socio-demographic background of the individuals.

The age of an individual clearly stands out to be one of the most important factors both in the utilization of medical care services and the choice of practitioners in cases of serious illness (Tables 2 and 3). The lowest use of medical services is seen among children below five years of age; use increases with age. An age differential, however, does not exist during terminal illness. Nor does it exist during childbirth, where 98 percent of the cases use some kind of provider anyway.

Table 2. Medical care utilization during illness by age group

Age Groups (years)	Utilized %	Not Utilized %	Total %	n
<5	67	33	100	336
5 - 14	69	31	100	242
15 - 44	91	9	100	230
45 & +	91	9	100	190
Total	78	22	100	998

Chi-square = 74.4; for 3 d.f. p <.001

With regards to choice of provider, children with serious illness use the services of indigenous practitioners and homeopaths significantly more than other age groups. This finding is true for terminal illness as well. Utilization of the CHP is significantly higher for older people while the utilization of the Doktor is greatest for working age people. These findings suggest that the CHP facilities are not ideal for people of working age or for children, who must be accompanied by an adult. The CHP facilities are more accessible for people who have less demand on their time. The need for immediate access to therapy by sick working adults, and at the same time, the ready availability of the Daktars probably make the latter the most popular source of care in the community. In addition, since the Daktars belong to the same community, they have better social ties, the trust of the people, and a better provider-patient relationship than the providers of the formal FHC system.

Table 3. Distribution of utilization by type of provider during illness and by age group (in years)

Age Groups	Daktar %	CHP %	Indigenous %	Homeopath %	Total %	n
<5	43	17	21	19	100	225
5 - 14	45	30	17	8	100	167
15 - 44	63	22	11	4	100	207
45 & +	45	38	17	1	100	173
Total	49	26	16	9	100	772

Chi-square = 80.2; for 9 d.f. $p < .001$

Daktar: Non-formal, semi-trained or self-trained practitioners of modern medicine.

CHP: Compañiganj Health Project.

Levels of education and occupation also show a positive association with utilization. These findings seem to reflect the fact that working members of the family have a greater incentive for seeking care more quickly than the non-working members. The majority of the people in rural Bangladesh depend on their daily wages for subsistence, and the loss of a job even for a day may mean that the family has to borrow from others or go unfed. In such situations, adults, particularly the poor, cannot afford to remain sick for a long time. Thus they are more likely to utilize medical care during illness.

Differences in the rate of utilization or in the choice of the medical care provider between males and females was not found to be significant, except for higher utilization among males in the working age group (15-44 years). This has important public health implications because this age group represents the child-bearing years for women, when their need for medical services is usually high. Lower utilization of medical care by the women of this age group reflects the neglect of maternal and child health (MCH) care by the population.

People with higher education and in more stable occupations are more likely to utilize the services of a Daktar than the CHP. The opposite is true for the uneducated and people in less stable occupations. This practice by the affluent is contradictory to their expressed opinion. In an opinion survey conducted prior to the actual surveillance on utilization, they showed a higher preference for the CHP. This may indicate that CHP services are ideally preferred by them, but that at the time of actual need, the services prove to be inconvenient or the facilities inaccessible. This finding is further supported by the fact that during terminal illness, utilization of the CHP by the affluent becomes much higher than during serious illness. Higher utilization of CHP during the time of severe illness may indicate their greater confidence in the system. However, they do not tend to utilize the CHP unless it becomes essential, or they have the time to use it.

The socio-economic status (SES) of a family shows a positive association with utilization (Table 4). Since SES is positively correlated with the education and occupation of an individual, it also displays similar influence on utilization. Thus, in the choice of provider, for example, people with higher SES chose the services of a Dokter, and the people in the lower SES chose the services of the CHP by a significantly higher proportion (Table 5).

Table 4. Distribution of medical care utilization during illness by socio-economic status (SES)

SES Category	Utilized %	Not Utilized %	Total %	n
Poor	74	26	100	449
Lower Middle	79	21	100	306
Upper Middle	79	21	100	127
Rich	86	14	100	116
Total	78	22	100	998

Chi-square = 9.1; for 3 d.f. $p < .028$

Table 5. Distribution of utilization by type of provider during illness and by socio-economic status (SES)

SES Category	Dokter %	CHP %	Indigenous %	Homeopath %	Total %	n
Poor	46	29	15	10	100	332
Lower-Middle	41	30	19	10	100	241
Upper-Middle	56	16	20	8	100	99
Rich	70	17	12	1	100	100
Total	49	26	16	9	100	772

Chi-square = 34.2; for 9 d.f. $p < .001$

Dokter: Non-formal, semi-trained or self-trained practitioners of modern medicine.

CHP: Companiganj Health Project.

Seasonal variation plays an important role in both medical care utilization and the choice of provider (Tables 6 and 7). Medical care services tend to be used by a significantly larger proportion of ill people during the summer than the winter. In the choice of provider, however, Daktars are utilized most during winter, while the CHP is busiest during the rainy season; 61 percent of the patients which utilize the CHP facilities are seen during the rainy

season. Such differences in the utilization between Daktar and CHP can best be explained by economic factors. Daktars, whose services are more costly than the CHP are more heavily utilized during winter when the cash flow is the highest. During the rainy season, when the people have fewer jobs, less money, and the road conditions are poor, the CHP is utilized more heavily. These findings suggest that when the fiscal means are available, people prefer the services of Daktars over the CHP.

Table 6. Distribution of medical care utilization during illness by season

Season	Utilized %	Not Utilized %	Total %	n
Winter	73	27	100	481
Summer	96	4	100	109
Rain	78	22	100	408
Total	78	22	100	998

Chi-square = 19.1; for 2 d.f. $p < .001$

Table 7. Distribution of utilization by type of provider during illness and by season

Seasonal Category	Daktar %	CHP %	Indigenous %	Homeopath %	Total %	n
Winter	53	17	21	9	100	350
Summer	48	20	23	9	100	102
Rain	46	35	10	9	100	320
Total	49	26	16	9	100	772

Chi-square = 39.1; for 6 d.f. $p < .001$

Daktar: Non-formal, semi-trained or self-trained practitioners of modern medicine.

CHP: Companiganj Health Project.

The distance of the CHP main centers and sub-centers from households shows a negative correlation to their utilization for all types of illness events. Utilization of the CHP is the highest for patients who live within a mile of the CHP clinics. The rate of utilization goes down significantly as one moves away from the facilities. When a CHP facility is available in the midst of other private facilities, the former is usually preferred. However, the CHP facilities do not seem to be adequately accessible to the people of

Companiganj. Although the majority of the CHP patients live within a mile radius of a facility, only 15 percent of the population live within a mile radius of the main centers and 40 percent live within that radius of the sub-centers.

While the CHP's physical accessibility may not correspond to the community's needs, it is certainly financially accessible. People in the lower SES categories utilize it more frequently, and its utilization increases during the rainy season when the cash flow in the community becomes low. People seem to overcome this physical accessibility barrier during times of financial need.

The nature of illness, the type of disease and the length of suffering all have been found to play a significant role in the utilization pattern both in the case of serious illness and terminal illness (Table 8). There are some distinctive differences, however.

Table 8. Distribution of medical care utilization during illness by type of illness

Illness Type	Utilized %	Not Utilized %	Total %	n
Acute	75	25	100	585
Chronic	81	19	100	345
Accidents/ Emergency	96	4	100	55
Total	78	22	100	985

Chi-square = 16.2; for 2 d.f. $p < .001$

For serious illness, utilization of the CHP facilities is the greatest for emergency and accident cases and chronic diseases, and the least for acute diseases. For terminal illness, this order is reversed. Daktars and homeopaths treated acute diseases most often, while visits to the CHP were significantly higher for emergencies and accidents or chronic ailments (Table 9).

Although the reason for the higher percentage of utilization of the CHP facilities for chronic illnesses, accidents and emergencies than for acute illness was not verified by the study, it would appear that the CHP's fixed schedule of daytime clinic hours lent it more to the treatment of chronic rather than acute illness episodes. The reputation of the CHP among villagers as a modern, technologically superior facility made it their choice for accidents and emergencies.

Table 9. Distribution of utilization by type of provider during illness and by type of illness

Illness Type	Daktar %	CHP %	Indigenous %	Homeopath %	Total %	n
Chronic	41	34	19	6	100	284
Acute	54	20	15	11	100	435
Accident/ Emergency	40	40	18	2	100	45
Total	49	26	16	9	100	764

Chi-square = 31.8; for 6 d.f. $p < .001$

Daktar: Non-formal, semi-trained or self-trained practitioners of modern medicine.

CHP: Comaniganj Health Project.

As indicated earlier, two thirds of the patients resorted to modern medical care during both the general illness and terminal illness. Two thirds of these are cared for by the Daktars, and the remaining one third by the formal CHP system. Throughout the analysis a see-saw pattern of utilization between these two sources of care was observed, without affecting the utilization of the indigenous practitioners or the homeopaths. It was apparent that the two latter providers had fixed niches of their own, while the major competition in the provision of medical care consistently existed between Daktars and the CHP, out of which the former was always the more successful by a large margin.

A comparison of the services of the two providers showed that the Daktars' services were much more attractive because of their availability and accessibility at the time of need. Although the CHP services were financially more accessible, organizationally and physically they were not ideal. Quality of care seemed to play a relatively minor role compared to availability and accessibility factors.

Of the several health service system factors included in the analysis, only domiciliary visits by the female health worker was found to have a significantly positive influence on the utilization of the CHP services. While the male field workers were able to visit a much larger number of households, their influence was found not to have any effect. Both the male and the female workers followed "banker's hours" for visiting the households. The former had greater mobility because they traveled by bicycles and were free from any social restrictions on their movements. However, once they reached a household, it was difficult for them to establish effective communication because male members of the household were usually away during the day. While the female workers had to travel on foot and observe several restrictions in their movement, they were able to establish much better communication with the women in the household who were usually always present and expressed more concern for the welfare of the household.

PREDICTORS OF MEDICAL CARE UTILIZATION

The results of several multiple regression analyses showed that the age of an individual, the SES of the family, the seasons of the year, the type of illness, and the total number of practitioners in a locality explained more than 30 percent of the variance in the utilization of medical care during serious illness. The first four variables were also the predictors for utilization of the CHP during serious illness, and together they explained 28 percent of the variance.

In comparing the delivery of health services between the CHP and Daktars, two factors, the place and the cost of treatment, stand out as the most important differentiating factors. The SES of the patient and type of illness are also included in the equation. Together, these four variables are able to explain 82 percent of variance in the utilization of the services of the CHP and the Daktars. A further analysis of the data revealed that the distance of the CHP subcenters from households, the travel time to treatment, and the winter season also have significant explanatory power in differentiating the utilization of the services of the two providers.

SOLUTION DEVELOPMENT

The majority of the above-mentioned determinant variables identified in the multiple regression analyses are actually constraints. The few decision variables that have major predictability clearly indicate that PHC services need to be brought closer to the people than they are presently.

The participants in the Delphi survey identified availability and accessibility of PHC facilities as the major causes of under-utilization. Other problems included poor communication between PHC providers and the community. Suggestions for improvement of PHC utilization which scored the highest points in the Delphi group process included: (1) establishing a clinic facility for every 5,000 population, (2) providing emergency services through the clinics, (3) improving the distribution of supplies to the clinics, (4) building a better rapport between PHC providers and the community, (5) improving the general awareness of the community regarding PHC, and (6) improving the quality control (Table 10).

As a result of the problem analysis and the Delphi group process, four alternative solutions were considered for increasing the utilization of PHC services. These were: (1) expansion of PHC clinic facilities by the government, (2) inclusion of Daktars into the PHC system, (3) motivation of the community regarding self-support for PHC, and (4) combining government and community resources. Each alternative considered had its own problems, arising primarily from limitation of resources, both within the government and the community. As a result, none of the alternatives could be strongly recommended as a solution for improving utilization. An approach combining both government and community resources seemed to be the most feasible. In making the recommendations, the feasibility questions will be given priority consideration.

Table 10. Items with highest scores in the Delphi survey
by major categories

Category	Highest	Second Highest
Clinic location	One PHC clinic for every 5,000 population	Clinic site be selected by a committee comprising PHC officials, local and public representatives
Clinic design	Separate arrangements for males and females	Some inpatient facilities for emergency patients
Operating hours	Present timing with emergency services when needed	Both morning and evening hours
Supplies	Improvement of both quantity and quality of drugs and supplies	Establishment of 'Fair Price' drug shop attached to the clinics
Staffing	Posting of graduate physicians in each PHC clinic	Employment of trained traditional birth attendants with salary
Credibility and trust of PHC staff	Establishment of better rapport and spending more time with patients by PHC providers	PHC clinics to be used as general patient care centers rather than only family planning centers
General awareness of people	Use of mass media	Participation of PHC personnel in local institutions & functions
Fees	Existing system of no fee	Some subsidized fee for non office-hour services
Quality control	Improvement of supervision and support form higher authorities	Establishment of a local committee comprising PHC officials, and local and public representatives to oversee PHC activities

CONCLUSION AND RECOMMENDATIONS

Through this study insight has been gained into the pattern of medical care utilization by the people of rural Bangladesh and some of the factors that determine such utilization. At the same time, the relative role of formal PHC services in the midst of several other types of medical care providers has also been examined. Several important policy implications for PHC have been derived from these results.

It is evident that in order to enhance better utilization of the PHC facilities they should be closer to the public than they are at present. While the ideal would be to have a PHC clinic within a mile's reach of every locality, such a close network of PHC clinics is just not practical. One PHC clinic for every 5,000 population, as was suggested in the Delphi survey, is also impractical. However, it was recommended that there be at least one clinic in every 'ward', which is the smallest unit of civil administration comprising a population of 6,000-7,000.

Site selection for the clinic is a very important initial step and consideration should be given to locating it in the most accessible place in the ward. It was recommended that the selection be done by a committee comprised of elected representatives, responsible residents and PHC officials. The same committee would also function to oversee the development and support of the PHC activities. To encourage local participation, the land or a building for the clinic should preferably be donated by the community.

The person recommended to administer the clinics would be a paramedic, who is a permanent resident of the ward with a reputable background. One of the duties of the paramedics will be attending to emergencies and acute conditions beyond office hours. As an incentive, it is recommended that he be allowed to charge some fee for the services he provides after hours. Clinic hours, however, should be decided by the PHC committee. Another important task of the paramedics should be to make regular visits to local institutions, such as schools, offices and market places, to help make people aware of the PHC facilities. Such an awareness drive should also be taken up by the central administration of PHC to disseminate information through the mass media (i.e., radio and newspapers).

The paramedic would be assisted by two part-time, trained female workers, preferably traditional birth attendants, also permanent residents of the ward. Their main functions would be to render domiciliary preventive, promotive and MCH services in the ward, and to have some responsibilities at the clinic as well. Enhancing the domiciliary services of the female workers should be given major emphasis since they are clearly more effective workers than their male counterparts in promoting medical care utilization.

An alternative to the above arrangement is to incorporate the local Daktars into the PHC system since, in most cases, they fulfill the conditions of the paramedic, and they are already established as doctors in the community. An earlier attempt by the Government of Bangladesh, in collaboration with the World Health Organization, did not succeed. After one year of scheduled training the Daktars were found to return to their old practices with hardly any evidence of their earlier training. Nevertheless, many believe that the program was not given a fair chance to succeed and that it still has the potential to expand throughout the country. However, the procedures for selecting, training and supporting the Daktars should be thoroughly revised and strictly imposed.

Consideration should be given to prioritizing diseases for special attention, such as diarrheal disease, pneumonia, and other acute diseases of the respiratory tract, all of which are highly prevalent and potentially fatal. Specific control and treatment measures for such diseases may prove highly effective.

MCH services must also receive priority in the PHC system. Services delivered in the clinics are not ideal for them. In fact, the knowledge regarding the specific needs and priorities is so little, and the obstacles to utilization of PHC services by these two groups so great, that the development of an efficient program is difficult. Further studies will be needed to determine not only MCH needs, but also the role of education on mothers' health care behavior.

Maintenance of essential drugs and supplies is crucial to establish the credibility of the PHC services in the community. Hence the regular replenishment of these should receive priority. The major point of concern, if the program becomes a success, is the cost of drugs, which may go well beyond the clinic's present budgetary limits. Some form of payment system may need to be introduced in the clinics. While there may be some initial resistance to the idea, the resistance will pass once the system proves effective, since people are paying up to ten times more for their medical care from Daktars than from the CHP system.

In the light of the above, it is hoped that the findings of the study will be of help towards the design and implementation of a much more effective PHC program for Bangladesh.

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This study was conducted from June 1985 through March 1986 by the Johns Hopkins University School of Hygiene and Public Health and the Christian Commission for Development in Bangladesh. This summary is based on the final report of the study prepared by Dr. A.T. Shafiq A. Chowdhury. Further information is available from the principal investigator, Dr. A.T. Shafiq A. Chowdhury, the Johns Hopkins University School of Hygiene and Public Health, Department of International Health, 615 N. Wolfe St., Baltimore, Maryland 21205, or from Ms. Lani Rice Marquez, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

COMMUNITY FINANCING TO REDUCE ATTRITION OF COMMUNITY HEALTH WORKERS AND INCREASE HEALTH SERVICE COVERAGE IN RURAL BOLIVIA



[The following summary is taken in large part from an article prepared by PRICOR researchers and staff for a 1987 issue of the international journal, Socio-Economic Planning Sciences and appears here with permission of the journal's editors.]

Bolivia is one of the poorest countries in Latin America. This landlocked Andean nation is beset with the world's highest inflation rate and a worsening economic recession. Such grave conditions seriously impede the ability of public and private institutions to deliver formal health services to the largely rural population. In the state of Cochabamba, as in other parts of Bolivia, the low coverage of health services has led private organizations and church groups to train

and deploy community health workers to provide basic services to small communities. However, inadequate salaries and supervision, as well as drug shortages, have resulted in CHW dropout rates of almost 70 percent. Such high attrition disrupts the consistent delivery and weakens the effectiveness of PHC services. This prompted researchers from the Instituto de Investigaciones Médico Sociales (IIMS) to undertake this operations research (OR) study to identify ways in which the existing CHW programs could be redesigned to reduce high attrition and improve coverage and effectiveness. Because an inadequate or unreliable salary was the major problem for these workers, this study concentrated on investigating ways in which the community would be willing to support their CHWs' salaries.

BACKGROUND

The study area is comprised of eight small villages ranging in size from 19 to 46 families. Previously, health services had been delivered to each village by one centrally located CHW. Unfortunately, the private voluntary organization (PVO) responsible for his training and supervision was no longer able to pay his salary, leaving him unwilling to continue attending to patients. The researchers, all of whom had worked extensively in rural Bolivia, selected this area for study because it was representative of many rural projects in the state of Cochabamba where PVOs could no longer offer salaries for their trained workers.

The task of redesigning the existing program posed two important operational issues: (1) how to select, train, and deploy effective CHWs, and (2) how to design a financial scheme to support these workers, given the communities' needs and constraints.

DESIGNING HEALTH SERVICE DELIVERY MODELS

Early in the study, researchers conducted a household survey in two rural areas to determine conditions under which communities would be willing to support a health worker, how much they would pay, and how payments would be made (i.e., in-kind, fee for service, annual installments, etc.). Results from this survey indicated that most people would be willing to support health workers if the health workers had established working hours and were selected by the community. Furthermore, villagers from smaller communities would be more willing to support a health worker who resided in their own community and attended only to community members.

Considering these findings, the investigators designed two possible delivery models. Model I, similar to the existing program, would upgrade and retrain the CHW to be responsible for providing services to persons in his or her community as well as for those in outlying "satellite" villages. Model II would employ lower level health workers (health promoters) who would attend only to those persons living in their individual communities. These promoters would be supervised by a nearby CHW and a study team member. The investigators concluded that both delivery models should be included in the analysis of alternative financing schemes.

IDENTIFYING CHARACTERISTICS OF AN EFFECTIVE HEALTH WORKER

After the initial survey, researchers conducted meetings with CHWs and community members to identify aspects of the PHC system that contributed to high attrition. Both those CHWs currently working and those who had left the system, identified the lack of financial support by the PVO or the Ministry of Health (MOH) as their major reason for dissatisfaction. They also felt that the community was largely unsupportive or unaware of their activities. They saw themselves divorced from important decision-making organizations and felt that institutional support from a highly visible group of community leaders would increase their own motivation and their credibility with the villagers.

Discussions with villagers indicated that, although most of them clearly recognized the need for a local health worker, they were reluctant to commit their own scarce resources until they were assured that the worker would be competent, reliable, selected by the community, and well supplied with medications.

Findings from the discussions with CHWs and community members, combined with survey results, led the researchers to conclude that a community-supported health worker should be:

1. Selected by the community for stability and reliability,
2. Well trained and supervised,
3. Adequately supplied with medications,

4. Available at regular hours,
5. Accepted by the community,
6. Adequately and regularly compensated, and
7. Low in cost to the community.

After identifying the above requirements for an effective health worker, the study team returned to meet with community members to define those requirements more precisely. For example, it was necessary to develop health worker selection criteria for the community to use which would promote CHW reliability and stability. In the past, communities had little input in the selection of their health workers. Each PVO or the MOH identified workers according to agency policies or characteristics of the area. However, in this study those characteristics that community members identified as contributing to a more reliable workforce formed the basis of the new selection criteria. Through these meetings, it was determined that communities preferred CHWs to be older mothers who do not participate in seasonal migration.

Additional informal meetings were held to help set regular work hours, to design standardized training and supervision schedules, and project salary needs. The study team anticipated that this community input would encourage greater utilization of and support for the CHW services. However, they also understood that the selection of financing schemes would call for a more systematic decision-making approach than that of the informal community meetings.

SELECTING A FINANCING STRATEGY

Once the two delivery models and the set of health worker requirements had been defined, the researchers identified the following four possible financing schemes. Three of the four schemes consisted of two components.

1. Fee for services and medications paid for by individual patients.
2. Community paid salaries and medications paid for by individual patients.
3. PVOs paid salaries and medications paid for by individual patients.
4. Salary and medications paid by community.

The investigators then employed an impact matrix to assess the potential effectiveness of the individual financing schemes on the different delivery models (see Figure 1). One advantage of the impact matrix is that it allowed the investigators and five participating community members to systematically assess the potential effect of each financing scheme on the seven characteristics required for an effective PHC system and health worker. An additional advantage of impact matrices is that they enlist the preferences and judgments of those who are programmatically closest to the decision, and can easily tap into knowledge not often available to decisionmakers. This type of insight ultimately allows for increased likelihood of the program/decision being adopted.

Table 1. Effect of financing schemes on health worker characteristics

Characteristics of effective health worker	Fee for services, medications paid individually	Community pays salaries, medications paid individually	PVO pays salaries, medications paid individually	Salary and medications paid by community
1. Stable, reliable (Selection system)	No effect	No effect	No effect	No effect
2. Well trained, supervised	No effect	No effect	No effect	No effect
3. Well supplied with medications	Variable	Variable	Variable	Stable
4. Paid regularly	Variable	Fixed salary	Fixed salary	Fixed salary
5. Accepted, supported by community	Minimal	Moderate	Minimal	Major
6. Available at regular times	Variable	Fixed	Fixed	Fixed
7. Low cost to community	None	Low	None	High

- Characteristics to be included in impact matrix

This process, coupled with findings from earlier surveys and repeated community meetings, guided the investigators and community members to determine that the most feasible strategy could finance both the salary of the health worker and medications. Discussions with the community revealed that they preferred to pay in-kind for health worker salaries. Payment in cash was not considered practical given Bolivia's annual inflation rate of 10,000 percent and the area's reliance on a non-cash economy. It was also decided that these in-kind payments would be sold and the cash proceeds used to pay for health worker salaries and purchase medications. It was finally

agreed that the in-kind payments could only be made after the cash crop was harvested, which initially meant a four month delay in payment of the workers. However, due to the communities' commitment and interest in the program, they decided to proceed and select their workers, have them trained, and begin delivering services with the assurance that they would be paid after the harvest.

The model, already implemented in seven communities, required retraining the existing CHW to provide both better services to his community and to supervise six health promoters in the outlying villages. These promoters, selected by community members based on the selection criteria designed earlier in the study, differ substantially from the CHW in that they are mothers, have little education, and receive half the salary of the CHW. The CHW's longer training, as well as his previous year's work experience in the health post partially explains the pay differential. All workers have been trained and supervised by the research staff and two Bolivian physicians who reside near the study area. The monthly supervisory meetings include a review of the workers' records and meetings with the community organizations which are responsible for the management of the health workers' salaries.

The organization and collection of these in-kind payments rely on the following two community groups: the Sindicato (a traditional organization found in each community) and the Health Committee. The former is ideal for ensuring that each family donates its quota since attendance of the regular Sindicato meetings is obligatory for each household head. The Health Committee, composed of a member from the Sindicato and an elected mother, is directly responsible for the collection, storage, and marketing of the in-kind payments. The mother, selected by the women in the village, serves as their delegate to present their concerns and requests to larger forums such as the Sindicato meetings. This group is one of the few which provides for and encourages the participation of mothers in decision making at the village level.

CONCLUSION

This project depended on the investigators initiating, encouraging and maintaining community involvement in every phase of the study. First, the study team contacted the leader of each Sindicato whose support was essential to the future success of the project. The study team's familiarity and long work experience in the research area facilitated these first contacts.

Early in the study the investigators proposed to use communities' participation in both the identification of the problem, and the ongoing refinement of the proposed solutions. Though the project staff realized that community resources would be used, they depended on the community to define which resources and how these were to be managed. The consistently high level of community support could be partially attributed to the ongoing meetings and contacts made with both individuals and groups.

Key decisions (i.e., how much workers should be paid, how often, etc.) were generally made by consensus after repeated group discussion. The director of the Sindicato played a major role in organizing meetings and facilitating decision making. The investigators were careful to include mothers' input in

the group meetings, and often represented their concerns during the larger meetings.

This project's success is partially due to the community's continuous involvement in each part of the project. The community not only financed PHC services; their participation was enlisted to resolve key operational questions. This level of collaboration did not come immediately. In this study it required substantial time, commitment, and the willingness to compromise on the part of the community members and the investigators. This study also illustrates that, even under grave economic circumstances, viable community financing schemes may be designed and supported. Their viability rests in the schemes' ability to cover costs as well as its sensitivity to the needs and constraints of the community.

This model has been modified slightly and replicated by other PVOs in the Cochabamba area. More importantly, these health promoters are still working, attending to their patients, and are able to manage their agricultural and family responsibilities. They enjoy their work and received their first salary in August.

* * *

This study was conducted from October 1984 through March 1986 by the Instituto de Investigaciones Médico Sociales. This summary is based on the final report of the study prepared by Dr. René González. Further information is available from the principal investigator, Dr. René González, Director, IIMS, Casilla 4444, Cochabamba, Bolivia, or from Ms. Karen Evalyn Johnson, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

COMMUNITY FINANCING OF PRIMARY HEALTH CARE IN RIO DE JANEIRO



[The following summary is taken in large part from an article prepared by PRICOR researchers and staff for a 1987 issue of the international journal, Socio-Economic Planning Sciences and appears here with permission of the journal's editors.]

Recognizing that international resources cannot and should not support primary health care (PHC) programs indefinitely and that the community itself represents an important potential source of health care financing, the Centro de Pesquisas de Assistência Integrada à Mulher e à Criança (CPAIMC) of Brazil undertook an operations research project to develop community financing (CF) mechanisms. The objective of this study was to identify and test alternative strategies for community financing of PHC services.

The project was conducted in ten low-income communities of Rio de Janeiro from 1983 to 1986.

BACKGROUND

Brazil, with a population of 135 million, is the largest nation in Latin America and the sixth most populous country in the world. Despite high levels of industrial and urban development, Brazil still faces large and difficult problems in extending primary health care to its vast city slums and rural areas. Major health problems, such as lack of adequate water and sewage systems, high infant mortality, low life expectancy, prevalence of vaccine preventable diseases, and diarrheal dehydration exist in many regions. Health services are provided by the private sector, the official public sector, and the social security system, but these services do not reach an estimated 20 percent of the population (approximately 27 million people). Resources for health care are limited and are concentrated on individual, highly technological, hospital-oriented, curative medicine.

CPAIMC, a private, nonprofit organization based in Rio de Janeiro, Brazil, concentrates its efforts on promoting PHC, particularly for women and children, through training and the development of appropriate technology. CPAIMC provides both community-level and hospital-based health services. In

low-income neighborhoods of Rio de Janeiro, CPAIMC operates a large network of PHC units and miniposts where 90 percent of all care is provided by technical and auxiliary nurses. In 1978, when CPAIMC initiated community-level PHC, services were offered free of charge thanks to the availability of funds from international donors. By 1983, having been successful in introducing new concepts in PHC delivery to low-income communities, CPAIMC decided that community resources could be tapped to support the recurrent costs of providing PHC.

ANALYZING COMMUNITY FINANCING ALTERNATIVES

The CPAIMC researchers initially set out to analyze the community financing problem. Since they planned to use a series of preference and interaction matrices to identify the best CF schemes, it was necessary to find out what information they would need to complete the matrices. Members of the upper- and mid-level CPAIMC management, CPAIMC service providers and supervisors, and the research staff used nominal group technique to generate lists of possible community financing schemes and factors (including constraints) that might influence the implementation of these schemes. The Delphi technique was subsequently used to order the schemes in terms of preference, and the constraints in terms of their importance. Seventeen possible community financing schemes were thus generated in the general categories of: service fees, drugs sales, personal prepayment, and ad hoc contributions/fundraising by community organizations. Factors that would positively or negatively influence the success of the community financing schemes, included: the availability of drugs, the availability of equipment, the cost of mobilizing the CF scheme, the value of PHC vs. other health care services, competition from other health care providers, perceived importance of physician-provided vs. nonphysician-provided care, self-medication habits of community members, awareness of CPAIMC services, relationships between CPAIMC staff and clients, consumers' ability and willingness to pay, degree of community organization, and political problems.

Using these lists of schemes and constraints, the group constructed a preliminary matrix and identified major information gaps. During these initial meetings, the participants also identified four groups who should participate in decisionmaking: community residents, community leaders, CPAIMC service providers, and a representative group of CPAIMC managers, supervisors, and researchers called the "Group of Ten." The participants decided that more information was needed from the community residents, the community leaders, and the service providers. It was decided that data would be collected through two surveys: one of the community and one of CPAIMC health care providers.

The community survey was conducted because the research staff needed (1) data to complete preference and impact interaction matrices on behalf of the community members and (2) baseline indicators to use later to compare with field test indicators. The survey was conducted in 10 low-income communities in Rio de Janeiro and covered 2,844 households. Interviewers asked questions

regarding households' general socioeconomic characteristics, their use of CPAIMC services, and, for children under five and women aged 15-49, their sources of health care and their use of and payment for this care. The smaller survey of all physicians, nurses, and promoters assigned to the 10 study communities elicited similar information from the providers' perspective. Community leaders interviewed gave opinions and suggestions regarding community financing of PHC.

These surveys and discussions provided useful information on community use of and payment for health services. Most households (93 percent) reported that at least one household member was covered by public sector health insurance. Government health care facilities were the major source of health care for women aged 15-49 and children under five. Preventive health care services were sought for 33 percent of the children and 46 percent of the women at their most recent health care visit.

Survey results were useful in determining what kinds of health care payments people were currently making and, therefore, what kinds of services people might agree to pay for at CPAIMC facilities. Payment for health care was made for only 6 percent of the children and 8 percent of the women, based on most recent visits. About a fifth (22 percent) of the women whose most recent visit was for dental care paid for that care, while 17 percent paid for injections and 7 percent paid for gynecological care. Most people did not pay for popular child care services such as vaccinations, pediatric care, well-child care, and emergency care, as they were available free in public health facilities. Injections and dental care were more likely to be paid for since these services were not always available in public health centers. Household members also paid for drugs and contraceptives from pharmacies.

DEVELOPING COMMUNITY FINANCING STRATEGIES

Members of the relevant decision groups used preference and impact interaction matrices to develop solutions to the problem of PHC financing. The interaction matrices were used (1) to determine the preferred financing schemes for all decision groups in each of the study communities and (2) to identify the existence and strength of relationships between the 17 financing schemes and the system objective (PHC coverage), and between the financing schemes and the 13 constraints. The "best" schemes were identified through systematic analysis of these matrices.

For each community and for each relevant decision group member, three matrices were prepared: (1) a square preference matrix listing the 17 CF schemes as rows and the same 17 as columns, (2) an impact interaction matrix listing the 17 CF schemes as rows and the 13 constraints as columns, and (3) an impact interaction matrix listing the CF schemes as rows and the system objective (PHC coverage) as the sole column. These matrices were completed by all members of the Group of Ten and by all CPAIMC supervisors and service providers working in nine communities. (One community was excluded from the study during problem analysis.) Consumers were represented by the community survey data from which the research staff made inferences. The research staff conducted in-depth discussions with community leaders and reported the results

of these discussions to the Group of Ten who incorporated the opinions of community leaders into their matrix entries.

Each financing scheme's final ranking in each community was determined from tabulation of these matrices. These rankings were used to construct community financing strategies (mixtures of several schemes) specific to each community. This was accomplished by considering each scheme as a component to be linked with other schemes to create a CF strategy. Beginning with the scheme ranked the highest, schemes were added to the strategy by moving down the ranking until the next scheme appeared to conflict with previous components. (For example, prepayment for services and service fees could not be implemented at the same service site.) The strategies chosen for the individual communities consisted of one to seven schemes. For example, in Vila Aliança the strategy included payment for selected services, payment for selected visits, sale of prescribed drugs, registration fees, and contribution by the community organization of labor to clean and maintain the women's health care unit and of funds to pay the utility bills for the unit. In Prazeres, the only scheme chosen was the creation of a "Friends of the Community" group to provide regular contributions from upper- and middle-class residents to support the MCH/FP unit. (See Table 1 for the CF strategies selected by each of the nine communities.)

Table 1
Final Schemes Composing the PHC Community Financing
Strategies to be Implemented in Each Community

PHC Communities Financing Schemes	Mini-Posts			Women's Health Care Units				MCH/FP Units	
	Senador Camará	Borel	Dendê	Parada de Lucas	Vila Aliança	Vila Kennedy	Barreira do Vasco	Bispo	Prazeres
Payment for selected services	x			x	x	x	x	x	
Payment for selected visits			x		x	x	x		
Sale of prescribed drugs	x	x		x	x	x	x		
Sale of prescribed & non-prescribed drugs & contraceptives			x						
Registration fees	x		x	x	x	x		x	
Community fundraising "Friends of the Community"		x						x	
Cleaning of U/MP		x	x	x	x	x	x		x
Payment of U/MP utility bills		x	x	x	x	x	x		
Physical maintenance of U/MP		x	x	x	x	x	x		
Provision of office & clinical supplies				x					

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Refinement of Selected Schemes and Strategies

For schemes involving payment for services, visits, and/or drugs, group discussions identified which services, visits, and drugs would be sold, and their prices. For example, in Vila Kennedy charges were established for all family planning visits, Pap smears, injections, blood pressure checks, first aid, pregnancy tests, antihelminth administrations, registration for women, selected drugs, and contraceptives. These decisions were based in part on the results of the household survey. The Group of Ten attempted to include in their selection of visits/services to be paid for only those the community members were accustomed to paying for (at other health facilities). They felt that establishing charges for services usually provided free would likely lead to a decline in utilization of CPAIMC services. In determining which drugs to make available and charge for, the Group took into account types and frequency of illnesses in the community. Decisions about which types of contraceptives to make available for sale took into account patterns of usage of different brands available from pharmacies or other institutions providing family planning services.

Determination of the price scale was based largely on intuitive judgment and the following criteria:

1. Prices should not be lower than the actual service cost.
2. Prices should not be higher than market prices in neighboring communities.
3. Prices should be affordable for people in the low-income bracket.
4. The sum of the prices of the most commonly used services in a single visit should be affordable to the majority of clients.
5. Prices should be increased every four months, based upon rises in costs and the cumulative inflation rate since prices were last readjusted, and also upon increases in the government-legislated minimum wage.

Credit, discounts, and exemptions were allowed for those unable to pay.

The researchers also reviewed the strategies that did not include payment for services, visits, and/or drugs and reconsidered them in relation to each community. For example, the methodology did not lead to the recommendation of ad hoc community fundraising in any community. However, the group decided to include this scheme in the recommended strategies for the communities of Borel and Bispo. Borel possessed a well-organized community association with strong leadership, and Bispo had successfully used this method of fundraising in the past.

Once final details of each strategy were defined, they were reviewed in discussions between community leaders and representatives of the Group of Ten. Schemes or elements of schemes not considered acceptable to the leaders were subsequently deleted from the strategy. Community leaders were asked to sign written agreements detailing the responsibilities of both CPAIMC and the

community in implementing the CF strategy. Only three leaders actually signed the agreement prior to scheme implementation, but most of the leaders had signed by the end of the PRICOR study.

IMPLEMENTING AND EVALUATING COMMUNITY FINANCING STRATEGIES

Before the field test of the community financing strategies could begin, preparation of the service sites, staff, work methods, and information systems was necessary. Preparation of the service sites included procurement of supplies and materials, provision of cubicles to ensure privacy in gynecological examinations, and installation of shelves and cupboards for drug storage. A few days of training were provided for technical and auxiliary nurses to introduce them to the new services and administrative responsibilities they would have when the new strategies were implemented. To overcome delays in Pap smear testing, CPAIMC instituted new work methods in the department responsible for this service. The research team also developed information systems for collecting, tabulating, reporting, and monitoring revenue and costs.

CF strategies were implemented in the nine study communities and then systematically evaluated. In six of the communities, the field test was conducted over a nine month period, from April 1 to December 31, 1985. In the remaining three communities, the field test began earlier and ran a full 18 months, from July 1984 to December 1985. This methodological error occurred because of a supervisory problem and was compensated for during the evaluation.

During the implementation period, CPAIMC staff and researchers spent considerable time working with communities and health workers. To publicize the new services and charges, CPAIMC intensified their usual promotional efforts. During community visits, researchers made personal contacts with residents, distributed leaflets describing the services, and placed banners in public places. Members of the research team made monthly supervisory visits to the units and miniposts (U/MPs) that were testing the financing strategies. The purposes of these visits were to monitor the activities of the U/MP staff and to clarify any doubts about policies and procedures. Three meetings with service supervisors were held during the implementation period to discuss problems encountered and to suggest possible solutions.

CPAIMC staff members normally responsible for cost control at the units and miniposts reported the direct, indirect, and total costs of each unit and minipost to a research assistant each month of the field test. All cost and revenue data were recorded in cruzeiros, the Brazilian currency.

The evaluation of each community financing strategy was based on three indicators: (1) ability to generate revenue to cover PHC costs, (2) effect on service utilization, and (3) effect on service coverage.

Revenue Generation and PHC Cost Coverage

The evaluation of revenue generation and PHC cost coverage was carried out using a quasi-experimental design and the post-test only method. The experimental group consisted of the nine units and miniposts included in the

study, and the control group consisted of other CPAIMC units and miniposts that implemented PHC community financing strategies independent of the PRICOR study during the field test period. "Proportion of total PHC costs covered by the revenue generated" was the indicator selected as the principal measure of performance to be compared among the strategies. The costs of providing care at the U/MPs were defined as "direct" (all costs for personnel, drugs, and supplies, as well as other general expenses such as water, electricity, maintenance, and transportation); "indirect" (costs related to program management and administration, training, and evaluation); and "total" (sum of direct and indirect).

The mean monthly revenue generated by the schemes over the nine month period of the field test varied significantly among the nine communities, ranging from US\$ 4 to US\$ 121. The strategy that generated the most revenue was the one implemented at the women's health care unit in Barreiro do Vasco. This strategy included charging for selected services (Pap smears, pregnancy tests, blood pressure checks, injections, first aid, administration of antihelminths, and laboratory exams); charging for selected visits (all physician visits); and charging for drugs prescribed at the unit. The strategy that generated the least revenue was the one in operation at the minipost in Borel, which consisted of charging only for selected contraceptives. The actual revenue generated was compared with the potential revenue that could have been collected if the strategies had not allowed for discounts, exemptions, and credit for those unable to pay. With the exception of one community, no significant differences were found between the actual and potential amounts.

The costs of providing PHC also varied among the study units and miniposts. For the nine month period, mean monthly costs ranged from US\$ 457 at the minipost in Borel to US\$ 1,210 at the MCH/FP unit in Prazeres. The researchers calculated that the three most successful strategies (in terms of PHC cost coverage) were able to cover approximately 11 percent of total (direct plus indirect) costs of service provision. The most successful CF strategies covered 20 percent of the direct costs of service provision. (See Table 2 for the proportion of total and direct PHC costs covered by the revenue generated from the CF strategies.) In general, most experimental (PRICOR study) communities, which implemented a variety of financing schemes, were more successful in covering a greater proportion of PHC costs with the revenue generated than the control (non-study) communities, whose strategies were limited to charging fees for registration, Pap smears, and contraceptives.

The specific CF schemes that generated the largest proportion of total revenue in all communities combined were payment for selected services and sale of prescribed drugs and contraceptives. (See Table 3 for the rank order of each CF scheme in each community according to the proportion of total revenue generated.) The scheme involving payment for selected services generated from 49 to 72 percent of all revenue in communities where the scheme was implemented. This scheme also covered the largest proportion of PHC costs in those communities. The scheme components that generated the most revenue were charges for Pap smears, contraceptive sales, physician visits, and drugs, in that order. The same components covered the highest proportion of total PHC costs. The proportion of total revenue generated by Pap smear fees ranged from 20 to 72 percent.

The lowest proportion of total revenue was generated by the scheme involving payment for selected visits, which ranged from 5 to 17 percent of all revenue in those communities using the scheme. The components of this scheme which covered the least proportion of total costs were administration of antihelminths, blood pressure checks, injections, and first aid.

Strategies in six of the nine U/MPs involved indirect means of financing not reflected in the preceding calculations; they included community inputs of labor and materials and community payment of utility bills. Certain of these schemes were successfully implemented during the field test period, some were partially implemented, and others not at all. Payment of U/MP utility bills appeared to be the scheme most often successful. In Borel and Barreiro do Vasco all these schemes were successful, while in the other four communities the outcome was mixed.

Table 2
Proportion of Total and Direct PHC Costs Covered by
Revenue Generated from Community Financing Strategies
April-December 1985

PHC Revenue & Costs in US\$	Mini-Posts			Women's Health Care Units				MCH/FP Units	
	Senador Camarã	Borel	Dendê	Parada de Lucas	Vila Aliança	Vila Kennedy	Barreira do Vasco	Bispo	Prazeres
Total Revenue	478	37	168	249	812	801	1,087	321	200
Total Direct Costs ¹	2,385	2,383	3,745	2,702	4,086	5,116	5,432	5,645	6,414
Total Costs ²	4,370	4,110	6,390	4,999	7,477	9,318	9,685	9,537	10,888
Proportion of Costs Covered by Revenue ³									
Direct Costs (%)	20.0	1.6	4.5	9.2	19.9	15.7	20.0	5.7	3.1
Total Costs (%)	10.9	.9	2.6	5.0	10.9	8.6	11.2	3.4	1.8

¹ Direct costs include personnel, medicines and supplies and general administrative expenses, such as utilities, rent, maintenance, transportation, food, etc.

² Total costs include direct costs plus indirect costs.

³ In this and other tables proportions were calculated utilizing revenue and cost data in cruzeiros and may not equal exact proportions calculated in US dollars due to currency conversion and rounding.

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Table 3
Rank Order of PHC Community Financing Schemes According to the
Proportion of Total Revenue Generated by each Scheme

PHC Community Financing Scheme	Mini-Posts			Women's Health Care Units				MCH/FP Units		All Service Sites
	Senador Camará	Borel	Dendê	Parada de Lucas	Vila Aliança	Vila Kennedy	Barreira do Vasco	Bispo	Prazeres	
Payment for selected services	1	*	*	1	1	1	1	1	1	1
Sale of prescribed drugs and contraceptives	2	1	*	2	2	2	2	*	*	2
Registration fees	3	*	2	3	3	3	*	3	*	3
Community fundraising ¹	4	**	*	*	*	*	*	2	3	4
Payment for selected visits	*	*	3	*	4	4	3	*	*	5
User contributions ²	*	2	4	4	5	5	4	*	2	6
Sale of prescribed and non-prescribed drugs and contraceptives	*	*	1	*	*	*	*	*	*	NR ³
"Friends of the Community"	*	*	*	*	*	*	*	*	1	NR ³
Number of schemes	(4)	(3)	(4)	(4)	(5)	(5)	(4)	(3)	(3)	(8)

Note: The schemes are ranked from the highest to the lowest proportion of total revenue generated (i.e. "1" is the scheme that generated the highest proportion of total revenue).

* Scheme was not part of the PHC community financing strategy.

¹ Community fundraising activities were part of the financing strategy in Bispo and Borel but were also conducted in Senador Camará and Prazeres. No activities were conducted in Borel.

² User contributions were part of the financing strategies in Prazeres and Dendê but also occurred in other communities.

³ Schemes were not ranked (NR) since each was implemented in only one community.

** Scheme was part of the PHC community financing strategy but no revenue was generated.

PHC Service Utilization

To evaluate of the effects of CF strategy implementation on PHC service utilization, the study team used a quasi-experimental design based on a time-series analysis. Data from the existing CPAIMC microcomputer-based information system was used to identify pre-implementation utilization trends for 13 variables (e.g., total number of health care visits, number of initial visits for women, number of Pap smears, etc.). This was done prior to field testing by fitting a linear regression line to monthly values. The pre-implementation period considered was from 1982 to 1985; however, where there had been extreme fluctuations upwards (due to promotional activities) or downwards (due to closure of facilities, rain, or community unrest), only the interval following the major irregularity was used. (In one community, Dendê, analysis was not possible due to an extreme fluctuation immediately before field testing.) The trend line was used to make projections for the implementation period itself. The two-tailed T-test was used to compare the mean monthly number of observed visits for each variable with the mean monthly number of projected visits for each variable. This variable-by-variable analysis helped determine whether implementation remained stable, decreased, or increased following implementation of the CF strategies.

Trends in total number of visits were different in each unit and minipost. In six of eight service sites, the trend in total number of visits remained unaltered, while in two of the sites it decreased significantly. For all variables combined, apart from the total number of visits, significant decreases in utilization occurred more often than did no significant changes in utilization. Significant increases in utilization were few.

Only one association appears to exist between individual financing schemes and changes in utilization trends. In all five units where registration and Pap smear fees were charged for, the number of initial visits for women decreased significantly.

PHC Service Coverage

A nonexperimental design was used to measure PHC service coverage before and after implementation of the CF strategies. Coverage was defined as the proportions of women aged 15-49 and children aged 0-4 years who received care at the CPAIMC unit/minipost in the previous six months. The research staff used two community surveys to measure coverage. The baseline community survey was conducted from November to December 1983 as a part of the problem analysis phase of the research. A final survey was conducted in November and December 1985 during the final months of the field test. The respondents to this survey were 781 women and 248 children, randomly chosen from those persons included in the original survey. In the second survey, considerable difficulties were encountered in locating the women and children who had been interviewed previously. To prevent bias in making comparisons between the two surveys, age distributions in the two surveys were compared and analyses presented only for communities where age distributions were similar.

In the four communities where valid comparisons for coverage of women were possible, coverage increased in two communities and declined in two. For children, coverage rose in all four communities for which valid comparisons are possible.

Community Awareness

During the last community survey, information was also collected from all households regarding their knowledge of CPAIMC services, their knowledge of the CF schemes, and their opinions on PHC community financing. Knowledge of the existence of the CPAIMC unit or minipost in each community was high. In all communities combined, fully 82 percent knew of the service site. Knowledge of whether fees were charged for services or commodities was, however, quite low. In the eight communities where strategies involved personal service fees, only 38 percent of the female respondents knew that fees were charged for some services for women, and only 34 percent of the adult respondents knew that fees were charged for some services for children. Most respondents (60 percent) did not know who was responsible for covering the costs of the CPAIMC units and miniposts. The respondents were asked if charges for services or commodities prevented them or the community in general from using health care services. Nearly three-fourths of the respondents affirmed that charging for services does not keep them from using services for

themselves or their families. More than one-half, however, stated that charging for services does impede service utilization for the community at large. Fully 65 percent of the respondents who knew of the CPAIMC service site in their respective communities stated that community residents should help maintain the CPAIMC unit/minipost.

DISCUSSION AND CONCLUSIONS

The CPAIMC operations research project resulted in several important findings relating to community financing of primary health care.

- Residents of low-income communities served by CPAIMC in Rio de Janeiro are willing to participate in the financing of PHC. This was confirmed during the final community survey, when nearly two-thirds of all women interviewed who knew of the CPAIMC service site stated that community residents should help cover the costs of community-level PHC.
- Residents of low-income communities in Rio de Janeiro are able to pay for PHC services and commodities. Of 13,040 health care visits during the period of the field test, 55 percent involved payment of some kind, and of these, 89 percent were paid in full.
- Implementation of PHC community financing strategies is not unconditionally associated with consequent reductions in overall service utilization, as measured by the total number of health care visits. In the majority of communities there was not a significant reduction in trends in the total number of visits following implementation; in the remainder, there was a significant reduction.
- No significant improprieties resulted from PHC community financing. Revenue was collected daily in nine communities over a nine month period and there was only one incident of missing funds.
- The revenue generated by the CF strategies covered a modest share of the total costs of PHC provision. The highest proportion of direct PHC costs covered was 20 percent, which occurred in three of the nine communities.
- The PHC community financing scheme that covered the largest proportion of total PHC costs was payment for selected services. The service and commodity fees that contributed the largest share of the revenue and covered the greatest proportion of PHC costs were for Pap smears, contraceptives, physician visits, and drugs.

After examining the findings, the researchers asked themselves why there was such variation among communities in the proportion of total PHC costs covered—from 20 percent in Barreiro do Vasco to 1.6 percent in Borel. And why did the "best" strategy cover only 20 percent of direct costs? To answer these questions the team reviewed the research steps and concluded that the community financing problem had not been sufficiently analyzed. The fact that maximization of the revenue-generating potential of the financing schemes was

not included in the solution objective explains in great part why the strategies implemented were not more successful in generating revenue. The lack of appropriate decision models for determining which services and commodities were to be charged for, and their prices, was thought to be responsible for the low proportion of PHC costs covered and the variation between communities. These conclusions were confirmed by several different analyses and will help CPAIMC design and refine future community financing schemes.

The researchers made several recommendations to the CPAIMC executive director and top level management. They recommended that financing schemes that covered the largest proportion of PHC costs should be replicated in other CPAIMC units and miniposts. To maximize revenue-generating potential of the U/MPs, researchers also recommended that an operations research (OR) approach be taken to determine the mix of services and commodities to be charged for and their optimal prices. They also recommended the development of an appropriate monitoring and evaluation system for CF schemes. (The system used for this project was considered too detailed and cumbersome for everyday use.) Lastly, the researchers recommended that CPAIMC continue to explore new alternatives for community financing using OR decision models.

* * *

This study was conducted from July 1983 through March 1986 by the Centro de Pesquisas de Assistência Integrada à Mulher e à Criança (CPAIMC). This summary is based on a final report of the study prepared by Karen Johnson Lassner, Beatriz B. Collere Hanff, Glaucia Maria Bon, Magda Soares Smarzaró, and Luiz Claudio de Souza Benguigui. Further information is available from the principal investigator, Ms. Karen Johnson Lassner, CPAIMC, Avenida Presidente Vargas No. 2863, Rio de Janeiro, Brazil, or from Dr. David Nicholas, PRICOR study monitor (Chevy Chase).

Study Summary

MOBILIZING TRADITIONAL HEALERS IN BRAZIL TO DELIVER ORT



In northeastern Brazil diarrhea is a major source of morbidity and mortality among infants and small children. In rural areas, traditional healers have long been the first source of medical care for children suffering from diarrhea and other illnesses. The healers are the critical frontline caretakers, available to the community 24 hours a day, and work not for monetary incentives but from a desire to serve the community. From March 1984 through February 1986, faculty from the Federal University of Ceara and the University of Virginia conducted an operations research study to determine how best to mobilize traditional healers to clinically manage diarrheal illnesses and to deliver oral rehydration therapy (ORT). The study, which sought to identify and

develop solutions for the various operational problems in providing ORT through traditional healers, was conducted in Pacatuba, a rural community near Fortaleza, the capital of the State of Ceara.

BACKGROUND

The community of Pacatuba, with its population of 7,000, is located only 32 km from the burgeoning city of Fortaleza (pop 1,800,000). While its residents are influenced by and dependent upon the nearby state capital, the population includes marked socioeconomic differences as not all have equally reaped the benefits of rapid socio-cultural change. The most successful families live in the Centro (town center), where water is piped directly into homes, and flush toilets provide a sanitary home environment. In view of this wealth, but just outside its reach, live the migrant wage laborers of the neighborhood of Matadouro. Drinking water is piped into a community faucet from an unprotected reservoir in the mountains, and families defecate into crude pits dug in their backyards. The poorest families in Pacatuba live in the isolated neighborhood of Sao Joao working as subsistence farmers or sharecroppers under large landholders. What human excrement is not eaten by pigs is washed into a nearby stream where they bathe, wash clothes, and collect drinking water.

Previous studies carried out in Pacatuba indicated that the leading cause of childhood death is diarrhea and dehydration. Residents readily identify diarrhea and dehydration as symptoms of various folk illnesses and as a common

cause of child illness and death. Thirty percent of Pacatuba's children are moderately to severely malnourished. Breastfeeding is limited or of short duration, and growing numbers of babies are not breastfed at all.

Formal health care in Pacatuba consists mostly of services provided by the State Secretariate of Health which maintains a health center that serves as the principal source of medical care for local residents as well as for the entire county. Although four physicians are paid by the state to attend the poor, only one physician is full time in Pacatuba for a total population of 7,000. He attends four mornings per week for patients with social security cards (for which only salaried employees are eligible). Of a total of 30 consults available each week, only 10 are earmarked for the poor and are paid for by the mayor. These free services are restricted to three days a week, and patients must wait in line for three to six hours. No emergency services or clinics are available in the afternoons or evenings. Outside the formal health care system in Pacatuba exists a widely accepted popular health system dominated by traditional healers. At least three types of indigenous healers treat children with diarrhea and other illnesses: the rezadeira or rezador (prayer healer); the raizeiro (herbalist); and the Pae or Mae de Santo (voodoo healer). These "doctors of the poor" differ significantly in their training, powers, and healing ways. Rezadeiras(-dores), the most common type of lay healers in Pacatuba, are deeply religious women and men who are endowed with a special healing force that they receive either directly from God or inherit from an elderly healer shortly before his or her death. Most prayer healers are illiterate and must learn their healing skills by imitating the practicing healer with whom they associate, by watching, reciting prayers, and learning to prepare home remedies under the expert eye of their mentor.

Unlike the prayer healers, the raizeiros de-emphasize the supernatural role in illness. As herbalists, they cure with chemical substances extracted from medicinal plants and, more recently, with modern pharmaceuticals. The Pae or Mae de Santo, head of the religious sect Umbanda -- a voodoo-like religious syncretization of ancient African, Brazilian, and Catholic beliefs -- is distinguished from the other traditional healers in several important ways. As a spirit medium, he or she has direct contact, while in a trance, with supernatural beings from whom he or she receives the power to heal. This voodoo healer, unlike the prayer healers or herbalists, also has the power to cause harm in the form of sickness and even death. Because of their tremendous supernatural power, flirtation with the underworld, and demands for food and money offerings, they are feared, respected, and kept at a social distance. The Pae and Mae de Santo are often unacceptable to more pious clients.

The healers' skills are in particular demand by village parents since, according to popular thought, diarrhea and dehydration are symptoms of a number of folk-defined illnesses including 'evil eye' (quebranto, mal olhado), 'fright disease' (susto), 'spirit intrusion' (sombra, encosto), 'intestinal heat' (quintura do intestino), and 'fallen fontanelle' (caida da moleira). An envious glance at a beautiful child by neighbors, friends, or strangers; a sudden, unexpected fright from, say, a passing train or barking dog; intrusion of a dead person's spirit into a child's body; or heat that accumulates inside the intestine and upsets the hot-cold humoral equilibrium, can all result in diarrhea, just as a fall or blow on the head is believed to cause the child's

fontanelle to sink into its skull, a signal of grave illness and almost certain death.

While the traditional healing network is unknown to the biomedical community, the healers are very much known within the community. In Pacatuba, the ratio of popular healers to patients is 1:150, whereas the ratio of physicians to patients is (theoretically) 1:2000. While all of the biomedical services are located in the center of town, where infants age 7-12 months have less than two episodes of diarrhea per person per year, 71 percent of the traditional healers (15 rezadeiras and 7 Paes de Santo) live and practice in the poor rural periphery where the diarrhea attack rate for infants of the same age is greater than nine episodes per child per year.

Only 29 percent of the lay healers (4 rezadeiras, 2 folk pharmacists, 1 preacher, 1 herbalist and 1 "lay doctor") are concentrated in the center of town.

THE RESEARCH APPROACH

Faced with the limitations of the formal health care system and the pervasive influence of traditional medicine, the researchers sought to develop a strategy for involving Pacatuba's traditional healers in the delivery of ORT that would be low cost, acceptable and accessible to poor mothers, and replicable in other Brazilian communities.

To understand the social and cultural context in which the traditional healers strategy would function, the researchers carried out a baseline survey of half of the households in Pacatuba and conducted a series of in-depth diarrheal illness episode interviews to determine community knowledge, attitudes and practices regarding diarrhea. The household survey revealed that 77 percent of mothers, representing all socioeconomic strata, sought the help of popular healers for their child's diarrhea, which they generally thought of as a symptom of various folk-defined illnesses. Only 17.6 percent sought physicians as the first line provider. Village mothers consulted traditional healers an average of only 1.2 days after the onset of their children's illnesses, whereas care at urban rehydration centers or hospitals was sought relatively late in the illness (9.4 and 12.56 days after onset, respectively). Traditional healers were the frontline care providers in urban neighborhoods as well. Of 62 poor children admitted to an urban rehydration center in Fortaleza, 91.9 percent had already been treated by a traditional healer. The survey also revealed that the official medical system is sorely inadequate in caring for poor children with diarrhea, with long waits, rationed appointments, expensive and improperly prescribed drugs, and poor communication.

The research approach to identify the optimal ORT delivery structure within the popular healing system was a flexible and iterative process of discussion, identification of alternatives, and testing and refinement of solutions that involved the researchers, traditional healers, and community members. The division between solution development and testing blurred, as approaches were tested and reviewed, often leading to identification of additional problems as well as new solutions. To identify and discuss alternatives, informal

meetings were conducted in the community with traditional healers, mothers, and sometimes children, with active dialogue between all participants. Verbal solicitation of each healer's opinion and nose counts replaced formal group discussion processes, and through the process, utmost respect was shown for the healers' traditional wisdom.

Traditional healers in Pacatuba were first identified through the household survey and by healers already known to the researchers. The healers identified were invited to an initial meeting with the researchers to discuss their ideas about the causes and treatment of a large number of popular illnesses related to diarrhea and dehydration. The lively discussion and enthusiastic response of the healers resulted in their agreement to participate in the project.

A series of 13 meetings were held between the researchers and traditional healers during which problems such as how to integrate ORT into the healers' rituals, what oral rehydration solution should be utilized, how to teach healers to correctly prepare and administer ORS, and where the ORS should be prepared and delivered were addressed. The meetings thus served as both training and problem-solving sessions.

The traditional healers identified a wide range of folk illnesses which threaten a child's life: evil eye, fright disease, spirit intrusion, intestinal heat, fallen fontanelle, illness of the child, and teething. Through discussion of these illnesses it was revealed that diarrhea is a symptom of all of them, and that diarrhea can kill, while "dry meat" and "angel eyes" are both symptoms of severe dehydration. Healers learned to associate these illnesses with dehydration and thus, with the need for ORT.

To help stimulate discussions and generate ideas, healers were asked to bring their favorite treatment for a particular condition (i.e., "dry meat" and diarrhea) to one of the meetings. A large table was set up to display the remedies which included coconut, rice water, a wide array of medicinal teas, packaged ORT, and items supplied by the researchers, including pharmaceuticals and expensive diluted ORT. In turn, the merits of each was discussed. The consensus: herbal remedies work, but a child with "dry meat" and "angel eyes" needs ORT too.

While the traditional healers agreed that sick children needed the "things" in ORT, and since the commercially prepared ORT was expensive and only available by prescription, they decided that the children could get these "things" in an ORT solution made at home for free, like teas. A series of "kitchen sessions" gave birth to the traditional healers' homemade ORT solution. Each healer was asked to bring the kitchen utensils, bottles, containers, and measuring devices they kept on hand; the merits of each were discussed and the bottle cap was selected as the standard for measurement since it was easy to find and available in only one size. The healers were asked to prepare their favorite medicinal tea for diarrhea, then ORT solutions. When the village children taste-tested the mixtures, they clearly preferred the heavily sweetened teas. However, the healers realized that they needed all the ingredients in the ORT solution even if it, like many medicines, did not taste good. The result was that the healers decided to mix homemade ORT with the teas. Not only would the water be boiled and biomedical treatment added, the mixture had the

additional power of the traditional herbal treatment. A final taste test of the "new" ORT met their approval. Although eight caps of sugar provides concentrations approximating the WHO/UNICEF packets, the healers preferred to add seven caps of sugar, because of the magical value seven has in the popular culture. Either measure gave safe electrolyte values, as was determined through laboratory testing, and since "7" was an important number in the culture, the formula with seven capfuls was easy to remember.

Discussions about where supplies could be stored, and where children, especially those who were severely dehydrated, or those whose mothers were working, would be treated and watched afterwards, gave birth to the "curing room". It was decided that these rooms would be located where the healers live, be made of the same materials as their houses (mud and thatch), and be constructed by their neighbors. They would serve as an altar and religious center, as well as an infirmary during the diarrhea season. The ORT could be stored, prepared and administered by the healers, and mothers could be taught there while their children were being treated. Because the healers themselves came from varying socioeconomic levels, no single model of a curing room was appropriate for all. Thus the curing rooms included simple but dignified room additions to healers' homes, modifications to existing rooms, and in some cases, merely the placement of the simple equipment needed to prepare ORS in the healer's home or store.

A process similar to that used for the development of the ORT solution was employed in developing educational materials for use by and with an illiterate population. The researchers worked closely with the traditional healers, presenting materials to them and asking them to "read" aloud what they "saw". Surprisingly, their interpretations were dramatically different from the messages which the researchers intended to put forth. In the discussion meetings, the revised materials, which were redrawn with the assistance of the healers and a local artist, were discussed with the healers and revised again until they were finally agreed upon by all. The messages began with the existing folk medical concepts and built new health information onto these. The graphic presentations were kept simple, incorporating peoples' cognitive forms of organizing and "seeing." Materials were developed depicting the causes of diarrhea, preventive strategies for diarrhea, and the formula for the healers' ORT solution.

During the intervention, some 46 healers were identified and educated about ORT. These included 20 prayer healers (rezadeiras), 7 Afro-Brazilian healers (Umbandistas), 4 spiritists, 3 popular pharmacists, 1 herbalist, 1 popular "doctor", and 10 visiting Protestant prayer healers. However, the core group of healers with whom the researchers worked most closely and who were fully trained and supervised in the delivery of ORT numbered 19.

In-depth interviews were conducted with these 19 healers to assess their knowledge of biomedicine and their attitudes towards working with physicians. In these interviews, the healers expressed a cautiously cooperative and pragmatic attitude towards working with physicians. While most (68 percent) said they would be willing to work with doctors, a large number said they would do so only if certain conditions were met. The traditional healers expressed confidence in their own healing abilities and methods and had a clear sense of their role as well as limits; most firmly believe that there is

a wide array of folk-defined illnesses that can only be cured by traditional healers.

Once the healers had been trained in the preparation, use and administration of ORT, they were visited monthly in their homes, interviewed, observed, and supervised by the researchers. The information obtained during supervision visits included the name of the healer, the date of the visit, a description of the preparation and administration of ORS, of the use of a filter, consumption of sugar and salt, the number of liters of ORS prepared in the previous three day period, and the "conduct" of the healer in treating dehydration and diarrhea. The interview also included questions about the kinds of sicknesses treated without ORS, whether the healer had treated any very sick children, or children who died, and whether the healer used any kinds of medicine, biomedical or traditional, to treat sicknesses. These visits were conducted monthly for ten months.

In the first few months, the major problem noted was with the administration of ORS. While there were no reported problems with the preparation of ORS, many healers attempted to control the dosage and to modify it according to the age of the child. Of the eight age/dosage combinations noted, three formulas administered large volumes, one gave the same volume to all ages, and three formulas severely restricted fluid intake, with the possibility of serious complications for dehydrated children. After three months, no further problems with administration were noted observed.

Other problems noted in the first three months were with the filters (dirty, torn, broken, leaky), supplies (missing filters, no sugar, ants), and curing rooms (wet floors, leaky roofs, moldy walls, untidiness). These problems were all resolved with the exception of an occasional broken filter.

The illnesses which the healers treated without ORS included the ethnomedical complaints of quebranto and mal olhado (evil eye), vento caido (fallen fontanelle), and susto (fright disease). A disturbing finding was that many healers regarded these ethnomedical complaints, which often involved diarrhea and dehydration, as not needing ORS. In addition, four healers stated that only children with little diarrhea needed ORS.

The healers prepared varying amounts of ORS ranging from 0 liters in three days to 18 liters in three days, with an overall average for all months of the project of 4.45 liters in three days.

RESULTS

To assess the effects of the traditional healers' ORT activities on maternal knowledge, attitudes and practices about diarrhea, dehydration and ORT, a post-intervention survey was conducted with the other half of the community that had not been interviewed during the first household survey. Results from the two surveys were compared using chi-squared analysis, and are presented in Table 1.

The findings of the pre- and post-test mothers' surveys revealed that while a large number of mothers had heard of ORT before the intervention (96 percent),

few (3 percent) knew about homemade oral rehydration solution. In the post-intervention survey, 72 percent of mothers knew about home made ORT, with the greatest percentage of mothers who knew how to prepare homemade ORT in the poorest neighborhoods. Of those who reported knowing how to prepare homemade ORT, 96 percent learned it from a traditional healer. Furthermore, the percentage of mothers who knew about the free government (CEME) ORT packets increased from 56 to 75 percent, with the largest increase shown in the poorest mothers. The number of mothers knowing how to prepare the free government (CEME) ORT packets increased among all socioeconomic levels after the intervention with the greatest increase in the poorest neighborhoods (from 55 to 86 percent).

Regarding self-reported use of ORT, the percent of mothers who reported always using ORT when their child had diarrhea increased from 39 to 69 percent. Over half of all mothers reported having used the homemade ORT prepared by traditional healers, with the greatest proportion pertaining to the poorest neighborhoods (62 percent). The use of doctors or pharmacists as the first source of care for children with diarrhea/dehydration did not appreciably change during the intervention period. The proportion of mothers who first sought treatment for their children from a traditional healer remained high, suggesting that beliefs about the causes of diarrhea and in folk medical diagnoses also were not significantly affected by the intervention. The increased use of both the traditional healers' ORT and the CEME packets reduced the use of commercially prepared salt packets by 25 percentage points, with the greatest decline in the poorest neighborhoods (45 percentage points). Prior to the intervention, commercial packets were the type of ORT reported as most frequently used by all socioeconomic levels. In the post-intervention survey, over 40 percent of the poorest families reported homemade ORT as most frequently used, followed by CEME packets.

With regards to the feeding practices for children with diarrhea, the proportion of mothers who believed that breastfeeding should be continued rose from 71 to 92 percent. However, in general infants are weaned very early, especially by the wealthier mothers, and women may not have breastmilk to give during diarrheal attacks, even though they support the idea. The practice of withholding milk during diarrheal episodes decreased by 18 percentage points overall, with the greatest decline in the wealthiest neighborhoods, where children are weaned the earliest. The practice of withholding milk for five or more days decreased by 16 percentage points in the poorest neighborhoods, where children are the most malnourished, and by 10 percentage points overall. Although the post-intervention survey showed that the use of pharmaceuticals to treat diarrhea remains unacceptably high, the project did make inroads into changing the perceived need for drugs to treat children with diarrhea, particularly among the poorest families who are least able to afford expensive and unindicated drugs.

Table 1. Pre- and post-intervention indicators for maternal KAP related to ORT

	Pretest % (n=204)	Posttest % (n=226)	P value
1. Ever heard about ORT	96.1	98.7	NA
2. Familiarity with any type of homemade ORT	2.9	72.0	<0.001
Rice Water	2.5	0.0	
Coconut Water	0.5	0.0	
Homemade ORT	0.0	72.0	
3. Familiar with CEME (government packed) ORT	56.3	75.0	0.001
4. Ever used ORT			<0.05
Always	39.2	68.59	<0.01
Sometimes	49.5	26.99	
Never	11.3	4.42	
5. Belief ORT must be given when diarrhea	84.2	93.0	<0.01
6. Ever used traditional healers' ORT	0.0	54.3	NA
7. Know how to prepare homemade ORT	0.0	28.2	NA
8. Who taught mothers the ORT preparation			NA
Didn't learn		67.72	
Rezadeira		30.95	
Doctor		0.89	
Health Agent		0.44	
9. Know how to prepare CEME ORT	55.4	67.0	<0.01
10. Have sugar in the home	88.7	88.0	<0.05
11. Believe breastfeeding should be continued during diarrhea	71.2	92.0	<0.001

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12. How long milk withheld when diarrhea			
0 days	28.9	46.9	<0.01
1-2 days	22.0	20.7	
3-4 days	30.3	23.4	
5 or more days	18.6	8.8	<0.01
13. Believe diarrhea can be managed with only ORT and dietary interventions	42.6	68.0	<0.001
14. ORT most frequently used			
Pedialyte	33.33	21.72	<0.01
CEME	20.63	26.83	>0.05
Commercial Packets	37.03	11.50	<0.001
Traditional Healers' ORT	0.0	38.65	NA
Don't use	8.99	1.27	
15. Believe pharmaceuticals should be given when child has diarrhea	93.1	72.56	<0.001
16. Believe child with diarrhea must be taken to a Rezadeira	79.4	83.2	>0.05
17. Who is child with diarrhea taken to first Rezadeira	78.7	76.0	>0.05
Mothers/Fathers of Gods	0.0	2.0	NA
Doctor	18.2	17.7	>0.05
Pharmacist	3.0	0.0	NA
18. Believe medicinal teas should be given	76.2	82.7	>0.05

Data on infant and child deaths during 1985, the year in which the program with traditional healers was fully operational, were collected for the purpose of calculating the mortality impact of the intervention. While the population of Pacatuba was not large enough to permit documentation of a reduction in mortality, the researchers did discover that the method of death surveillance led to significantly different statistics on the number of deaths in children

under five. The three methods used - the official death registry, an intensive door-to-door survey, and questioning local grave diggers - led to quite different counts of infant deaths. The most accurate method appears to have been a culturally derived death surveillance network composed of local traditional healers and the grave diggers. While the official registry listed four deaths in 1985 and the door-to-door survey detected six, the healers and grave diggers documented eight deaths. A comparison of the information from all sources revealed that nine deaths had occurred in 1985. This discrepancy suggests that more culturally appropriate death recording methods are needed, and that failure to address this problem could underestimate the Infant Mortality Rate by at least 20 percent.

A cost analysis was carried out at the end of 1985 to determine the financial feasibility of a traditional healer-based ORT program. During the intervention period, the researchers mobilized, fully trained, and supervised some 17 lay healers to routinely deliver ORT. (Over 46 healers were identified in Pacatuba during the intervention period, but not all were fully trained and integrated into the routine delivery of ORT.) Five fully equipped "curing rooms", or popular rehydration units, were constructed, and for 13 healers, an existing room was adapted and equipped for ORT delivery.

In 12 months, traditional healers delivered over 7,400 liters of ORT. The total program cost was calculated at US\$ 4,027.23. Initial investment costs totaled only US\$ 2,959.53; this amount included the training of traditional healers by a nurse, one senior and one junior level physician, supplies, materials to construct and equip the curing rooms, and transportation expenses. Operating expenses for a 15-month period were low, at US\$ 1,067.70. The latter figure includes costs of ongoing supervision of traditional healers by research staff (two physicians and a nurse), and four community research assistants; operating supplies, such as salt, sugar and plastic bags; travel costs of supervisors; and incentives for traditional healers including meeting expenses.

When the cost analysis was broken down by activity, the financial feasibility of such a project, even in economically strapped communities, is clearly demonstrated. Costs of initial training, performed mostly by health professionals, totaled US\$ 870.00. The average cost of constructing a curing room was only US\$ 26.22, due mainly to use of donated labor; and the cost for fully equipping a room for ORT delivery was US\$ 43.15. The average number of liters of oral rehydration solution prepared per month per healer was 36 liters, at a cost of approximately US\$ 0.48 per healer per month for the sugar used, the most costly ingredient.

CONCLUSION

In Northeast Brazil, traditional healers can be effectively mobilized to deliver homemade ORT, building upon rather than trying to change existing popular traditions. The healers have proven capable of preparing safe and effective ORT and conveying the value of this lifesaving intervention to mothers. They significantly increased mothers' knowledge and use of ORT and positively influenced feeding and pharmaceutical use behaviors during diarrheal episodes. An important, unexpected result of the healers' efforts

was to increase the awareness and use of free government ORS packets, as well as to decrease the use of expensive commercial ORT preparations by poor families.

The project has demonstrated that traditional healers can provide a highly accessible, low-cost ORT delivery model that is replicable in other Northeastern Brazilian communities, where their influence is pervasive.

Based on the successful experience with traditional healers in Pacatuba, the use of traditional healers has been incorporated into the design of the VIVA Project, a new large-scale child survival effort funded by Project Hope and AID that is being implemented in 33 counties in the State of Ceara. The VIVA Project, which will cover approximately 500,000 people, has adopted the basic approach developed by the PRICOR-funded researchers, including the educational and teaching materials and ORT preparation methods and measures.

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This study was conducted from March 1984 to February 1986 jointly by researchers from the Federal University of Ceara, Brazil and the Division of Geographic Medicine in the Department of Medicine of the University of Virginia. The research project was directed by Marilyn K. Nations, Ph.D., and Maria Auxiliadora de Souza, MD, Ph.D., who oversaw all technical aspects as well as much of the day to day functioning. The field activities were coordinated by Luciano Correia, MD, and Diana Nunes, RN. Further information is available from the principal investigators, Dr. Marilyn K. Nations, Box 485, School of Medicine, University of Virginia Medical School, Charlottesville, VA 22908, and Dr. Maria Auxiliadora de Souza, Caixa Postal 1674, Aldeota 60.000 Fortaleza, Ceara, Brazil, or from Dr. David Nicholas, PRICOR study monitor (Chevy Chase).

Study Summary

DEVELOPING A REVOLVING DRUG FUND FOR DOMINICA



In spite of severe economic hardships, the Dominica Ministry of Health has been quite successful in delivering health services to its population, particularly with the expansion of primary health care. The decentralization of the health care system has improved access to health care while the training of health workers has improved the quantity and quality of health care services. However, the full effectiveness of these improvements have been constrained by an inadequate system for the distribution of pharmaceuticals and medical supplies. To increase the availability of essential drugs and medical supplies, and at the same time

decrease the costs to the government of supplying those items, the Ministry of Health proposed the establishment of a national Revolving Drug Fund (RDF).

From April 1983 through March 1986, Management Sciences for Health (MSH) and the Dominica Ministry of Health (MOH) conducted an operations research study which first identified key operational issues related to the design and implementation of the revolving drug fund. They then tested new RDF components designed to address those issues.

THE HEALTH SERVICE DELIVERY SYSTEM

The Five-Year National Health Plan (1982-1987) describes a primary health care (PHC) strategy which would provide for the extension of health services coverage and the establishment of a national system for financing the health sector. One key feature of this strategy has been a major decentralization of the health care system. Seven health districts have been created, each one headed by a resident District Medical Officer. Health care facilities in each district include PHC units which provide basic services to villages as small as 600 in population, and a district health center which provides PHC services to a population of 2-3000, with higher level services to the total population in the district, usually 6-8000 people. Princess Margaret Hospital is the only major inpatient facility in the country and provides a broad range of specialized services. Although 13-14 percent of the government's total expenditures are allocated for health care, less than 15 percent of the health budget was allocated for drugs and supplies. Furthermore, the government owed over ECS 400,000 to suppliers, resulting in delayed shipments of goods from

suppliers, stockouts at the Central Medical Stores (CMS), and a lack of drugs and supplies at the local level.

In 1982, USAID undertook a study of the financial status of the health care system in Dominica. The study found that while patients were not yet paying for health services through Government facilities in Dominica, they were spending nearly as much as the government for drugs and doctors' fees through the private sector. This suggested that they might be willing, and able, to contribute towards health services in the public sector. The study also predicted that the new PHC strategy would increase the demand for health services, particularly for pharmaceuticals, thereby exacerbating the Government's financial difficulties even further unless new initiatives were explored. Following this study, the MOH decided to establish a revolving drug fund to bring financial accountability to the drug supply system and at the same time, to increase the supply of pharmaceuticals available for health service delivery. It was expected that the RDF would increase the volume of drugs and supplies available to the districts, decrease the financial burden on the Government through bulk rate purchasing and consumer cost-sharing, and increase cost-consciousness among consumers.

METHODOLOGY

The Ministry of Health and Management Sciences for Health together felt that the application of operations research (OR) techniques could assist them in reaching that goal by systematically identifying and analyzing the operational issues and problems, formalizing the logical thought process to address and eventually overcome those problems, and designing solutions that would then be tested and refined. It was felt that such an approach would result ultimately in a feasible, effective, and efficient RDF for Dominica.

The PRICOR three-phase methodology of Problem Analysis, Solution Development and Solution Validation did not constitute distinct separate steps in this study. Some issues were identified early, others emerged later. The continual identification, analysis, and resolution of issues was very much an overlapping, iterative process.

RDF SYSTEMS ANALYSIS

A preliminary model for the RDF was known from the start of the study, and the study began with a comparative analysis of this model and the current drug and supply system. The initial analysis of the existing system showed the CMS and MOH to be managing the system's material assets, while a Management Information System (MIS) was coordinating the functions of selection, procurement, warehouse/inventory management, and distribution.

While these elements are all required for the RDF's management of material assets, the researchers' past experiences suggested that careful financial planning and management, as well as attention to environmental factors, both organizational and public, would be required. This analysis resulted in the identification of eight components that would be required for the design and implementation of an RDF system, as well as several operational issues within each component.

Some of the major operational issues that were identified in each of the eight components are listed below, although the structure and organization of these issues changed somewhat over the course of the study.

1. Finance

- capitalization requirements
- methodology for billing districts
- % markup over drug/supply costs
- pricing policies (Phase II)

2. Management Information/Accounting System

- degree of financial control desired
- forms and procedures required
- ability to maintain the MI/AS

3. Selection

- RDF scope -- what drugs and supplies to include in the system

4. Procurement

- procedures -- periodic or perpetual ordering
- what suppliers
- quantities to order

5. Warehouse/Inventory Management

- safety stock levels
- monitoring of expiry dates

6. Distribution

- scheduling of issues to districts
- backordering/returns/exchanges from districts
- course-of-therapy prepackaging (Phase II)

7. Organizational Development

- authority/responsibility for RDF management
- what staff required
- what training required

8. Information, Education, Communication/Public Attitudes

- how to gain public support
- identification of indigents (Phase II)

At the outset of the Revolving Drug Fund the priorities for attention were the issues which required a major policy decision in order for RDF design and implementation to proceed. These priority issues were in the components of (1) Finance (capitalization and pricing issues), (2) Management Information and Accounting Systems (a mechanism for financial control), (3) Distribution (adoption of course-of-therapy prepackaging), and (4) IEC/Public Attitudes (identification of indigents and development of a publicity campaign). These issues had been analyzed in policy discussions with Ministry of Health officials, and alternative solutions were being developed when the government announced a change in policy for the RDF. The change in policy called for delaying consumer cost-sharing for an indefinite length of time. It also meant that the research team needed to reshape the focus and structure of the study. This was done by dividing the study into two phases. Phase I would

concentrate on the design and implementation of the financial and materials management systems at the central level. District budget allocations would be used to reimburse the Fund until Phase II when consumer cost-sharing would be introduced.

With the decision to postpone consumer cost sharing, the priority issues and operational research focus changed. Neither a publicity campaign nor the development of a course-of-therapy prepackaging operation would have to be addressed for the Phase I RDF. Postponement of these issues would allow priority attention to be focused in the early stages of the study on developing the central-level management systems and demonstrating their reliability before undertaking implementation and management of the higher-risk community drug sales program. Furthermore, the information generated by a carefully designed management information system would facilitate decision-making for the resolution of Phase II operational issues.

Priorities were set based on changes or solutions that could be expected to have the greatest effect. Finance was the major new subsystem that needed to be in place for the RDF to function. The MIS/Accounting System was also essential for financial control and for monitoring the system. Materials management - the flow of inventory through the system - was a critical subsystem of the RDF, but those components were already in place in the existing supply system and did not require further developments at the start. Selection of items for the inventory list was already underway, and further changes would contribute at best only marginal improvements. Procurement, inventory management, and distribution systems were already at a functional level (feasible and to some degree effective).

Organizational development was considered a peripheral issue. It was defined early on to include administrative relationships as well as staffing and training. Although this component was considered important, it is only in retrospect that it is viewed as a critical issue. The IEC/Public Attitudes component, although important, was considered an issue for Phase II and thus, lower priority for attention beyond simply raising the issues.

COMPONENT STUDIES

Findings from the two major components of this study, Finance and the Management Information and Accounting System, and their operational issues, are presented in detail below. A brief description of the other six components is also described.

Finance

Finance was considered the major component in this study because it involves a set of issues which characterize, and in fact define, the concept of a revolving drug fund. The assets of a revolving fund exist in two forms, liquid funds and inventory. These constantly shift and change, with funds being converted into inventory as drugs and supplies are purchased, and inventory converted back into cash as users pay for the drugs and supplies they consume.

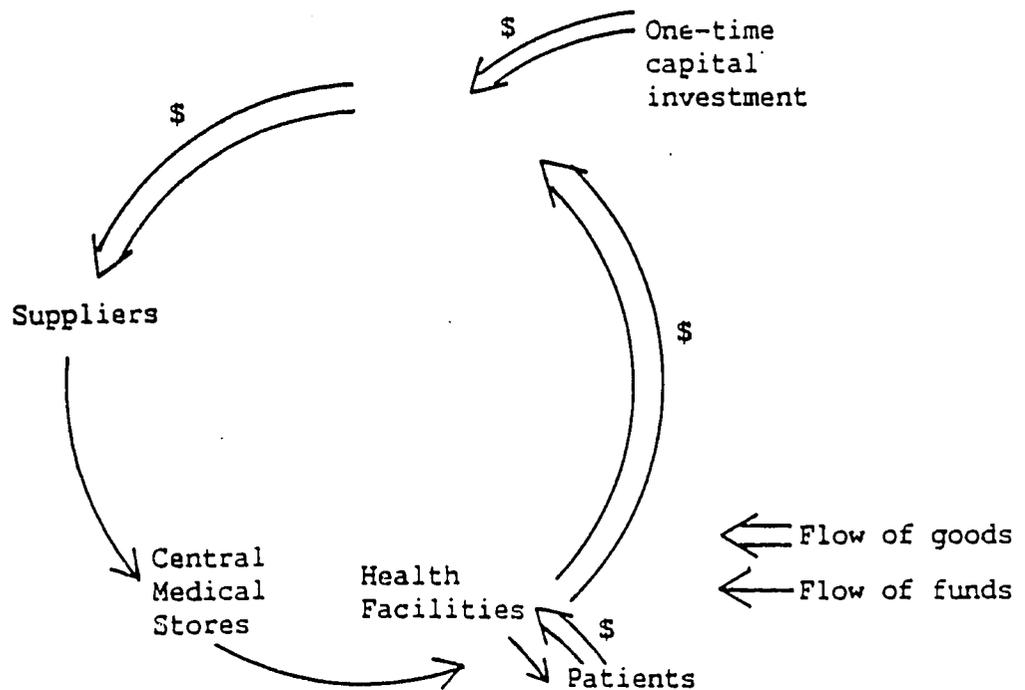
Careful attention to financial issues was not an element of the pre-existing drug and supply system in Dominica. Purchase orders for drugs and medical/surgical supplies were prepared at Central Medical Stores and sent to the Ministry of Health for approval and processing. Supplies were received at CMS and invoices paid through the Ministry of Health Accounts Officer, but there was little coordination between the two. The CMS storekeeper did not know the total value of his purchases, or whether he stayed within his budget.

If there were cash flow problems within the Treasury, or if administrative processes were slow, suppliers waited to be paid. The storekeeper had no control over this but suffered the consequences in terms of delayed receipts and continually eroding supplier performance.

Although the new primary health care strategy did incorporate some decentralization of decision making, it did not extend to the management of supplies in any meaningful sense. Health districts and facilities had budgets for drugs and supplies in the Annual Estimates, but they were not informed of either their allocations or the value of the supplies they used each month. Therefore, these budgets were effectively meaningless for financial management or control. With no tracking of the value of drug usage by each health facility, the Ministry had no way of knowing whether district and facility budgets were adequate or inadequate to cover their annual usage.

From existing knowledge and experiences from other countries, a preliminary model of the planned RDF was available at the start of this study (See Figure 1 below). The Finance component of the model is signified by the double lines in this model representing the flow of funds through the system. After initial capitalization, monies would be spent for drug procurement and would be replenished by drug sales. From this graphic depiction the major financial variables of the model are evident - "capitalization" and "reimbursement."

Figure 1. RDF with consumer cost sharing



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Operations research techniques would be used in this component to determine the level of capitalization required and the pricing policies necessary for money to be returned to the Fund.

With the July 1983 decision to postpone consumer payment, the priority operational issue became the design and implementation of a Phase I RDF in which reimbursements would be made by health district and facility budgets rather than by consumers. Estimates of capitalization requirements changed somewhat since the Phase I RDF extended only to the districts and facilities as users, rather than to the patients. Instead of establishing pricing policies at the outset, decision makers were faced with questions about how the reimbursement mechanism would work and whether the district budgets were adequate.

To determine the amount of capitalization required, the researchers considered two factors: (1) the rate of consumption and (2) the length of the pipeline. Optimal capitalization requirements were unknown at the start of the study because accurate estimates of monthly consumption were not known and information was not available to estimate the length of the pipeline with certainty.

Dominica was in the fortunate position, however, of having capitalization funds of one million EC dollars available through a loan from its Social Security Fund. Six months into the project an initial installment of EC\$500,000 was provided, establishing the RDF. The question now facing the Ministry of Health was not what the precise capitalization requirements were, but whether the initial EC\$500,000 from Social Security would be adequate. In a meeting between senior Ministry officials and project researchers, consensus was reached that the additional EC\$500,000 should be requested.

Capitalization. A series of cash flow analyses were conducted at 6-12 month intervals to provide more accurate information on the rate of consumption, the length of the pipeline, and the status of the funds in the RDF. These analyses showed that while the cash balance was dropping, it was still at an acceptable level. The decision was made after a year of operation to request an additional EC\$200,000 from the Social Security Fund. At the end of FY 1984-85 the analysis showed that although CMS had embarked on a better procurement program and the issuance of supplies increased by 34.5 percent over the previous year, the cash flow balance fell very low. This was attributable to the long reimbursement time from the Treasury to the RDF; accounts receivable by the RDF from the Treasury increased five-fold for a six month period of time.

Investment. The low cash flow balance was also due, in part, to the fact that EC\$100,000 had been invested in a Certificate of Deposit to earn interest. A cost-benefit analysis by the researchers revealed that the costs of lost liquidity of funds, and the use of interest earnings as "extra income" for unplanned expenses, outweighed the benefits of this investment. Therefore, the CCD was liquidated.

Reimbursement. The primary characteristic of RDFs is that disbursements are reimbursed. While this was originally to be done through consumers reimbursing the RDF with cash payments, the new Phase I scheme called for charging the districts and facilities. The districts requisition for drugs

and supplies was to be "costed" and a copy sent to the MOH for debiting the district's budget allocation, and then to the Treasury for issuance of a check to the RDF.

Markup. The objective of the markup was to cover all non-direct costs except personnel and the purchase of a truck. The determination was made to add a 20 percent markup to the total cost of goods issued and to note this at the bottom of the requisition slip. Financial analysis showed that the 20 percent markup was more than adequate with total operating expenses for FY1983-84 at 11.2 percent, FY1984-85 at 12.3 percent, and the first half of FY1985-86 at 8.1 percent, with possible savings to the RDF in FY 1985-86 of ECS13,000.

District budgets. The districts' line item budgets did not distinguish between drugs, medical supplies and "other" items. An analysis of the districts' spending on the 03 line item for "supplies and materials" revealed that all districts spent more than their 03 allocations on drugs and medical supplies alone (115.87 percent for FY1984-85). This was due not only to the increased ability of CMS to provide drugs and supplies, but the fact that the districts' budgets were not limited during this first year of operation. Despite the fact that stockouts at CMS continued and the districts were not being supplied with all the items they requisitioned, consumption was still expected to increase. Although procedures were developed for the districts to monitor their own budgets, by the end of the study it was apparent that not only were the district's budget allocations inadequate to meet the demand, but they were also not functioning as a control mechanism to limit usage. What was missing was a management decision to restrict shipments beyond what could be paid for, or to consider implementing consumer cost sharing to replace the budgetary allocations.

Monitoring. The "costing" of drugs and supplies began almost immediately, but it was not until the Management Information/Accounting System was implemented eight months later that it became a regular process. The 03 budget line item was split into two line items: drugs and medical supplies, and other supplies. Accounts books were distributed to each district with the opening balance for both 03 components. The staff were shown how to subtract the value of each shipment received, along with other expenses incurred, to maintain a current balance. Although the staff thought the process useful, they found it too time consuming. They also did not exercise control in requisitioning, but neither did CMS control its issuances.

Unmet demand. Overconsumption by the districts continued in spite of the fact that CMS still experienced stockouts. The MOH was faced with the following options: (1) do not meet the demand through the MOH system, (2) meet the demand and pay for it through increased budget allocations, or (3) meet the demand through consumer cost-sharing. In a survey of three physicians, five pharmacists and four nurses, all but one agreed that patients would be willing to pay small fees for drugs. By the end of the study however, the government had still not decided to implement consumer cost-sharing.

Pricing policies. The researchers prepared a discussion paper to show the effects of the Government's concern to exempt different age groups and types of medications from the consumer cost-sharing scheme. However, with the decision to postpone consumer cost-sharing, a thorough examination of the pricing

issues was also postponed. The researchers prepared a discussion paper to show the shrinking effect on the revenue base of multiple exemptions for both major sections of the population and a number of widely used drugs.

Testing of the finance submodel. At the end of the study the Finance submodel of the Phase I RDF appeared to be feasible. It was not as effective as it should have been, however, in supporting RDF goals. With inadequate liquidity to allow prompt payments to suppliers, one of the major benefits of the RDF is not being realized. Continuing problems of inadequate capitalization, delayed reimbursements, and district budgets which were insufficient to meet demand are threatening the effectiveness of the RDF as a whole. Several Phase II operational issues were addressed, but require more attention before consumer charges for drugs can be introduced.

Management Information and Accounting System

A management information and accounting system was identified as a critical component of the RDF model to coordinate management of both financial and material assets. A management information system (MIS) is required to coordinate all phases of the procurement and distribution cycles necessary for any supply system; the RDF MIS requires, in addition, a tracking of assets throughout the system in order to control these assets and to ensure the conservation of capital in the Fund. An MIS was already present within the drug supply system in Dominica. It was an MIS that had evolved over time and provided the necessary information to keep the system functioning, though not necessarily very effectively, since it did not incorporate any tracking of the value of the supplies as they moved through the system. A revised MIS and accounting system (MI/AS) was needed to monitor and control all phases of the procurement and distribution cycles, to provide information on which to base management decisions and to ensure the conservation of the RDF's assets. Experiences from other countries suggested that issues of both design and implementation of the MI/AS would be critical to its success.

The decision to introduce a Phase I RDF as a preliminary model was made early enough to facilitate the MI/AS design and implementation process. The initial MI/AS design focused on central-level systems as well. It was anticipated that only minor modifications would be needed to incorporate the management information that would be required for Phase II.

Financial control. To determine whether to implement a single-entry or double-entry accounting system, the researchers conducted a qualitative cost-effectiveness analysis. Since the major objective of the accounting system is that it conserve the capital of the RDF, a double-entry system was decided upon. By the end of the study, the double-entry system had been very effective in controlling the fund's assets, although maintenance of the system was difficult. The researchers and the MOH also developed procedures for conducting monthly and annual financial analyses.

Phase I forms. A major objective of the MI/AS is to monitor all aspects of the procurement and distribution cycles of the supply process to provide information necessary for management decision-making. To this end, the researchers developed, tested and refined a number of reporting forms to assist all levels of the RDF in monitoring their finances.

Costing methods. This major operational issue was subdivided to consider several decision variables, including which units of distribution would be costed (i.e., tablet, bottle, or course-of-therapy prepackaging). Since Phase II of the RDF was postponed, Phase I costs would be based on the smallest units used or ordered by the districts, such as bottles or boxes. A second variable for consideration was the price changes associated with changes in the unit cost of goods as a result of using lower-cost suppliers. Rather than basing the price on the actual costs of the units, the research team decided, for reasons of administrative simplicity and equitability, to use an average price based on the differences in the costs of units from the different shipments.

Coding system. From the start of the study the coding system that had been used at CMS was posing problems when new items were added to the inventory. It was recognized that a new system would ultimately be required, but it was not until after the first year of the project that modifications were made. When Kardex cards were reprinted, an additional column was created to introduce the new coding system. The old codes were still retained, however, since they would continue to be needed to trace earlier documents.

Petty cash. After a series of discussions between the CMS Supplies Management Officer, and the MOH Accounts Officer, a petty cash system was set up at CMS to pay for small fees which would expedite the procurement of supplies by bypassing the MOH Accounts Office. It would also keep information on the financial status of the RDF more up to date since the RDF's accounting system was more detailed than the Ministry's.

Phase II management system. The Phase I RDF required very few forms and procedures to be implemented at the district level, with the exception of the Stores Inventory Voucher. The researchers suggested that any new procedures which required management decision-making at the district level be considered Phase II issues. Some Phase II forms and procedures did begin to be introduced during the period of the study:

Budget Monitoring. The Phase I RDF included a checklist for districts to use to monitor their drug usage against their budgets. The researchers assisted the Supplies Management Officer in the design of a Budget Control Book for the districts to monitor expenditures in both categories of the 03 line item. As was discussed earlier in the Finance section, the books were not being kept up to date in most districts.

Inventory Management. When this study began there were no formal procedures in place at the district level for inventory management. An ad hoc requisitioning pattern by the districts led to frequent stockouts and emergency requisitioning to cover this situation, or, at the other extreme, overstocking. The researchers discussed the idea of Bin Cards with the district pharmacists, and implemented the system in December 1984. Rather than piloting the cards in one district, CMS preferred to introduce them in all districts simultaneously. The Chief Pharmacist visited the districts to assist pharmacists in using the Bin Cards to monitor monthly usage and to more accurately estimate the quantities of items to be ordered from CMS. In a survey taken a year after their introduction, six of seven district pharmacists reported the Bin Cards to be useful.

Manual vs. computerized system. Initial applications of the computer in support of the revolving drug fund were designed in three main categories: (1) ongoing analyses for improved decision making, (2) development and dissemination of information on various supply system activities to Ministry officials and to District Medical Officers and pharmacists, and (3) support of various elements of the RDF accounting system, in particular preparation of periodic financial statements. The team made heavy use of the computer with the finance consultant carrying out annual financial closings, and other researchers performing analyses involving price history data, stock levels, and the value of issues, as well as the procurement and reimbursement segments of the pipeline. By December 1984, the computer was being used regularly and successfully by both the PRICOR research assistant and the Chief Pharmacist to perform all three functions.

Timing of implementation. The Prime Minister had first mandated that a strict cost accounting system within CMS go into effect before the RDF was capitalized. The determination of unit costs for all items held in inventory had begun in May 1983. A preliminary accounting system was developed by a freelance accountant between August and October but was inadequate and therefore not implemented. With the initial capitalization funds provided in November, the researchers redesigned the accounting system and the revised MI/AS was implemented in February 1984. It was decided to open all required ledgers as of July 1, 1983, so that a full fiscal year's data would be available for analysis.

Financial authority. As the study evolved, the question of where financial authority and responsibility should lie came to be identified as a major operational issue by researchers. The management of financial assets was controlled by the MOH Accounts Officer while the management of material assets was controlled by the CMS Supplies Management Officer. This system proved to be cumbersome, poorly coordinated and therefore resulted in inefficient management of the RDF.

MI/AS maintenance responsibility. When the MI/AS was first set up, it was assumed that those portions of the information system that were involved with aspects of the supply process would be maintained by CMS staff, and the accounting system by the Ministry Accounts Officer. At the first financial closing in July 1984, however, the researchers found an unacceptably high error rate in the accounting books that had been maintained by the Ministry Accounts Officer. Researchers concluded that it may have been a mistake to have asked the Ministry Accounts Officer to undertake the additional responsibility for the RDF accounts, given the other responsibilities of the position, some of which understandably deserved priority attention. They pushed forward to hire a Research Assistant for the study who would assist in maintaining the RDF.

Toward the end of the study, it became obvious that successful maintenance of the accounts and thus viability of the RDF concept required an accounts officer who could give it priority attention. Researchers had a number of discussions with Ministry Officials, urging them to hire the Research Assistant as a full-time member of CMS staff. By the end of the study, he had not been hired.

Testing of the MI/AS submodel. The Phase I MI/AS was designed to allow easy access to information which would facilitate decision-making in all phases of the drug supply system and management of the RDF. With substantial inputs from outside researchers and the PRICOR funded Research Assistant in Dominica, the system has been feasible and somewhat effective, and will become more effective as staff gain experience; due to the necessity of those extra investments, however, it has certainly not been efficient. With staff inputs limited to MOH and CMS staff currently available, researchers question whether the MI/AS will ever be feasible. This is one of the study's more important findings and poses a significant operational problem for the Ministry. Only a few Phase II elements have been added as yet to the MI/AS. Researchers conclude that the outlook for Phase II is not good until the Phase I system is more stable.

Selection

This was considered a key element of the materials management component in defining the scope of the RDF. Three key operational issues were identified and solutions developed. The first was which items to include in the RDF. It was agreed to begin the RDF with all 454 drugs and 193 supplies on CMS's current and active inventory list, of which 120 were out of stock items no longer being purchased. Over the course of the study the list was refined with new items being added and others dropped. By the end of the study the inventory list was 25.3 percent longer and the value of the inventory 37.5 percent greater.

The second issue addressed the development and introduction of the Dominica Formulary. Although this activity was independent of the study, CMS restricted its ordering to "primarily" Formulary items. The Formulary and a price list from CMS were distributed to all districts.

The third issue was the reorganization of the inventory list which also involved the introduction of a new coding and Kardex system. Inefficiencies continued throughout the study with a number of "never-used" items remaining on the inventory list, and with some confusion about what coding system would ultimately be adopted.

Procurement

A procurement system was pre-existing in Dominica at the time the Government decided to institute a revolving drug fund. A review of the weaknesses and inefficiencies of Dominica's procurement system suggested that major efforts needed to be directed toward improving the reliability of supply and decreasing unit costs paid. The major operational issues addressed included: (1) what purchasing model to follow, (2) obtaining better purchase prices, (3) supplier contracts, and (4) port clearing.

In considering whether to use a periodic purchasing model (whereby stock levels are reviewed and orders are placed on a periodic - often every three to six month - basis, and the needed quantities are ordered up to a predetermined maximum inventory level), or a perpetual purchasing model, (whereby the inventory level of each item is reviewed at least weekly, and an order for a standard quantity is initiated whenever the stock level falls below the predetermined reorder level), the researchers suggested a modified optional

replenishment system in which specific reorder levels for each item would be checked at predetermined order intervals. In addition, minimum stock levels would be set as a secondary control point to be monitored between the formal review periods. By the end of the study, stockouts still continued because procedures were not followed well.

At the beginning of the study, all items in stock were costed to provide baseline data. The annual amount spent was calculated for each item so that items could be ordered in decreasing order of their total cost. For each item over EC\$1000 per year, other sources of procurement were investigated. By July 1985, costs for the 39 most expensive drugs had decreased as a result of changing suppliers. However, the cost savings were counter-balanced by the need for emergency purchases.

To expedite port clearing, the RDF needed to have a continual supply of liquid funds to pay suppliers and clear the supplies promptly. However, EC\$100,000 were tied up in a Certificate of Deposit which were eventually liquidated.

Continuing problems have to do with the difficulty in accurately estimating order quantities, due to the unreliability of past consumption figures for forecasting demand, the unavailability, until recently, of accurate supplier lead time and data, the failure to establish contract terms with suppliers, and a low cash balance in the RDF, delaying supplier shipments.

Resolution of these problems will require continuing focused attention from Ministry officials. Until the Procurement submodel is more consistently effective in making supplies available, researchers believe that it is unrealistic that a Phase II RDF incorporating drug charges will be acceptable to consumers.

Warehouse/Inventory Management

This was not one of the study components that received priority attention. However, once the major systems of Finance, MIS, and then Procurement were underway, attention naturally turned to warehouse and inventory management issues. The use of Bin Cards was implemented and well maintained throughout the study to monitor stock levels. Although the cards helped identify low stock levels and impending stockouts, no procedures existed for reporting low stock levels or placing new orders. The researchers suggested that safety stock levels be set at two months usage and reorder levels set at six months.

The researchers had estimated the stockout rate at CMS at approximately 30 percent when they set up the RDF accounting system in January/February 1984. But by June 1984, following receipt of the first large orders placed with non-profit generic suppliers in Europe, the stockout rate was measured at 10.8 percent of all items, 10.4 percent of all drugs, and 8.6 percent of all first-line drugs, for a 90 percent service level. In the 18 months that followed, however, stockouts within CMS increased dramatically to over 25 percent of first-line drugs. This was the period during which improved procurement and inventory management procedures needed to be not only initiated, but also maintained, and they were not.

The researchers also instituted a first-in-first-out (FIFO) stock rotation procedure at CMS to avoid loss of items due to expiration.

At the end of the study period, researchers concluded that there was no evidence to suggest that the Warehouse/Inventory Management submodel was infeasible. It was not as effective as it could have been in making supplies available to the district facilities, or in maintaining reorder and safety stock procedures. These central level problems must be resolved before inventory management in peripheral facilities can be expected to be effective or efficient.

Distribution

As an important element of the materials management component of the RDF, the researchers considered the smaller operational issues of (1) unit of distribution, (2) scheduling of distribution, (3) backordering procedures and communication with districts, and (4) returns and exchanges from districts.

The researchers recommended course-of-therapy prepackaging as the unit of distribution and were investigating costs associated with set-up, maintenance, and labor when the government decided to postpone consumer cost-sharing.

A system of staggered requisitions from user facilities was implemented to even out the workload, decrease the turn-around time, and avoid emergency ordering. However, emergency ordering did not decrease primarily because of inventory management problems at the district level, which had very little to do with CMS.

This situation was addressed by requesting the districts to submit only one requisition per month to CMS. When CMS was out of stock, an alternative would be proposed to the district and the item backordered and delivered to the district when it was received. A system of allowing returns and exchanges of expired or surplus goods was instituted, which would credit the district's budget by that value.

At the end of the study, the Distribution submodel was reasonably effective in getting supplies out to users, but could have been even more effective if a procedure for backordering supplies had been implemented. Inefficiencies in the system were demonstrated by suboptimal use of staff time, the continuing frequency of emergency requisitions from districts, and the fact that the credit system to allow districts to return or exchange supplies was not working.

Organizational Development

During the problem analysis phase of this study, researchers identified the organizational environment as a critical component in the design and implementation of the RDF system. The operational issues in Organizational Development that arose in this study include: (1) management responsibility for the RDF, (2) authority/responsibility for RDF assets, (3) gaining support/collaboration of Audit Department, (4) staffing required, (5) training required, and (6) additional staffing/training required for Phase II.

Management responsibilities were being shared by the CMS supplies Management Officer and the Ministry's Accounts Officer, although the time and effort of the former were greater than the latter's. As discussed earlier, a Research Assistant was eventually hired by the PRICOR research staff to manage the

RDF's accounts, but he was in the awkward position of reporting to both Officers. The researchers suggested that all functions be coordinated by the CMS Supplies Management Officer, or alternatively, that an RDF Management Committee be developed. They felt that the authority and responsibility for RDF assets should be vested in one individual.

Since the RDF accounting system was new to the MOH and somewhat different from other government accounting procedures, the Auditing Department was consulted during the design phase and continued to provide good support throughout the project.

As the workload and the responsibilities of the RDF increased, the researchers suggested hiring more personnel, especially the research assistant as the accounts manager. However, the government was not able to fund any new positions for the RDF, and was therefore faced with providing training to the Junior Clerk, who would most likely assume the accounting responsibilities, and arranging for periodic assistance from a trained accountant.

The Organizational Development submodel included a number of fairly discrete issues. Given the significance of management decision-making to the continued viability of an RDF, researchers questioned whether the authority and management structures currently in place were even feasible; they suggested a reorganization and a reassignment of responsibilities to allow the RDF to function as it was designed, more independent from normal government accounting procedures.

The staff available and the training provided to them throughout the study period were reasonably effective in supporting the RDF, but considering the project resources that were invested to maintain a critical staff member, the researchers could not conclude that the submodel, as developed, was efficient.

Information, Education, Communication/Public Attitudes

The operational issues that were first identified had to do with determining the willingness and ability of people to pay for drugs, designing and implementing a publicity campaign, and deciding how indigents would be identified. The major significance of public attitudes was underscored by the Government's decision to postpone consumer cost-sharing.

The concept of an RDF with drug sales and the realities of introducing a Phase I RDF in Dominica benefitted from the start from strong support from the Minister of Health. Both he and the researchers made presentations to the Prime Minister and the Cabinet gaining their public support.

After the Government postponed consumer cost-sharing, all activity focused on the central level with very little attention to the district level. However, their support and cooperation were critical to the RDF's smooth functioning. The supplies Management Officer and the Chief Pharmacists visited the districts to gain their support by introducing the new elements of the RDF as they were being developed. A survey of the health system staff in December 1985 showed their responses to be predominantly supportive of the Phase I RDF and of the outlook for Phase II.

Public opinion, however, was still an issue of concern for the Ministry. It was noted that the level of service provided by the current drug supply system was having a negative impact on public perceptions of health services. In February 1984, the Minister described the RDF in a Sunday morning radio program. On several occasions the researchers were also interviewed for the radio. In May, however, a Letter to the Editor appeared criticizing the drug distribution system. The Minister arranged for a feature article to be published describing the RDF and the work underway.

In thinking ahead to Phase II, researchers decided to monitor the experience the Ministry was having at Princess Margaret Hospital where new fees for service had been introduced in January 1984, for any lessons that could be gained for better planning for the introduction of drug charges. The staff interviewed said that it seemed as though the program was introduced "all of a sudden" and many patients said they did not know about it. They suggested a larger public relations campaign in advance of the introduction of Phase II in the districts.

CONCLUSIONS AND DISCUSSION:

Phase I of the RDF, identified and defined by the MOH for political considerations, was found to be a very useful as a transition stage in the development of a comprehensive RDF. Since its design incorporated the major components of all the management systems required for an RDF except consumer drug sales, introduction of the RDF in phases permitted attention to be focused on developing the central-level systems which are necessary before sales to consumers could begin at peripheral facilities.

A review of the experience of this study led to the identification of the factors critical to the implementation of an effective and efficient RDF at the central level. These include:

- *Coordinated leadership and management.* Authority and responsibility for RDF assets should be vested in either a single person or a committee that meets regularly to review financial reports, address operational problems, and make managerial decisions.
- *Adequate staff.* Initial design of the RDF, and in particular of the MIS accounting system, requires the advice of an expert accountant. Ongoing RDF maintenance requires all current CMS staff to maintain the supply system, plus an RDF accountant. This accountant would maintain the accounting books and will ensure maintenance of other aspects of the MIS that provide information for RDF management; he should report to the RDF manager or RDF Management Committee. To ensure the continuity and reliability of the supply system, all staff should be permanent rather than temporary.
- *Adequate capitalization.* The level of capitalization required is the product of the monthly usage rate and the length of the pipeline. If accurate data are not available at the outset, the information system should be designed to collect the necessary data for continually monitoring both usage and pipeline length, in order to continually refine the capitalization estimate and make the necessary adjustments. Adequate funds for capitalization must be available if the RDF is to succeed.

- *Assurance of RDF reimbursement.* Because all distribution of drugs and supplies from the RDF must be reimbursed in order for the fund to revolve, two variables - distributions and reimbursements - are important, and must be kept in equilibrium. This means that if distributions are to increase, as is happening in Dominica, additional funds must be found to reimburse the RDF.

The "component approach" has proven to be a valid one for analyzing the RDF system and addressing important operational issues. In Dominica the priority components were finance, MIS, and in retrospect, organizational development. These priorities would vary from country to country, as would the amount of time required to analyze, implement and validate the model.

While results can appear quickly in individual components, as happened in Dominica, these results are sustainable only if they are implemented in conjunction with developments in related components. The issues within each component of the RDF are interdependent and interacting. It is the composite result - the sum of solution development in all components and operational issues - that emerges from this study.

At the end of this study, Phase II of the RDF had not yet been implemented although some operational issues of the Phase II components have been addressed. District physicians and pharmacists began monitoring the cost of the drugs and supplies used against their budgetary allocations, as well as to monitor usage by patients to better manage their inventories. They were also beginning to discuss the cost of drugs with patients. These are all necessary prerequisites for a successful RDF with drug sales.

Generally there has been a 15 percent overrun by the district facilities of their budgets. This indicates that either the budgets must be increased, some mechanism must be developed for limiting the amount of drugs the district facilities are able to order, or consumer payments instituted to help fund the increased demand. Perhaps the greatest problem in the RDF development has been the reluctance on the part of the Government to institute user payment for drugs at the peripheral level. Up until now, this was considered to be either politically unwise or impossible. However, most outside observers feel that the institution of user payments could be accomplished if there was adequate preparation and education of the public and that it would not necessarily be a political disadvantage to the government. If consumer payments are not introduced, it is quite likely that this revolving drug fund will fall into the same kinds of problems that occurred before it was established, namely, delays in payment from the treasury because of inadequate government funds, delays in payments to overseas suppliers, and shortages of drugs. In such a case, consumers would again have to be given prescriptions and go to high priced private pharmacies on the island. This would be unfortunate as Dominica presents a unique opportunity to develop a national revolving drug fund in a short period of time.

* * *

This study was conducted from April 1983 to March 1986 by the Dominica Ministry of Health and Management Sciences for Health. This summary is based on the final report of the study prepared by Mr. Peter Cross, Dr. Desmond McIntyre, and Ms. Margaret Hume. Further information is available from the principal investigator, Mr. Peter Cross, MSH, 165 Allendale Road, Boston, MA 02130, from Dr. Desmond McIntyre, Health Services Coordinator, Ministry of Health, Roseau, Dominica, or from Dr. David Nicholas, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

OPERATIONS RESEARCH TO IMPROVE THE SUPERVISION, LOGISTICAL SUPPORT, AND TRAINING OF RURAL HEALTH PROMOTERS IN ECUADOR



In 1980, the Ministry of Health (MOH) and the Marginal Rural Development Fund (FODERUMA), an agency of the Central Bank of Ecuador, initiated the implementation of a Primary Health Care (PHC) strategy with a health promoter component to balance the inequity in health care coverage. Despite efforts to improve the health promoter program, numerous operational problems have limited its effectiveness and contributed to the attrition of these community level health workers. In collaboration with the Ministry of Health, researchers from the Fundación Eugenio Espejo (FEE) carried out an operations research (OR) study from September 1983 through March 1986 to examine problems besetting the national rural health promoter program and to

develop and test solutions that could be implemented by the MOH.

BACKGROUND

The Republic of Ecuador, situated in northwest South America, is a country of great geographic and cultural diversity. The Andes range divides it into three distinct geographic areas: the coast, highlands and eastern jungle. The population was over 8 million inhabitants as of the last census in 1982, with an approximately equal distribution between urban and rural areas. The ethnic distribution is 19 percent white, 38 percent Indian, 40 percent mixed and 3 percent black. Correspondingly, a mixture of languages are spoken: Spanish, Quichua and various other ethnic minority languages. Population growth is relatively rapid for a Latin American country. The average annual rate of population growth between 1962 and 1982 was 3 percent, and over 42 percent of the total inhabitants are under the age of 15 years.

Although health status has improved during the last fifteen years, Ecuador's general, maternal, and infant mortality rates are high relative to other Latin American countries. In 1982, the general mortality rate was 6.8 per 1000, the maternal mortality rate was 1.9 per 1000 and the infant mortality rate was

63.9 per 1000 live births. Almost one third of all deaths occurred in children less than one year of age. Disaggregation of these gross rates by geographic area reveals an unequal mortality distribution. Mortality rates are much higher in the rural central Andean provinces such as Cotopaxi, which has an infant mortality rate (IMR) of 103.6 per 1000 as compared to provinces such as Pichincha (where the capital, Quito, is located) with an IMR of 46.8 per 1000. The principal causes of childhood morbidity and mortality are infections of the digestive and respiratory systems, protein-calorie malnutrition, whooping cough and measles.

The health system in Ecuador is mixed, with several independently functioning subsystems such as Social Security, private medical services, military services, private charities, and the Ministry of Public Health. These service providers often have differing policies, objectives and strategies that result in inefficiencies in the delivery of services, and incomplete coverage. Additionally, an informal health system of traditional medicine exists.

Primary Health Care

In 1970, the Rural National Health Plan required one year mandatory service in rural areas by all physicians, nurses, obstetricians and dentists. This has increased health care coverage in rural areas to about 2 million inhabitants, but has still left about 50 percent of the rural population, particularly dispersed rural populations in towns of less than 500 inhabitants, with inadequate coverage. In 1980, the Ministry of Health (MOH) and the Marginal Rural Development Fund (FODERUMA), an agency of the Central Bank of Ecuador, initiated the implementation of a Primary Health Care (PHC) strategy with a health promoter component to balance the inequity in health care coverage.

Between 1980 and 1985, the Division of Community Development of the Ministry of Health trained a total of 472 volunteer health promoters to extend coverage of primary health care services in rural areas. By 1985, 72.2 percent of these volunteers were still providing services in 15 provinces, covering a total of 110,000 inhabitants. These promoters were expected to link the formal and non-formal health systems at the community level.

Despite efforts to improve the health promoter program, numerous operational problems have limited its effectiveness and contributed to the attrition of these community level health workers. In collaboration with the Ministry of Health, researchers from the Fundación Eugenio Espejo (FEE) carried out an operations research (OR) study from September 1983 through March 1986 to examine problems besetting the national rural health promoter program and to develop and test solutions that could be implemented by the MOH.

Preliminary analysis of the promoter program identified problems in such areas as community organization and participation, selection of health promoters, training profile of promoters, supervision, motivation, feedback, provision of medical and other supplies, and the evaluation process. Through discussions with MOH officials and others knowledgeable of the promoters' work, the researchers selected those problems thought to have the greatest influence on extending PHC coverage to rural areas. Three basic problem "subsystems" were categorized as priorities for operations research: supervision, logistical support and training of health promoters.

First, the lack of standardized guidelines for the supervision of promoters has led to sporadic and often technically weak supervision and, as a result, promoters' efforts have not been well linked to other health system activities. With regard to supplies, the current system of supplying promoters directly from the central level with little or no local supervision of promoter supplies has resulted in local shortages of essential medications and in some cases inappropriate use of drugs. Finally, the effectiveness of promoters has been limited by inadequacies in their training, which has been overly oriented to institutional concerns rather than to the needs and conditions of their communities.

Because each of the problems required its own thorough and detailed analysis, and because of interaction between the three areas, an operations research study was designed to identify and solve specific operational problems in each of the three subsystems. Each of these subsystems was studied in-depth to define the problems that were impeding the promoters' effectiveness. This description of the operations research study on rural health promoters in Ecuador will thus focus first on the supervision subsystem, followed by separate discussions of the logistical support and training subsystems.

SUPERVISION

Since supervisory support for community health workers through ongoing education, technical assistance and follow-up is expected to help make them more effective, the ultimate goal of analyzing the supervision subsystem was to improve promoter productivity. Preliminary discussions and analysis indicated that supervision of promoters in Ecuador was quite variable. Even when management of human resources was systematically undertaken, appropriate functions such as formulation of objectives, performance monitoring and program evaluation were irregular. The operations research objective for the supervision subsystem was to develop and test a strategy to improve the supervision process at an acceptable cost.

Problem Analysis

Elements of supervision were analyzed systematically to determine the most appropriate variables to modify. The researchers distinguished between two dimensions of supervision: (1) the external factors influencing supervision and (2) the characteristics of the supervisory contact. To find out how supervision was actually being carried out and to understand the factors affecting supervision, surveys were conducted of 86 promoters and 34 supervisors in six provinces in the coastal, highland and eastern jungle areas. Separate survey instruments were developed for the supervisors and the promoters. The supervisors interviewed included doctors, nurses, nurse auxiliaries, health educators and sanitary inspectors who had varying degrees of contact with promoters. The variables collected in each of the two surveys are shown in Table 1.

Both descriptive statistics and regression analyses were conducted on the survey data. Based on a review of CHW literature and identification of decision variables under MOH control, regression analyses were performed to examine the relationships between supervisor and promoter characteristics and promoter productivity. The descriptive analysis of the survey results

Table 1. Information collected to evaluate factors influencing supervision

Factors Influencing Supervision	D A T A		S O U R C E	
	Promoter Survey		Supervisor Survey	
Health facility level to which supervisor is assigned	<ul style="list-style-type: none"> • Health center, subcenter or post 		<ul style="list-style-type: none"> • Health center, subcenter or post 	
Characteristics of promoters and supervisory agents	<ul style="list-style-type: none"> • Demographic characteristics of the promoter • Type of supervisory agent 		<ul style="list-style-type: none"> • Demographic characteristics of the supervisor • Length of supervisory training 	
Frequency of contact	<ul style="list-style-type: none"> • Number of contacts during the previous year 		<ul style="list-style-type: none"> • Frequency of supervisory contacts 	
Supervisor to promoter ratio	-		<ul style="list-style-type: none"> • Supervisor to promoter ratios 	
Costs of supervisory visit	-		<ul style="list-style-type: none"> • Travel and per diem costs 	
Supervisory routes	<ul style="list-style-type: none"> • Travel time to the closest health facility • Type of transportation to the closest health facility 			
Timing and duration of supervisory activities	-		<ul style="list-style-type: none"> • Time dedicated to the contact 	
Tools employed in supervision	<ul style="list-style-type: none"> • Perception of the system of rewards and punishments • Difficulties in the information system 		<ul style="list-style-type: none"> • Community participation in supervision • Administrative process 	
Activities performed	<ul style="list-style-type: none"> • Supervisor activities 		<ul style="list-style-type: none"> • Type of activities conducted 	
Perceptions of supervision	<ul style="list-style-type: none"> • Perception of support for the promoter 		<ul style="list-style-type: none"> • Perception of the value of supervision • Perceived constraints 	

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concentrated on characteristics, self-reported activities, knowledge about the supervision process and perceived problems. The results of the two surveys are summarized below.

Characteristics of supervisors and their contacts. The survey found that supervisors had an average age of 29 years, with a post-secondary school education. Somewhat more males than females were supervisors. Promoters were variously supervised by doctors, nurses, nurse auxiliaries, health educators, sanitary inspectors, and community members.

On the average, supervisors reported that they made 15 contacts per year with each of the two to three promoters under their supervision. Promoters similarly reported that they saw the supervisors an average of once a month, although not all of these contacts were for supervision. Supervisors tended to be located far from the promoters, generally at the subcenter level or higher. Over half of the promoters indicated that the supervisor has visited them in the community on only a few occasions.

Perceived obstacles. The obstacles that supervisors felt hindered performance of their work were: insufficient training and financial resources, ill-defined roles, and inadequate appraisal of their work by the MOH. Also, less than half the promoters thought that the supervisors received enough support from the MOH. Nevertheless, supervisors did perceive the positive contribution of their role to the improvement of community health status.

Supervision activities. Over half of the supervisors interviewed reported that they 'always' collect information about the promoters' activities following MOH forms, 'always' define the objectives for promoter tasks, and 'always' promote ongoing education. However, only about half said they 'sometimes' observe the promoter's work directly. Over three-fifths of the supervisors claimed they 'sometimes' call for community meetings, but about the same number had 'never' met with a group of promoters. Less than a third of the supervisors reported that they 'always' check if the promoter has necessary materials and medicines.

Activities rated by the majority of promoters as 'always' reviewed by their supervisor were: evaluating promoter activities and suggesting improvements, caring for patients referred by the promoter, responding to the needs presented, and going over reporting forms with the promoter. Most promoters reported that supervisors 'never' helped them with: visiting and building latrines, visiting family gardens, paying home visits, and checking for safe water. Intermediate responses were given for activities such as holding meetings with the community, participation in community projects, problem-solving, checking of supplies and medicines, observation of work and provision of necessary help, provision of ongoing education and checking data accuracy.

Factors affecting supervisor performance. The regression analyses showed that supervisors with higher levels of education seemed to have less supervisory knowledge and to review promoter activities less frequently than those with less education. These supervisors also tended to supervise more promoters. Fewer supervisory contacts per promoter occurred when supervisors were responsible for more promoters. More extensive training in supervision, however, was shown to have a strong association with increased contacts with the promoter.

Older and female supervisors dedicated comparatively more hours to supervision than younger and male supervisors. Older supervisors tended to supervise more promoters. Younger and male supervisors tended to review more activities with their promoters. Younger supervisors also seemed to have a better understanding of supervisory concepts.

Most effective supervisory agent. The nurse auxiliary from the health facility nearest the promoter was shown to have the greatest effect on promoter output for specific activities. For instance, supervision by the nurse auxiliary from the health post resulted in better promoter output for latrine building. Regression analyses also showed that increased supervisory contacts by the nurse auxiliary were associated with more pregnancies detected and greater number of women cared for directly after childbirth. The number of hours spent on home visits and the number of adults and children cared for also increased with number of contacts. Promoter output was lower when the supervisor role was performed by supervisory agents other than the nurse auxiliary.

The nurse auxiliary also showed the best knowledge of supervisory process and activities. Over four-fifths of the nurse auxiliaries felt responsible for collecting promoter information forms, whereas less than a third of the physicians felt this was their responsibility. More nurse auxiliaries than doctors believed they should always explain objectives and tasks to the promoters while only half of the physicians felt this was necessary. Nurse auxiliaries also surveyed supplementary feeding, went over ORT procedures and checked water quality more often than did physicians.

Promoter characteristics and supervision. Female promoters were found to work significantly more hours than male promoters, regardless of the supervisory agent. Promoters with higher educational levels seemed to work more hours than their less educated counterparts when the nurse auxiliary was the supervisory agent. However, when the agent was a physician or a health educator, less-educated promoters tended to work more hours. Better educated promoters tended to have a poorer perception of supervisor effectiveness, regardless of the supervisory agent. When the supervisor was a nurse or nurse auxiliary, promoters perceived the most effective supervisors to be the ones who worked at the closest health facility level.

Solution Development

Between March and May of 1985, the research team from the Fundación Eugenio Espejo worked together with the MOH and FODERUMA to develop solutions to problems uncovered in the first research phase. To design alternatives, decision variables--those factors which the researchers could control--were analyzed utilizing the survey data results, taking into account constraints due to the existing situation in Ecuador.

Constraints, defined as factors outside the control of the researchers or MOH officials responsible for the promoter program, included bureaucratic delays; scarce economic resources; poor road infrastructure; climate; migration; and the existence of both traditional and formal health care services.

Bureaucratic regulations and procedures delay the delivery of promoters' bonuses and supervisors' allowances. The scarcity of economic resources has

led to continual reductions in the health budget, particularly in the resources allocated to primary care services. In dispersed rural areas, poor roads result in a poor communication and transportation network. Transportation is hindered even further during the rainy season. Migration poses the problem of rapidly shifting demands for health care, particularly at the community level. Conflicts arise between the traditional health care practices and the formal health care system.

Based on the data analysis and on discussions with MOH officials, decisions were made regarding those factors which the researchers could control. The principal controllable factors, or decision variables, relevant to developing an improved supervision strategy included:

1. Most effective and feasible number of supervisory contacts (within a range of 4 to 12 contacts per year).
2. Most appropriate health facility level where supervisor is based.
3. Most appropriate supervisory agent.
4. Maximum number of promoters assigned to a supervisor.
5. Most convenient supervisory routes to minimize travel time and expenses for supervisors.

They also considered such factors as the activities to be carried out during the supervisory contact, motivation of supervisors, community participation, participatory vs. authoritarian supervision, and the training needed for supervisors.

The selection of alternative supervision strategies based on these decision variables involved several iterative steps of examining possible alternatives, their costs and perceived effectiveness. As a first step, an analysis of the advantages and disadvantages of alternative supervisory agents was undertaken. A decision tree was used to analyze the cost and expected effectiveness of potential supervisory agents. The branches of the tree included the health facility level used for supervision, the supervisory agent, categories within each profession and the frequency of supervision. Calculation of annual costs was based on salaries, allowances and transportation costs. Based on the analyses, the nurse auxiliary was selected as the most appropriate supervisory agent due to her association with increased promoter productivity and lower costs. An organizational chart was designed delineating the responsibilities for direct and indirect supervision of the promoters. Under this strategy, the promoters would be directly supervised by the nurse auxiliary and would also be supported by indirect supervision by nurses from the canton (county) and province levels. The later higher-level personnel would meet monthly with the auxiliaries to assess the promoters' work, detect needs, and resolve problems.

An analysis of distances through the use of maps permitted the identification of supervisory routes and calculation of minimum supervision costs per province. Given their proximity to the promoter and the community, health posts and subcenters were designated as the health facility level at which supervisors should be based. The category of closest supervisory agent was crossed in a matrix with distance, mode of transport, daily salary, daily allowances, days assigned to supervisory tasks, and transport fares. The information produced was used to design supervisory routes.

Supervisory contacts were set at monthly intervals, based on the number of contacts promoters were already having with higher level personnel. However, by testing the model, investigators hoped to determine if monthly contacts were the most effective. The length of the contact was designed to be four hours. As the number of contacts and supervisors' familiarity with the supervision process increased, it was expected that the duration of the contact would be reduced. It was recommended that the nurse auxiliary supervise one to four promoters.

Finally, an element which the researchers felt was essential to the improvement of promoter supervision was the definition of norms for the content of the supervisory contact. Effective supervision was considered to consist of four main components: investigation (including review of records and direct observation); evaluation; training; and programming promoter activities. The activities to be carried out during each supervisory visit are summarized below:

1. Investigation - Review promoter's register of weekly activities and referrals and inventory of supplies and medicines. Observe promoter in preventive activities during home visits and in curative activities such as injections and the provision of drugs to assess completion of assigned tasks and quality of relationship with the community. Interview community leaders to determine satisfaction with the promoters' work and verify reported activities.
2. Evaluation - Assess the activities carried out by the promoter in terms of priority, completion of targets, effects and use of resources.
3. Training - Provide continuing education for the promoter.
4. Programming - Assist promoter in solving problems, setting priorities among activities, identifying resources needed and programming future activities.

A form was developed and revised with feedback from MOH officials to guide the nurse auxiliary during monthly supervisory visits. This form records information on community organization activities, individual health services, environmental sanitation and immunization activities carried out by the promoter. It also guides the nurse auxiliary in interviews with community leaders and in observations to be made during the visit. The nurse auxiliary would submit the promoter supervision form monthly to her supervisor, the nurse at the canton (county) or the province level.

Testing the Improved Supervision Strategy

The improved supervision strategy was implemented and monitored by the research team in conjunction with the Department of Community Development of the MOH and representatives of FODERUMA. Provincial health officers shared the decisionmaking process and collaborated with the field testing. Two provinces were chosen as experimental for implementation of the new supervision strategy, along with two control provinces. In the experimental provinces, 29 promoters were supervised by 15 nurse auxiliaries and 5 indirect

supervisors. Specific supervisory routes and the number of promoters assigned to each nurse auxiliary were specified. In the control provinces, 27 promoters were directly supervised by 10 health personnel.

The new supervision strategy was introduced in each experimental province through a workshop involving the research staff, the Director of Priority Programs for the Provincial Health Office, the nurses and nurse auxiliaries who would be serving as indirect and direct supervisors, respectively, and the promoters from the participating cantones (counties), representatives of community development organizations at the provincial level, and representatives from local popular organizations. During the four-day workshop, the objectives of the research study and the results of the problem analysis were discussed. The improved strategy for supervision was introduced emphasizing the functions of the supervisor and the forms that would be filled out by the nurse auxiliaries and nurses for direct and indirect supervision. Both the nurse auxiliaries and promoters practiced using the forms and made suggestions for improving the supervision instruments. The specific supervisory routes, indicating the promoters and geographic area to be covered by each supervisor, the cost, mode of transportation, distance and traveling time, were also presented.

The participation of popular organizations in the workshop was considered useful because the researchers had identified the need for greater involvement of the community in supervision of the promoters. It was envisioned that this participation would occur at two levels: (1) at the community level, through the involvement of formal and non-formal leaders in the evaluation and coordination of the promoter's activities; and (2) at the canton and province regional levels, where canton and provincial level health officials would coordinate primary health care (including promoter) activities with representatives of mass organizations. The workshop provided an excellent opportunity for health officials and leaders of these community groups to discuss possible areas of coordination, such as having popular organization representatives accompany the auxiliary nurse in her supervision visits, at least every three months.

Evaluation of the field test. A post-test survey was carried out after five months of field testing the new supervision strategy. As in the problem analysis phase, interviews of both the promoters and supervisors were conducted. Promoter output was judged on the basis of the work performed in the previous month.

The survey of promoters and supervisors demonstrated significant differences in supervision between experimental and control provinces. As shown in Table 2, the average number of supervisory visits, time spent with the promoter, number of contacts with community leaders and number of joint home visits with promoters to pregnant women were higher in the experimental provinces than in control provinces. Supervisors in the experimental provinces reviewed activities with the promoter more often than did control province supervisors. The former also gave better support to the monitoring of pregnant women, health education, curative care to children and adults, surveillance of water sources, garbage and excreta disposal, and treatment of diarrhea and respiratory conditions. In general, they provided more supervisory services than their control province counterparts.

Table 2. Average number of selected supervisory activities per supervisor during the five-month experimental period

<u>Average:</u>	<u>Control Group</u>	<u>Experimental Group</u>
# Visits per promoter	1.8	3.4
Hours of contact	3.2	9.0
Meetings of community leader & supervisors	0.6	2.7
Visits to pregnant women with promoter	0.8	2.9

Supervisors in experimental provinces felt that their activities were appraised more often by the MOH than supervisors in control provinces. Additionally, the average monthly cost of supervision was about half as much in the experimental provinces as in the control provinces (approximately US \$2.20 as compared to US \$4.78 in the control provinces), despite the much higher frequency of contact in the experimental areas.

Analysis of promoter output in the month prior to the post-intervention survey revealed that promoters in the experimental provinces clearly outperformed those in the control provinces. Detection of pregnant women, control of pregnant women, monitoring of postpartum women and newborns, and control of healthy children were significantly higher in experimental provinces. Promoters in the test areas also showed higher output for first aid interventions, activities to increase consumption of potable water, proper disposal of garbage, community health talks and a variety of other activities. (See Table 3.)

Table 3. Average number of activities per promoter conducted in the previous month per community

<u>Average:</u>	<u>Control Group</u>	<u>Experimental Group</u>
Detection & control of pregnant women & children	4.3	7.4
First aid visits	2.6	4.1
Number of latrines built	0.03	0.4
Health talks given	0.5	1.0

The researchers concluded that improvements in the supervision process led to better performance by the promoters. The nurse auxiliary at the health post level was shown to be an effective and affordable supervisory agent. Monthly supervisory contacts proved to be adequate and feasible with the routes assigned and appeared not to have disrupted other responsibilities of the nurse auxiliary. The supervisory protocols developed were successfully used

by the nurse auxiliary and the canton/province nurse and proved to be an effective mechanism for focussing the supervisory contact on priority activities. Finally, as noted, the costs of the improved supervision strategy were equal to or less than the costs of supervision in the control provinces, with better results. Therefore, the improved supervisory strategy was considered to be more cost-effective.

SUPPLY LOGISTICS

Supply logistics continues to be a problem area for the promoter program and for the health system in Ecuador in general. While supply difficulties experienced by the promoters are similar to those encountered throughout MOH facilities, health promoters are not directly included in the MOH regulations for provision of supplies. Instead, the Marginal Rural Development Fund (FODERUMA) purchases, stores and distributes supplies for promoters. This system is parallel to that of the MOH for personnel considered to be within the formal health care system. Although they are the link between the formal health care system and the community, promoters are not officially considered to be MOH personnel.

Because supply logistics for the promoters bypass MOH channels, the use of medicines and supplies by promoters is poorly controlled and supervised by health personnel. The promoters' main source of information on use of drugs is frequently local pharmacists, whose advice often does not conform to MOH regulations regarding promoters. This has led to inappropriate use of some medications, such as antibiotics, without adequate orientation to their proper use.

In theory, each promoter receives a stock of supplies from FODERUMA when he or she initiates service. Promoters are expected to replenish their supplies by establishing a revolving drug fund, whereby revenues from the sale of stock medicines are used to purchase additional supplies from pharmacies, other private sector providers or the MOH. Supplies are also replenished yearly by FODERUMA, based on a retrospective analysis of the previous six months' consumption. In practice, supplies are generally distributed based on availability rather than actual local demand. These supplies are distributed from a central distribution center in Quito, to the promoters in their communities.

In view of the difficulties in the provision of supplies encountered by the promoters and the MOH in general, the researchers set out to study existing mechanisms for the provision of medicines and materials to the promoters in order to develop a solution to the supply problems. Specifically, they sought to determine the variation in demand for supplies among promoters and the obstacles encountered in filling orders. The objectives for improvements in logistics and supply were to assure sufficient levels of appropriate medicines and other supplies to promoters while minimizing the cost and time of supply inventory and distribution.

Problem Analysis

The researchers from the Fundación Eugenio Espejo considered the supply subsystem to be interrelated with the supervision subsystem. Thus, for the purposes of problem analysis, the same survey of promoters and supervisors included separate questions relating to both supervision and supplies. Promoters were asked: (1) their opinions on problems regarding the supply system; (2) the frequency, quantity and type of supplies they received; and (3) how they requested, obtained and used supplies. Questions concerning the use of traditional medicines were also asked of the promoters. The supervisors were asked: (1) what was their role in supply provision to the promoters; (2) what were the costs, frequency and constraints of supply delivery; (3) what were estimates for supplies they had provided the promoters; and (4) what were the mechanisms of control, assistance and support in supply management.

The FEE researchers also analyzed maps to determine distances between promoters and supply distribution centers and collected information on transportation costs and road quality. To explore alternative supply sources for promoters, a survey was conducted of rural physicians to determine which medicines were locally available to the promoters. Additionally, a cost-comparison was made of retail prices for drugs at the community level from various retail suppliers and costs for drugs from other sources (i.e., missions, private voluntary organizations, pharmacies, etc.).

The results of the surveys showed that the initial provision of supplies to promoters, sent by FODERUMA from Quito, took an average of 103 days from the time of the request. Subsequent annual deliveries took about the same length of time. Regarding the availability of medicines and other materials, only 15 percent of the promoters felt that they had the necessary supplies. Less than half stated that they still retained all the necessary equipment originally provided to them for first aid care. Some 85 percent claimed they had insufficient didactic materials to support their health education activities in the community.

The main constraint to maintenance of adequate supplies reported by the promoters was limited resources to purchase replacement supplies. The revolving drug funds maintained by the promoters did not function very effectively because much of the costs of the revolving drug fund were non-recoverable. This was due to the fact that many people were unable to unwilling to pay in full or on time.

The average cash balance of the revolving fund was found to be 1,200 sucres (approximately US\$ 10-15), with a range of 0 to 6,000 sucres. Promoters reported that their transportation costs for replenishing supplies outside the community were between 40 and 3800 sucres and that such trips took them away from their communities for one to six days. To purchase additional supplies, promoters had to generate sufficient cash through other means than the sale of FODERUMA drugs, such as home marketing of drugs purchased at the local pharmacy. When medicines were unavailable from the MOH, the promoters would often purchase medicines outside the MOH regulations in pharmacies or use traditional medicines.

The price comparison showed that the value added to the prices of medicines and supplies sent by FODERUMA was between 50 percent and 100 percent of the original cost, due to the costs of storage, transportation, salary and travel allowances. The total costs of providing supplies through FODERUMA often exceeded the cost of subsidizing their purchase from private drug stores. The least expensive provision centers were the Provincial Health Offices (PHO), but the PHOs had the least amount of useful supplies. The next least expensive provision points were popular pharmacies or community stores that sell essential medicines at reduced prices that are regulated by law. Promoters can also obtain non-drug supplies free at the closest health facility.

In summary, the subproblems identified by promoters in the area of logistical support and supply provision included: the lack of regulations regarding supplies, irregular and varied demand for medications, lack of first-aid supplies and materials for community health education, and irregular provision of supplies from the provincial level that did not respond to local demand.

Solution Development

The FEE researchers initially planned to apply a resource allocation model ('set-covering algorithm') to minimize the costs and time of supply inventory and distribution by determining the optimal locations of centers for promoter resupply. However, after discussion of the findings of the problem analysis with MOH and FODERUMA officials, the investigators concluded that the logistics subsystem could not be significantly improved through a mere fine-tuning of the existing structure through the reassignment of supply distribution points. The researchers realized that a more fundamental solution, consistent with the given constraints in the MOH supply management system, was needed.

To develop a practical solution to the supply problem, the researchers reexamined the constraints, facilitating factors affecting supply logistics and the decision variables that would define potential solutions. The main constraints on promoter supply logistics related to the source and financing of promoter supplies. Since the promoters were not part of the MOH supply system, auxiliary nurses could not supply the promoters for free with medicines from MOH facilities. Moreover, FODERUMA was not willing to completely turn over their funds to the MOH for promoter supplies, and the amount of money available in the promoters' revolving drug funds was limited. However, the existence of a national program to subsidize basic medicines facilitated the promoters' access to low-cost medicines at both government and private distribution centers. Furthermore, the monthly visits to promoters by the nurse auxiliary, under the new supervision strategy developed by the researchers, provided a means of regularly distributing supplies to promoters. With these considerations in mind, the researchers identified the elements of promoter supply logistics that could be modified. These decision variables consisted of:

1. Supply source.
2. Supply agent.
3. Records/procedures for orders, resupply.
4. Resources to manage supply acquisition and distribution (transportation, allowances).
5. Frequency of control of promoters' inventory.

The drug stores of the subcenters and health posts were found to be the least costly source of supplies, so it made sense to incorporate the promoters into the provision of supplies by the MOH. The pragmatic approach developed by the investigators was to incorporate the management of supplies into the strategy for improved supervision by assigning the nurse auxiliary from the nearest health subcenter or health post to oversee the acquisition and use of supplies by the promoter. Under the new strategy, the purchase of drugs and supplies for the promoters would still be financed through their revolving funds, but the purchase of replacement supplies would be done by the nurse auxiliary, using funds given to her by the promoter. This strategy would allow drugs to be obtained at lower costs and consistent with MOH regulations and would increase MOH control over the promoters' use of supplies. It was also expected that this mechanism would result in a supply logistics subsystem that would be more responsive to promoters' needs.

To improve logistical control, a simple inventory form was designed to be used during supervisory visits to systematically assess the promoter's use of supplies and current stock. During her monthly supervision visit, the nurse auxiliary would fill out this inventory form jointly with the promoter. Under the revised supply strategy, the promoter would request supplies by a written order given to the supervisor during her visit. As needed they would fill out the order form together based on the funds available and the need to maintain a minimum stock. The supervisor then would establish priorities among the requests according to their cost-effectiveness in addressing the community's health needs. The supervisor would decide where the needed supplies would be purchased (usually at the subcenter or health post), keeping with established regulations. Over time, the use of this order form could provide essential information to guide decisions about supply acquisition. In addition to providing the MOH with greater control over the promoters' use of drugs, the involvement of the nurse auxiliary in promoter supply logistics was expected to reduce costs of drugs by 30-40 percent through purchase at reduced MOH prices.

Solution Validation

The improved supply strategy was implemented in the same experimental provinces as the improved supervision strategy. Supervisors were trained in the management of supply provision during the four-day orientation to the new supervision approach. Together with the promoters, they reviewed the control forms and procedures to be used to assess the demand for medicines specific to each community, based on the financial resources available. As with the supervision strategy, two control provinces provided a basis for comparison.

Changes in the provision of supplies were evaluated after the combined supervision/supply logistics strategy had been in place for five months, through interviews, surveys, and direct observation. Supply provision was significantly improved in the experimental provinces because of better use of scarce resources, but not because of more rapid delivery of supplies. Promoters were restricted to consumption of medicines they were likely to administer. Purchase from more costly private supply sources was avoided. Funds for medicines, however, remained insufficient.

Other problems were identified during the solution testing. Considerable mystification of modern medicine occurs, and guidelines to deal with this are lacking. Control province promoters felt they had sufficient medicines because of aid from non-profit organizations, whereas the experimental province promoters complained about this insufficiency. However, one should not exclude the possibility that improved effectiveness of the promoters in experimental provinces could have led to greater use of medications. Additionally, the modified supply subsystem had been in place only for five months at the time of evaluation, which may have been an insufficient time period to assess the full impact.

TRAINING

Guidelines for promoter qualifications and training have been developed by the MOH. However, given the regional diversity of Ecuador, the training content and techniques have not been developed with sufficient flexibility to allow incorporation of the considerable geographic and cultural differences found among the over 14,000 small rural communities in Ecuador. The objectives for the training component of the study were to improve the content of training courses and the effectiveness of the training process to enable promoters to better address local community needs.

Problem Analysis

Information sources for the analysis of the training subsystem included a review of the MOH training modules, interviews with key informants, household and promoter surveys, and structured discussions in communities using Nominal Group Technique. Of particular interest were the curriculum content and time allocated to different topics; the didactic methods used; the background of the trainers; the operating costs of the training courses; and community participation in the training process.

In order to determine how promoter training could be improved, FEE researchers sought to define what existing promoters were actually doing. A standardized questionnaire was administered to promoters in 29 highland and coastal villages to evaluate their knowledge and practices. Demographic data on each promoter were collected to determine the adequacy of recruitment criteria. The survey instrument also included questions to determine the promoters' actual practice and level of retention of various topics covered in their initial training. To assess the community response to the PHC program, including satisfaction with the promoter, data were also collected from the heads of 7 households in each village, with a total of 210 households.

Analysis of the promoter responses indicated that retention of training topics was less than 50 percent two years after training. Regression analysis showed no significant associations between community acceptance of the promoter and the promoter's level of knowledge. Community satisfaction and utilization indices were also unrelated to the promoter characteristics of age, sex, marital status, education and ethnicity. However, the majority of persons interviewed did express preferences as to promoter sex, age and marital status. Most respondents also felt that promoters should be trained in some concepts of traditional or popular medicine.

A related study was carried out by Medical Assistance Program (MAP) International in conjunction with the Fundación Eugenio Espejo in 15 communities in the provinces of Chimborazo, Cotopaxi and Manabi to determine factors inherent in traditional communities that facilitate or discourage the adoption of preventive behaviors. The objective of the investigation was to utilize these results to assist in the design of the health education component of the promoter training program. Nominal Group Technique was used to obtain community members' perspectives and experiences in preventive health behaviors. This information supported the formulation of recommendations on the content of the training curriculum for promoters.

Because the FEE research team dedicated most of its efforts to the implementation of the supervision/logistics strategy, the training research was restricted to a description of how the current training system functions and a presentation of conclusions and suggestions for changes that could improve the present MOH's training plan for the promoters. To this end, the researchers held a series of working meetings with personnel from the MOH Division of Community Development to analyze findings and develop recommendations. This resulted in the incorporation of study findings into the MOH training program as the research was being carried out.

The current centralized training strategy, which consists of a two-month course held at a national MOH training center, was found to be inadequate. The eight-week course places a burden on the health promoters, who must leave their communities and incur the opportunity costs of deferring income-generating activities, as well as the isolation from their families. The training is usually conducted by nurses in their year of rural service who have little community experience and who tend to follow a traditional classroom teaching style. Practical work consists mainly of laboratory, demonstrations, and clinical observations in a local hospital, with little or no community-based field work. Additionally, indigerous (primarily Quichua-speaking) promoters encounter linguistic difficulties because the training is conducted entirely in Spanish.

It was also found that the training course does not sufficiently incorporate traditional community health beliefs and values that could reinforce PHC behaviors. Moreover, the promoter is not taught to make use of available community resources that could support PHC activities, such as non-formal leaders and traditional herbal remedies.

Solution Development

As with supervision and supply logistics, the investigators evaluated the constraints to better training and defined decision variables. Among the elements that limit improvements in the training process were geographic and ethnic diversity, limited economic resources, conflict between popular organizations and the formal health sector, and limited socio-economic development in rural communities.

To deal with these problems, the investigators identified factors that could be modified to produce a more appropriate training program. The specific decision variables considered were:

1. Selection process.
2. Improved link between the community and the formal health sector.
3. Occupational profile of the promoter and a suitable curriculum to fit this profile.
4. Characteristics of the trainers.
5. Didactic techniques, given local and regional restrictions.
6. Provision of material resources.
7. Means of community interaction and participation in training.
8. Schedule of training.
9. Training location.
10. Time spent on each module.
11. Balance between theoretical and practical training.
12. Class size.

Recommendations for an improved training program were developed by the investigators based on these decision variables and presented to the MOH. Three components were considered: the promoter, the trainer and the process of training.

Promoters. Basic requirements for selection of promoters that relate to the occupational profile of the promoter, such as literacy, should be defined by the MOH. However, ethnic and demographic characteristics (such as age, sex, marital status) should be determined by the community. The curriculum should be sufficiently comprehensive to consider the multiple ethnic and cultural groups in the country, but flexible enough to be adapted to specific ecological and cultural conditions. At least some exposure should be given to traditional medicine, so as to orient the promoter towards traditional health resources that could be tapped. Finally, the curriculum should include initial activity plans for the promoter, reinforcing the relationship with the supervisor.

Trainers. The complexity of the training process necessitates a multidisciplinary team. This team should be composed of experts in three subject areas: health, social, and education/communication. Trainers in the subject area of health should be health professionals with knowledge and experience in popular education. Personnel with experience and knowledge of the dynamics of the indigenous population should be in charge of training in the social area. This combination of social skills could be filled by leaders of canton level popular organizations. Trainers in the education/communication area should be skilled in popular communication techniques. Provincial health educators could be effective in this task with possible initial support from consultants. They should be in charge of promoting collaboration and effective learning during the training process. A team of trainers should be recruited in each health area to ensure sensitivity to local conditions.

Training process. The modified training process should be divided in two stages. The first stage should give the promoter a basic general knowledge about the PHC program and its components, including community participation and skills in curative and preventive actions appropriate to the area.

A balance between the theoretical and practical learning techniques should be maintained. The second stage of training should reinforce the general knowledge and skills acquired in the first phase, concentrating on conditions specific to the region in which the promoter will work. The second stage should also emphasize planning the promoter's work in relation to those specific regional conditions.

The first phase of training should be located in provincial or canton hospitals and have a duration of 4 to 5 weeks. The materials needed for training are a manual, audiovisual equipment and simple material to train students to make their own low cost teaching materials for community health education. The second phase of training should be located at the local level corresponding with the supervision system, and should last three to four weeks. Similar training materials would be needed with the addition of supervision forms and materials specifically useful to the health problems of the region.

In summary, the course content was modified to better meet community needs. A new decentralized training strategy was proposed involving local health personnel and other community resources in the promoter training. Practical experience was given increased emphasis. The expected benefits from this improved training strategy are that the promoter will be regarded as a community agent, not an agent of the MOH, and that the promoters' attention will be better focused on community needs, since promote activities will be supported by both the community and the MOH.

CONCLUSIONS

The principal investigators demonstrated that a coordinated, systematic approach to the analysis of PHC delivery by promoters could result in improved service delivery. This integrated approach helped to avoid omission of potentially important factors. Collaboration with the MOH and other institutions facilitated the implementation of results and lessened the degree to which impractical solutions were considered.

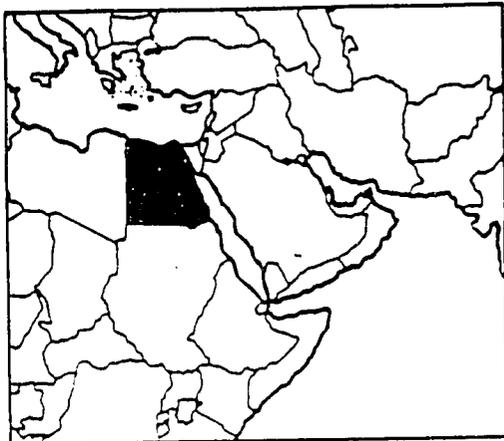
Significant progress was made in the area of supervision. Guidelines were established, supervisors were trained and carried out their duties, and the performance of promoters improved. A practical solution was adopted for supply provision, although some problems remain. Problems in training were identified and an improved strategy developed. A field test of the proposed decentralized training strategy, in conjunction with a proposed expansion of the rural health promoter program, was under consideration by the Ministry of Health at the time of the final study report.

* * *

This study was carried out from September 1983 through March 1986 by a research team from the Fundación Eugenio Espejo, with assistance from national and international consultants. This summary is based on a final report of the study prepared by Dr. Ramiro Echeverría, Lic. Jorge Luna Acosta, Dr. Francisco Sevilla, Ms. Carmen Barrera and Ms. Natalia Wray. Further information is available from the principal investigator, Lic. Jorge Luna Acosta, Fundación Eugenio Espejo, Atahualpa 333 y Ulloa, Quito, Ecuador, or from Lani Rice Marquez, PRICOR study monitor (Chevy Chase).

Study Summary

ADDING NUTRITION REPLETION EDUCATION TO ORT PROGRAMS IN EGYPT



[The following summary is taken in large part from an article prepared by PRICOR researchers and staff for a 1987 issue of the international journal, Socio-Economic Planning Sciences and appears here with permission of the journal's editors.]

During 1985-86, the Nutrition Institute of Egypt undertook an operations research (OR) study on the prevention and treatment of childhood diarrhea and subsequent malnutrition. The study focused on children under three years old who were given oral rehydration therapy (ORT) at primary health

care (PHC) units in Beheira governorate (rural lower Egypt), Assiut governorate (rural upper Egypt), and a suburban district of Cairo. The objective of the study was to find ways to incorporate into Egypt's national ORT program a nutrition message that would change the knowledge and practices of mothers concerning nutritional repletion of children during and after diarrhea.

BACKGROUND

Diarrhea is a major contributor to infant mortality in Egypt and has been the object of a massive campaign focusing on oral rehydration therapy. The campaign was launched in 1983 by the National Control of Diarrheal Diseases Project (NCDDP). Although infant mortality has been declining in Egypt, the decline has not necessarily been accompanied by better health in the survivors. The cumulative deterioration in nutritional status associated with repeated episodes of acute diarrheal disease, well documented in various parts of the world, has not yet been adequately addressed in Egypt.

Malnutrition is common in Egypt, afflicting more than 20 percent of pre-school children. From the age of four to six months, children begin to falter from reference growth curves, without demonstrable catchup episodes. During this critical age many mothers are not aware of how best to feed their infants. Breastfeeding remains prevalent and prevents a high incidence of severe malnutrition, but moderate chronic malnutrition develops as breast milk is supplemented late, and often with homemade preparations with low nutrient content. Host defenses become impaired with the risk of death from diarrhea and other infections increased.

The interrelationship of diarrheal diseases and malnutrition is well documented. Malnourished children are more likely to have more severe and

longer lasting episodes of diarrhea. Children with diarrhea are likely to have food withheld from them, or have it replaced temporarily by a variety of homemade remedies. The focus of diarrheal disease control programs on reducing the mortality associated with acute diarrhea in children provides a temptation to neglect the already well-recognized need to maintain nutritional support during the diarrheal episodes. With the survival of more malnourished children, the need to reinforce the importance of the nutritional aspects of diarrheal control is becoming more apparent.

THE PRIMARY HEALTH CARE SYSTEM IN EGYPT

The Egyptian primary health care system has several components. It includes the official government structure that provides basic health services to the Egyptian population, along with the private providers, community, family, and other individuals who contribute to the health of the population. For purposes of description, we define four levels in the Egyptian PHC System.

The Mother

Level one is the mother-child dyad. In Egypt as in most developing countries the mother is the primary caretaker of the child, especially with regard to feeding and health care. Over 90 percent of infants are breastfed, typically for at least the better part of the first year and many for 18 months or more.

The Family

Both nuclear and extended family structures are common in Egypt, with extended families under one roof more typical of rural than urban areas. In the extended family, the oldest member of the family is usually the acknowledged decisionmaker, and all adult family members are involved in decisions affecting the welfare of a child. Thus, mothers in extended families are often caught between conflicting advice from different sources, especially about child care. For example, advice from a more traditional grandmother may contradict advice from a doctor at the local health center.

First-line Professionals

Level three are the first-line professionals: doctors, nurses, pharmacists, and traditional practitioners. The country's approximately 4,000 rural villages are served by 2,555 government health units which are staffed by physicians, nurses, and paramedical personnel and offer a variety of preventive and curative health services. These health centers are mainly concerned with health education, maternal and child health, family planning, sanitation, and emergency care. Each health unit serves about 8,000 persons; there is one doctor for about every 6,000 rural inhabitants and one nurse for every 3,000. The urban population is served by a network of maternal and child health (MCH) centers. (In this summary, both the rural health units and the urban MCH centers will be referred to as "health centers"; the modifiers "rural" and "urban" will be used to distinguish between the two.)

National Programs

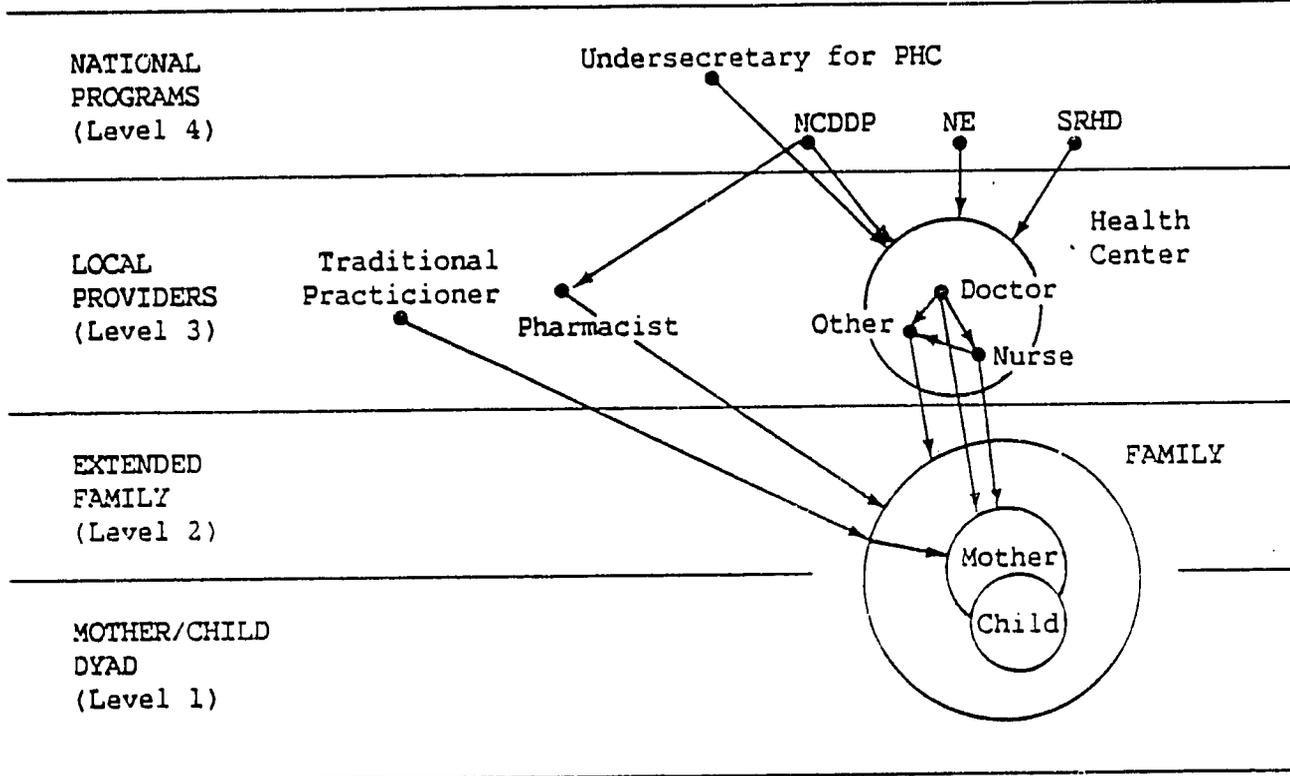
Level four consists of national programs that support and provide guidance for the activities of the health centers. Three of these are particularly relevant to this study: the National Control of Diarrheal Disease Project (NCDDP), the Nutrition Education (NE) program in health centers, and the Strengthening Rural Health Delivery (SRHD) program. Begun in 1983, NCDDP extended earlier efforts by the Egyptian Ministry of Health to implement oral rehydration therapy in Egypt. As a result, the distribution of oral rehydration salts (ORS) is now pervasive; they are available for purchase in private pharmacies throughout Egypt without physician prescription (accounting for 60 percent of ORS distribution), and available without charge at government-run health centers (accounting for 40 percent of distribution). NCDDP has launched a massive public education program through the mass media. In all health centers, each staff member is expected to be knowledgeable of the NCDDP-sponsored ORT program and contribute to the education of mothers about ORT.

The Nutrition Education program operates in more than 500 health centers throughout Egypt, while the SRHD program operates in 232 rural health centers in four governorates only. (Egypt is divided into 24 regional administrative units called governorates.) The NE program gives nutrition training to health center nurses who in turn provide nutrition training to mothers attending their centers; group presentations and individual interactions are used in this education effort. The multifaceted SRHD program emphasizes a variety of MCH preventive services. Some of these services include nutrition components, but SRHD does not contain a comprehensive nutrition education program. Thus, both NE and SRHD operate in the health centers with direct, purposeful contact with mothers of young children on a large but not universal scale. The two programs differ in the degree to which nutrition is the focus; in NE it is central while in SRHD it is not.

Getting health messages to mothers. Mothers receive child care messages from several sources, including various family members, doctors, nurses, pharmacists, traditional practitioners, and the mass media (especially radio and television). Each of these sources is in turn influenced by other sources. For example, a health center nurse may be influenced by messages from health center doctors and the mass media. The decision that the mother finally takes with respect to the child's care depends on the summation of all these messages as well as on the characteristics of the mother and of others with decisionmaking authority in her household.

Messages aimed at mothers move along this communication network from one node to the next and can finally reach the mother from several sources, as illustrated in Figure 1. The channels in this network have limited capacity and varying effectiveness. For example, one channel that is often overloaded in developing countries is the link between the health center nurse and the mothers, because national programs typically focus on the nurse as the one person in closest contact with the mothers. Thus, the way in which the Egyptian PHC system transmits messages to mothers through health center staff was the major focus of this study.

Figure 1



DESIGNING ALTERNATIVE SOLUTIONS

Early in the study a Policy Committee was formed consisting of policymakers from the PHC system, representatives from the Nutrition Institute, and several other individuals with relevant expertise. This Committee was charged with overall direction of the project and with the task of analyzing the problem and identifying alternative solutions for testing. The research team believed it was important to obtain input from those policy makers who would ultimately be responsible for the implementation of the study findings.

In a series of meetings, the Policy Committee analyzed the existing system for ORT delivery, shared knowledge and data about feeding of children during diarrheal episodes, and reviewed existing studies on the topic. The Committee concluded that there was a need to get more information to both urban and rural mothers and health providers on appropriate infant feeding practices during and after diarrhea. The participants wanted to learn if the knowledge and practices of mothers would change after they received an educational message on nutritional repletion through various channels.

The participation of senior officials in peer group discussion about the constraints and characteristics of good solutions enabled the Committee to define those characteristics that would facilitate the integration of the chosen solution into the Egyptian health care system. Consensus development

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using nominal group technique was attempted but was not successful in the Egyptian setting. Thus the approach ultimately used was a series of meetings in which issues were openly discussed and new ideas presented. As the group became more cohesive, it was possible to offer and evaluate potential solutions in a constructive framework. Much of the data used in the preliminary analysis and development of the solutions to be tested was provided by the PHC system directors, based on the functioning of their own units.

Solution Requirements

A major task of the Policy Committee was to develop a methodology for delivering the message and testing its effectiveness. In the first of several meetings of the Committee, the delivery of ORT through the existing PHC system was thoroughly described. Existing knowledge about current practices and recommendations for feeding children with diarrhea were also reviewed and discussed. The Committee decided that any solution to be implemented should be evaluated under both rural and urban conditions.

Because the target for knowledge and behavioral change in this study was the mother of the child with diarrhea, message effectiveness would be measured by the extent to which the PHC system delivered the nutrition message and by the extent to which such change had indeed occurred after the mothers had received the message. In order to understand more about the nature of the communication channels and any possible changes in the knowledge or behavior of the mothers, a survey was also designed to evaluate the knowledge and reported practices of health care providers in the PHC centers.

The Policy Committee and investigators identified several constraints to the range of feasible solutions to the problem. First, it was clear that existing programs were the only realistic mechanisms for delivering a nutrition message. Of the three programs already in operation, described above, it was recognized that NCDDP would give the widest and least expensive delivery, but the NE and SRHD programs provided an opportunity to test the relative effectiveness of more intensely-focused programs. The Policy Committee thought it worth testing whether a message about feeding during diarrhea could be effectively delivered by the NCDDP through the PHC system alone, or whether a special commitment to and training in nutrition (as by the NE program staff) or preventive medicine (as in the SRHD program) would be required to be effective.

A second constraint on the range of feasible solutions was the lack of a highly acceptable and widely distributed weaning food that would be safe and usable under these conditions. Thus any identified solutions had to rely on locally available foods that a mother would be likely to have in her household.

Developing the Message

The Policy Committee agreed that the message to mothers should be simple, specific, and traceable in terms of evaluating the transfer of information to the mother. Traceability was to be based on a specific and unique wording, a technique of labeling successfully used in a similarly designed health education effort in Mexico. This message should be consistent with information that the ORT program planned to give through the mass media and

should add to that information in a way designed to change the most detrimental feeding practices.

The message, once agreed upon, should be delivered through the existing mechanisms in each of the programs, since the addition of extra programming was unrealistic. The Policy Committee wanted to determine if the particular emphasis of each of these programs (nutrition, preventive medicine, etc.) was required for the effective delivery of the message. The directors of each of the three programs, therefore, would incorporate the agreed-upon message into their programs by their usual training and management techniques.

To develop the message, several meetings were held that included local experts from universities and research institutes. Information the group used to compose the message included: knowledge of common practices, data from the pretest of the knowledge, attitudes, and practices (KAP) survey questionnaire, the structure and content of existing programs, and the nutritional needs of the child with diarrhea. In addition, data from ongoing research projects were analyzed with regard to the foods commonly included in diets of toddlers. The message agreed upon has three parts:

1. When your child has diarrhea, continue to feed him so that he will be able to catch up.
2. If you are breastfeeding your child, continue to breastfeed him when he has diarrhea.
3. Feed the child whatever he was eating before having diarrhea, but boil it.

The first two parts of the message reinforce information introduced into the mass media by the ORT program in the summer of 1985. The third part, specific to this project and constituting the "labeled" idea, requires some explanation. Analysis of existing data on diets of older infants and toddlers indicated that a wide variety of foods is included. There is no "weaning food" per se; rather, the child is introduced over time to the usual family diet while still breastfeeding. Among the most commonly introduced foods are rice, potatoes, macaroni, vegetables, bread, fruit, beans, cheese, soups, puddings, and occasionally eggs and/or meat. From this list it appeared that if boiled items and other items for which boiling is an acceptable means of cooking could be retained, a nutritious, digestible, and safe diet would result.

Further, it was believed (and confirmed by pilot testing) that this message would not reduce the consumption of bread, but rather that mothers would probably toast bread (the equivalent of boiling) before feeding it to their children. By starting with the child's usual diet, the message does not require the mother to acquire anything special, but only urges her not to withhold foods which are safe and easily digestible. The specific message in Arabic uses the participle form (literally, "only boiled"), and connotes both those items which have been cooked by boiling and those which can be boiled.

This message is simple, easy to communicate orally, includes three important nutrition messages, and is easy to understand. It provides even the illiterate mother with enough information to allow her to deal with her child

at once and proceed with repleting him. Such a safe, simple message should give the mother confidence to follow it in recurrent attacks of diarrhea for the same child or other siblings. Once the content of the message was determined, the Policy Committee was faced with finding the best way to transmit that message.

Design for Transmitting the Message

Although there were many different possible ways to transmit the message, very little systematic data existed on which methods would be most cost effective. As noted above, early decisions and financial constraints narrowed the choices to existing programs and to government-run health centers. Within this range, the Policy Committee chose a strategy which it believed would be cost effective and which would provide information about the effectiveness of various channels of communication.

Specifically, the Under-Secretary of Health for Primary Health Care would send a letter to the directors of a sample of health centers establishing the message as official policy and requesting that the health centers work to implement the policy. The sample would include centers with NE programs, centers with SRHD programs, and centers having neither the NE nor the SRHD programs (called "PHC-only" centers in this paper).

This design, when coupled with the three-part message, allowed the analysis of several variables. First, any additional effect of the nutrition focus in the NE centers and of the preventive care focus in the SRHD centers could be ascertained. Second, the reinforcing effect of information previously transmitted by the mass media (as was the case with the first two parts of the message) could be compared to the effect of new information (the third part). Third, an attempt could be made to identify the immediate transmitter of the new information to the mother. This would provide a better understanding of the communication network.

TESTING THE MESSAGE THROUGH THE PRIMARY HEALTH CARE SYSTEM

Following the development of a suitable message and a strategy for delivering that message through the three types of health centers, a field test was undertaken. Its purpose was to ascertain whether the message was acceptable and effective before suggesting its incorporation into all aspects of the PHC system, particularly into the mass media.

In simplest terms, the evaluation of the transmission of the message involved three steps. First, a baseline survey of the knowledge, attitudes, and practices with respect to feeding during diarrhea was completed for both mothers and health care providers in several rural and urban areas of the country. Second, the three-part message was transmitted to the health centers. Third, mothers and health care providers at the same centers were resurveyed to determine differences in knowledge, attitudes, and practices after the message had been delivered through the center for three months.

In addition to assessing the level of knowledge and reported practices with regard to dietary modifications during diarrheal illness, the study team also incorporated into the second survey questions specifically designed to elicit

information on whether the mother had heard the relevant message in the last several months, and from whom.

The Sample

Three governorates were selected as study sites, based on the need to represent both rural and urban sites and the major cultural divisions of the country, north and south (Lower and Upper Egypt, respectively). Cairo governorate was selected as a major urban site; Beheira governorate was selected from Lower Egypt (the Nile Delta), and Assiut governorate represented Upper Egypt. The two nonmetropolitan governorates, Beheira and Assiut, are predominantly but not exclusively rural; both rural and urban health centers were sampled within these governorates. Within each governorate, health centers were selected at random after first eliminating those which contained both Nutrition Education and SRHD; thus each center selected had either the PHC system alone (neither NE nor SRHD), the NE program, or the SRHD program. All centers participated in the NCDDP. A total of 104 health centers were included in the baseline survey; 100 of these were surveyed six months later in the followup survey. In Cairo, three centers were shifted into the NE category because of the initiation of that program in the centers; four others were unable to participate in the second survey because their facilities were being renovated. The distribution of health centers by governorate and type of center is shown in Table 1.

Table 1. Number of health care centers by governorate and program components (baseline and followup surveys)

<u>Program components</u>	<u>Governorate</u>			<u>Total</u>
	<u>Cairo</u>	<u>Beheira</u>	<u>Assiut</u>	
PHC alone	10 (3)	14 (14)	10 (10)	34 (27)
Nutrition education	24 (27)	15 (15)	6 (6)	45 (48)
SRHD	0 (0)	14 (14)	11 (11)	25 (25)
Total	34 (30)	43 (43)	27 (27)	104 (100)

The two surveys took place in July and August 1985 and in December 1985. Standardized questionnaires were used for each interview. Interviews were conducted by Nutrition Institute physicians and by health care professionals from governorate health departments who had been trained in the administration of the questionnaires by Nutrition Institute physicians. In the first survey, all mothers present in the health care center on the interview day, and who had brought a child under three years of age for treatment of diarrhea, were interviewed. In the second survey, conducted during the winter months when the incidence of diarrheal disease is lower, all mothers present in the center with a child under three years of age for any presenting complaint were

interviewed. There were 1,003 mothers in the first survey and 1,000 in the second, 620 of whom had children ill with diarrhea on the interview day. Table 2 gives the sample size distributed by age of the child. All health care providers who were present on the interview date and who were able to give time for the interview were included in the sample. The health care provider sample included 341 providers in the baseline survey and 496 in the followup survey. The distribution as to type of provider was not significantly different between the two surveys (37 percent physicians, 40 percent nurses, and 23 percent others in the baseline survey; 30 percent physicians, 40 percent nurses, and 30 percent others in the second survey).

Table 2. Mothers mentioning giving ORS
in the current illness

<u>Age of child</u>	<u>July 1985</u> Percent. (N)	<u>December 1985</u>
0 - 3 months	29.6 (118)	75.4 (61)
4 - 6 months	37.1 (188)	67.7 (93)
7 - 9 months	38.0 (223)	71.7 (92)
10 - 12 months	46.9 (155)	68.5 (108)
13 - 18 months	48.3 (200)	68.8 (125)
19 - 24 months	44.6 (126)	74.4 (82)
25 - 36 months	43.9 (93)	69.5 (59)
Total	45.6 (1003)	70.5 (620)

The two surveys did not differ significantly with regard to the rural/urban residence of mothers (40 percent urban in the first survey, 44 percent in the second); maternal age distribution (31 and 29 percent below 25 years in the baseline and followup surveys respectively; 46 and 50 percent between 25 and 34 years; and 23 and 22 percent 35 years or older) or in the age distribution of infants brought for treatment. There was, for reasons which are not clear, a significant difference in maternal education between the two samples: in both the rural and urban samples, a greater proportion of mothers were literate in the followup survey, based on separate questions about ability to read and write, and a larger number reported having completed primary school. In the rural sample, 92 percent of mothers in the first survey but only 83 percent in the second survey were illiterate and had not completed primary school. In the urban sample, 74 percent of mothers in the first survey but only 64 percent in the second survey were illiterate and had not completed primary school. These differences are not explained by maternal age, which was not different between the two samples.

RESULTS

The results of the surveys provided information on changes in mothers' knowledge and use of ORT, on changes mothers made in their children's diet during and after diarrhea, on mothers' receipt of the educational message, and on the changes in practice of health care providers. These results are discussed below.

Mothers' Knowledge and Use of ORT

In the baseline survey, 73 percent of mothers reported that someone had told them about ORT, but fewer than half reported having used ORS in the current diarrheal illness. Having heard about ORT was significantly related to the type of health center. The centers with the specialized programs (NE and SRHD) had 75 and 80 percent of mothers aware of ORT compared to 67 percent who attended the PHC-alone type center. In the followup survey, a significantly greater percentage of mothers reported both knowledge and practice of ORT; 93 percent reported having been told about ORT, and 70.5 percent of those whose children were ill with diarrhea reported having used ORS in the current illness. It appears that at the time of the baseline survey, mothers were less likely to use ORS for younger infants (below six months of age), but that by the time of the second survey this trend no longer occurred (see Table 2). Since specific information about ORS was not part of the message delivered by this project, but is part of the program within which the message was delivered, we can assume that the message about feeding children with diarrhea was being sent to mothers at a time when general awareness and use of ORS was increasing, and that the effect may have been particularly strong in relation to young infants with diarrhea.

Change of Diet During Diarrhea

Specific dietary practices in relation to diarrhea were assessed by questions regarding the presence or absence of specific foods in the child's usual diet, and in the diet reported given during diarrhea. Table 3 presents data, by age of the child, on the percentage of mothers in both surveys reporting that they stopped all food during diarrhea and the percentage reporting that they stopped breast milk. The data from the followup survey are based on only those mothers (n=620) whose children were ill with diarrhea on the day of the survey. There was a marked decrease between the first and second survey in the proportion of mothers who stopped breastfeeding during diarrhea, from almost 15 percent to fewer than 5 percent. The proportion of mothers who reported withholding all food dropped from 10 to 5 percent.

In both surveys, the food items most likely to be retained during diarrhea (aside from breast milk) were rice and potatoes; those most likely to be restricted were eggs, meat, dairy products, beans, fruits, and vegetables. Thus the content of the message, to continue breastfeeding and to offer boiled food, was shown to be consistent with common practice and not to contradict practices followed by the majority of mothers. A significant number of mothers reported adding specific items to the child's diet during diarrhea;

Table 3. Percentage of mothers who reported withholding all food, and stopping breastfeeding, during diarrhea

Age of child	<u>Stopped all food</u>		<u>Stopped breastfeeding*</u>	
	<u>July 1985</u>	<u>December 1985</u>	<u>July 1985</u>	<u>December 1985</u>
0 - 3 months	1.7	3.3	6.7	5.4
4 - 6 months	7.9	3.2	11.7	5.6
7 - 9 months	10.8	0	15.3	2.7
10 - 12 months	11.6	5.6	12.3	3.1
13 - 18 months	8.0	6.4	10.2	5.0
19 - 24 months	11.9	7.3	14.9	0
25 - 36 months	9.7	6.8	27.2	8.3
Total	9.9	4.7	14.7	4.5

*Percentage of all mothers of children with diarrhea, not percentage of children receiving breast milk before diarrhea. Percentage of children receiving breast milk before diarrhea was not different for any age between the two surveys and declined steadily from approximately 92 percent for infants under 30 months of age to 27 percent at 25-36 months.

these were most often sweetened boiled water, with or without the addition of local flavoring agents, and several varieties of starch-based puddings. Documentation of these practices provides information for future development and refinement of the message to encourage existing favorable practices along with those currently recommended.

Receipt of the Educational Message

Mothers' familiarity with the educational message was assessed in two ways. In the first, more indirect approach, each mother in the followup survey was asked whether she had attended any health center in the past three months; if she had heard something there related to feeding the child during diarrhea; and if so, what. The question was open-ended, so as not to suggest the content. Table 4 summarizes the results by type of health center. Overall, 779 mothers (77.8 percent) reported that they had attended a health center in the previous three months and that they had heard something there about nutrition. Of these, 92 percent stated that someone had told them specifically about how to feed children with diarrhea. Almost all of these mothers (90 percent) in all types of health centers received information about the use of ORS during diarrhea.

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Table 4. Percentage of mothers who received message concerning nutrition repletion during diarrhea

<u>Advice</u>		<u>Type of center</u>			<u>Total</u>
		<u>PHC- Alone</u>	<u>NE</u>	<u>SRHD</u>	
ORT	% (N)	89.6 (172)	93.2 (329)	98.2 (168)	93.4 (669)
Continue Breast milk	% (N)	55.7 (107)	73.7 (260)	76.0 (130)	69.4 (497)
Same diet but boiled	% (N)	24.0 (46)	50.4 (178)	29.8 (51)	38.4 (275)

The component of the message concerning breastfeeding was reported by 69.4 percent of mothers; mothers attending NE and SRHD centers reported receiving the message more often than those attending PHC-alone centers. The component of the message stating "continue the diet, but boil it during diarrhea" was reported by 38.4 percent of mothers. This result is particularly significant in light of the fact that during the baseline survey only one mother had spontaneously mentioned "boiled food" when asked what she fed her child during diarrhea. In the more direct question, the educational message was read to the mothers; 58 percent reported it to be familiar. Of these, 75 percent stated they had been given the advice by doctors, 27 percent by nurses or by both.

Reported Practices of Health Care Providers

Each health care provider was asked specifically what his or her usual advice was for a child with mild diarrhea and, in a separate question, for a child with severe diarrhea. The baseline survey revealed significant differences among types of centers, with providers in PHC-alone centers more likely to refer cases of diarrhea and less likely to use ORT or to give dietary advice than providers in either NE or SRHD centers. These practices were related to years of experience in PHC-alone centers, with inexperienced physicians more likely to refer cases of both mild and severe diarrhea.

Virtually all providers stated that they would like specific materials and training in the area of nutrition during diarrhea; fewer than half the providers in the PHC-alone centers reported that they had had any such training, and they were more likely to rely solely on their own experience than providers in the centers with the specialized programs.

There was a significant difference in reported advice given between the first and second surveys. Table 5 summarizes these data in relation to the percentage of providers advising the use of ORS and those who reported giving dietary advice to mothers whose children had diarrhea. Table 6 summarizes

specific dietary advice given: for continuation of breast milk, for rice, for potatoes, and for starch puddings. From these data, we can conclude that the reported practices of health care providers in the study centers became more appropriate during the course of the study. The impact is seen for all types of providers (doctors, nurses, and others) and is strongest in the PHC-alone type centers which had not had the advantage of prior training in nutrition.

Table 5. Advice given on ORS and diet by health care providers (percentage recommending for treatment of severe diarrhea between July and December 1985)

Provider		ORS advised			Diet advice given		
		Type of center			Type of center		
		PHC-alone	NE	SRHD	PHC-alone	NE	SRHD
Doctors	July 1985	61.5	92.2	94.4	15.4	45.1	38.9
	December 1985	82.8*	97.1	100.0	41.4*	49.0	57.9*
Nurses	July 1985	57.9	67.5	30.8	0	33.8	12.3
	December 1985	51.2	60.7	56.3*	29.3*	24.3	20.3
Others	July 1985	24.1	50.0	35.3	3.4	28.6	11.8
	December 1985	32.8	32.5	30.8	5.2	15.0	3.8

*Significant increase, p is less than .05 based on a detailed students t test.

Table 6. Specific dietary advice given by health care providers (percentage recommending)

<u>Food to be continued</u>	<u>Provider</u>	<u>Baseline Survey</u>	<u>Followup Survey</u>
Breast milk	Doctors	81.1	88.2
	Nurses	80.2	92.5
	Others	62.5	64.4
Rice	Doctors	37.7	44.4
	Nurses	19.0	47.1
	Others	5.4	18.5
Potatoes	Doctors	44.3	57.6
	Nurses	23.8	53.5
	Other	8.9	29.6
Starch pudding	Doctors	27.9	32.6
	Nurses	13.5	36.9
	Other	3.6	11.9

CONCLUSIONS AND POLICY RECOMMENDATIONS

The problem of withholding food from children with diarrhea had been identified by previous studies and experience in Egypt. The development of a simple, straightforward message to mothers about feeding their children during diarrhea was undertaken so that it could be incorporated into all aspects of the country's ORT program -- through the health centers, the pharmacies, and the mass media. This study, which used the government-operated health centers to test the delivery and acceptability of the message, affirmed that the message developed was simple, understandable, and consistent with the reinforcement of existing favorable practices as well as with the discouragement of unfavorable ones. It can be concluded from this study, that (1) the health centers in Egypt are a viable route for sending simple health education messages to mothers; (2) the practices of health care providers, as well as the knowledge and practice of mothers, were changed favorably during the course of the study; and (3) the message was retained in the population of mothers and providers exposed to the message for at least the period of three months.

This study did not test the time for decay of the information in this system, i.e., how often the message will need to be reinforced. Nor did the study attempt to identify the spread of the message to pharmacists, to health care providers who joined the system since the beginning of the study, or to mothers who did not attend health care centers. These aspects require further research.

The Policy Committee's recommendations are that:

- The message be continued through the educational programs of all three types of health centers, and extended to all health centers in the country.
- The message be adopted by other systems concerned with health, i.e., school curricula and the mass media. (At this writing, it has been incorporated into the national mass media ORT campaign.)
- Egypt should explore the feasibility of adopting other priority health education messages to be communicated in a similar manner, given the demonstrated simplicity of the process once an appropriate message is agreed upon.

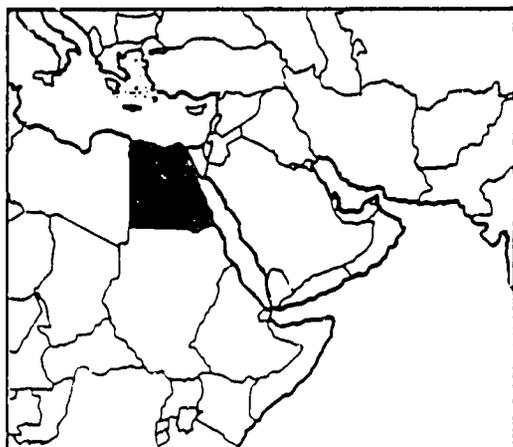
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This study was conducted by researchers from the Nutrition Institute, Cairo, from February 1985 through March 1986. This summary was based on a final report of the study prepared by Osman M. Galal, Farouk M. Shaheen, Gail G. Harrison, Dena Shehab, Cheryl K. Ritenbaugh, and Barton R. Burkhalter. Further information is available from the principal investigator, Dr. Osman Galal, Director, Nutrition Institute, 16 Kosr el Aini Street, Cairo, Egypt, or from Dr. Jeanne Newman, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

IMPROVING ORS INVENTORY MANAGEMENT IN RURAL HEALTH FACILITIES OF EGYPT



In 1984, the Strengthening Rural Health Delivery Project of Egypt's Ministry of Health initiated a study of oral rehydration salt (ORS) inventory control using operations research (OR) methodology. The objective of the study was to improve ORS availability in rural health facilities and surrounding communities. Two Governorates, Fayoum in Upper Egypt and Dakahleya in Lower Egypt, were selected as the sites of the study.

BACKGROUND

At the time the study began, the Egyptian population was estimated at 49 million, 55 percent of whom live in rural areas. Ninety-eight percent of the people lived in the narrow Nile River Valley which composes only 4 percent of Egypt's surface area. This pattern of population distribution has resulted in a de facto population density of over 1200 persons per square kilometer. Rural areas face such problems as poor housing conditions, lack of safe drinking water, and unsanitary sewage disposal systems.

Children less than five years of age constitute 17 percent of the total population, and the infant mortality rate (IMR) is 80 per 1000 live births. The leading causes of death among children less than five years old are diarrhea, respiratory tract infections, and malnutrition.

Health services are provided by an ever-growing private sector, and by multiple public sector organizations. Services to rural communities are primarily delivered through the Ministry of Health's (MOH) extensive infrastructure (2598 facilities in early 1986). Through the Nutrition Education (NE) program, nurses at some of the Primary Health Care (PHC) centers teach mothers about nutrition for themselves and their children. The Strengthening Rural Health Delivery (SRHD) Project is also active in some PHC units; this is a multifaceted program focused on upgrading preventive services, especially maternal and child health (MCH) services, through training of health providers and an outreach program.

World Health Organization formula oral rehydration salts (ORS) were introduced to Egyptian health facilities in 1977, and in 1980 the national program to combat diarrheal diseases among children was started. Through this program, efforts to distribute ORS packets to private and public health services

intensified. Despite these efforts, by 1983 routine ORT use in the health services was still less effective than anticipated in lowering morbidity and mortality from dehydration.

In 1983, the National Control of Diarrheal Diseases Project (NCDDP) was established and fully incorporated into the PHC system. This oral rehydration program reaches all health facilities (government and private sector facilities) and provides training for health care providers on ORT; it also carries out a mass media education program for the public. ORT is presently available at 2600 PHC units in 4000 villages through this program.

In addition, researchers at the SRHD Project undertook a three-phase operations research study to investigate the availability and demand for ORS, and to develop and test solutions to solve the problems they identified in the problem analysis phase. It is this OR study which is described in this paper.

PROBLEM ANALYSIS

During the problem analysis phase of the study, the researchers investigated both ORS availability and demand at rural health facilities and private pharmacies in two districts in the Fayoum Governorate in Upper Egypt, Fayoum and Sennoures. Fayoum was involved in the SRHD Project while Sennoures had only the basic government health services.

ORS Inventory Management/Distribution

In the initial phase of the PRICOR-funded study, the distribution of ORS packets was traced from Abasseya, the central warehouse in Cairo, to the Fayoum Governorate warehouse, to the Fayoum and Sennoures District warehouses, to the rural health facilities, and finally to the community.

The study found that ORS packets were available in abundance in the Fayoum governorate warehouse, and the Fayoum and Sennoures district warehouses. Most of the ORS stock from governorate and district warehouses was distributed to health facilities; only a small percentage of ORS stock was kept on reserve in the warehouses. The average number of packets given to rural health facilities in Fayoum district was higher than that of Sennoures district. This was due to the efforts of the SRHD Project in continuously updating the knowledge of health personnel in Fayoum district and promoting the use of ORS for managing diarrheal cases among children (Table 1). Only 47 percent of the packets ordered in Fayoum district health facilities and 66 percent in Sennoures district health facilities were actually given to consumers, however, resulting in a surplus of ORS packets at the health facilities. No problems were detected in transport or receipt of ORS packets at any level.

The investigators found that this build-up of excess ORS packets existed at each step of the distribution chain, and that this surplus created an inventory management problem particularly at the health facility level.

Inventory management at the rural health facility is the responsibility of the physician. Unlike other medications and supplies which are ordered directly by the health facility physician, ORS packets are not included as an item when considering the allowance for the facility since they are obtained without

Table 1. Total number of Oralyte packets ordered and average number of packets distributed per child per year (beginning of 1980 through the end of 1983)

	<u>Total number of Oralyte packets</u>			Number of children < 5 yrs.	Avg. No. of Oralyte packets distrib. /child/yr.
	Ordered	Distributed Number	Percentage		
Fayoum govt.	314,700	283,390	90.1	809,933	0.35
Fayoum dist.	77,030	73,280	95.1	222,348	0.33
Sennoures dist.	27,080	23,980	88.6	137,121	0.18

cost. ORS needs for the country, as well as the allocation of ORS packets to governorates, are made by the central maternal and child health office of the MOH. This estimation is based on the population size in each governorate, rather than the rate of ORS consumption at the Governorate. The result is that the demand for ORS is "pushed" from the center rather than being "pulled" by the periphery.

ORS Demand

The researchers also examined ORS demand during the same period, at the health provider and community levels. They interviewed physicians and nurses at rural health facilities and pharmacists in the private sector, to ascertain their knowledge of ORT for diarrheal disease control and their patterns of prescribing ORS to mothers whose children have diarrhea. Six health facilities in Fayoum district (SHRD) and six health facilities in Sennoures district (non-SRHD) were randomly selected, and the twelve physicians responsible for these facilities interviewed. Patterns of treatment by physicians for diarrheal cases were also assessed through analysis of the registration data at the 12 study health facilities during the peak diarrhea season of 1984 (mid-April to mid-August). Interviews were conducted with 29 nurses working in the same twelve rural health facilities (14 nurses in Fayoum and 15 in Sennoures). All pharmacists in rural Fayoum district were interviewed; pharmacists in urban Fayoum and in urban and rural Sennoures were chosen at random. The total number of pharmacists interviewed was 20.

Data collected from the registration of diarrhea cases at the facilities during the summer of 1984 showed that in Fayoum district, almost all of the cases had been given Oralyte packets (99 percent), while only two-thirds of the cases in Sennoures (61.7 percent) were given packets. (Table 2.)

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Table 2. Types of diarrhea treatment given by physicians by district

Treatment	Fayoum		Sennoures	
	Number	Percentage	Number	Percentage
- OralYTE only	742	55.0	44	2.6
- OralYTE + other drugs	593	44.0	993	59.1
- Antibiotics only	7	0.5	29	1.7
- Antibiot. + other drugs	7	0.5	590	35.1
- Others	0	0.0	24	1.4
Total Cases	1,349	100.0	1680	100.0

Interviews with physicians revealed that all six working in Fayoum district had attended training sessions on diarrhea management, while only three out of the six Sennoures district physicians had attended such a training course. All physicians except one (Sennoures), recommended using ORS for treating childhood diarrhea. However, physicians who had attended the SRHD project training program on diarrheal management prescribed ORS more frequently, generating a higher demand in Fayoum. None of the physicians reported any problem in obtaining ORS.

A survey of homes with children under five years of age and the registration of cases of childhood diarrhea at the 12 rural health facilities provided data on community demand. The survey included approximately 6,320 families with children under five years of age in Fayoum and Sennoures districts. Families were interviewed in both "mother" villages (i.e., those with a rural health facility) and satellite villages (without a facility).

Twenty-three percent of the children under five in these families had experienced a diarrheal episode during the month of June, 1984. The mean duration of diarrheal episodes was five days. In 99.1 percent of the families interviewed, the mother is the one who takes care of the young children. The government health facility is the prime source of medical advice for 68 percent of the caretakers in Fayoum district and 56 percent in Sennoures district. Diarrhea accounted for 73 percent of all illness among children less than five years old during the test month. Fifty-six percent of the caretakers in Fayoum district gave ORS while only 39 percent in Sennoures did so. Of these, eighty-eight percent of mothers in Fayoum gave ORS to their children within two days of the onset of diarrhea, which is significantly sooner and more often than in Sennoures. However, of those who preferred to use ORS, only 51 percent of them knew how to prepare a packet of OralYTE correctly.

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In general, the investigators found that the rural community's demand for ORS was greater where providers had been trained and the community had received health education. In such communities, people utilized the government health facilities more often, used more ORS packets, and gave the packets to their children earlier than in other communities.

In conclusion, the major findings of the problem analysis phase of the study revealed:

1. Weak health provider demand for ORS due to inadequate knowledge on the part of some health staff about modern methods of diarrhea management;
2. Weak community demand for ORS;
3. Poor community utilization of the governmental health facilities; and
4. Excess inventory.

The investigators concluded that the surplus of ORS packets in the medical supplies warehouses observed at the time of the study was the result of a national supply of ORS packets determined centrally based on epidemiological considerations, rather than in response to information on actual consumption of ORS. The problem of underutilization of ORS was not due to inadequate distribution as had earlier been hypothesized, but to insufficient local demand for the packets and inefficient management of inventory.

SOLUTION DEVELOPMENT

As a first step in developing feasible solutions to the problems identified in the problem analysis phase of the study, the principal investigator presented the findings to decisionmakers in individual meetings. The participants included top-level policymakers from the MOH, the NCDDP, the UNICEF office in Cairo, and the Fayoum Governorate Rural Health Department. The decisionmakers then came together at a solution development workshop early in 1985, where they used an Interaction Matrix Method to develop appropriate strategies to improve ORS distribution and utilization.

At the workshop, the decisionmakers were first asked to rank a set of criteria for evaluating alternative solutions to the problems identified. The evaluation criteria included: (1) guaranteeing ORS availability at health facilities, (2) increasing health providers' demand for ORS, and (3) increasing community demand for ORS.

Next, the PRICOR researchers offered alternative solutions including: (1) improve the ORS inventory management information system; (2) train health providers, including pharmacists, in ORT; (3) educate communities about ORT; and (4) distribute ORS through home visits by nurses or volunteers. The decisionmakers were asked to rank these proposed solutions in order of importance in satisfying the criteria above. Based on the average scores, suggested solutions were ranked in the following order:

1. Community health education
2. Training of health providers
3. Improvement of data flow on ORS demand from the periphery to the center
4. ORS home distribution by facility nurses
5. ORS home distribution by community volunteers.

The first two suggested solutions had already been given much attention by the NCDDP. Several mass media messages were being prepared and delivered, and intense in-service training for providers (including pharmacists) was underway. The fourth solution was already being carried out by nurses in many of the SRHD areas, while the fifth solution, home distribution by volunteers, was being tested by an NCDDP-sponsored Egyptian firm beginning with the summer of 1984. Consequently, it was decided to develop and test effective ways of improving ORS data flow from the periphery to the center.

The objective of a strengthened system for monitoring ORS consumption was to identify the key ORS inventory variables needed to construct an appropriate mathematical inventory model, which would in turn be used to develop an improved ORS inventory management system at the peripheral level.

SOLUTION TESTING AND VALIDATION

A field study was carried out in two governorates, Fayoum in Upper Egypt and Dakahleya in Lower Egypt. In the Upper Egypt governorate, the six rural health facilities in each of the two districts from the problem analysis phase were retained for the field test. Three of these represented SRHD and three non-SRHD districts. Six facilities in each of two Lower Egypt districts were randomly selected to reflect a different setting -- one in which the staff had not been exposed to the problem analysis phase of the study, but where they had received training on ORT in the normal course of SRHD training. The sample thus encompassed six facilities in each of the four districts.

For the solution testing and validation phase of the study, the researchers developed a system of ORS reporting forms to facilitate the flow of information about ORS consumption, from rural health facilities to the center. These forms were then field-tested in the 24 rural health facilities from May through October 1985. Data from these forms were supplemented by demand and utilization data abstracted from drug inventory books and clinic records at rural health facilities for the 18-month period, May 1984 through October 1985. Information from the individual health facilities was compiled on a district level form, and the district forms were compiled in turn at the governorate level. Inventories of ORS stocks were also carried out at both district and governorate level drugstores. The purposes of the additional data were two: to validate data collected through the monthly reporting forms, and to assess the potential seasonal variability of ORS consumption and requisitioning patterns.

At the request of NCDDP officials, a simple questionnaire was also designed and implemented to ascertain the attitudes of health facility physicians and their supervisors about the existing NCDDP information system, and their use of the NCDDP information. In response to a concern of some staff members at the NCDDP to estimate the time lapse between production and consumption, samples of ORS packets dispensed to mothers were collected. For each packet, the date on which it was dispensed (i.e., consumed) was recorded, along with the date of its production at the pharmaceutical company.

RESULTS

Demand for ORS

Comparison of the providers' demand for ORS in the study facilities of the two Upper Egypt districts during the summers of 1984 and 1985 showed little change in the SRHD district, as the initial level was already very high (99%). On the other hand, the demand in the non-SRHD district showed a significant increase in 1985 over the preceding year, although the level was still significantly lower than in the SRHD district. This positive change is presumably a result of the provider training launched by the NCDDP.

Nevertheless, although the total amount of ORS dispensed in both districts in 1985 markedly exceeded that of 1984, the per capita mean amount was less in 1985. ORS was prescribed by facility physicians to a relatively high proportion (88.6 percent) of children presenting with diarrhea. However, each contacted child received a mean of 7.74 ORS packets (5.5gm packets, i.e., 1.55 liters of solution) or the equivalent of only 65 percent of the theoretical demand expected on epidemiologic grounds. This observation suggests the need for continuing to provide training and education to providers.

The increase in demand for ORS may also be attributed to the community response to the NCDDP mass media education campaign. This explanation is substantiated by the observed increase in the number of children with diarrhea who sought facility care in both districts. It is believed that this trend reflects an increased awareness of caretakers, rather than an increased disease prevalence in the community.

The level of ORS consumption each month as recorded in the inventory books of the sample facility pharmacies was checked against that reported in the outpatient records. In many of these instances, the amount reported in the inventory book, was greater than that reported from the clinic record. This was due in part to the fact that expired and/or spoiled packets, as well as those dispensed to SRHD nurses for distribution during home visiting were subtracted from the inventory book, but did not appear in the outpatient records.

ORS consumption levels recorded in the inventory books over 18 months (May 1984 - October 1985) showed that there is a seasonal variation which is consistent with the seasonal variability of diarrheal disease incidence.

ORS Supply and Inventory

While the 27.5 gm ORS packets were generally abundant in the Lower Egypt governorate, the 5.5 gm packets were generally not available before May 1985. In general, the number of 27.5 gm packets delivered to the governorate and district level drug stores in both regions decreased over the 3 successive 6-month periods, while, on the other hand, the numbers of 5.5 gm packets increased markedly. This pattern was expected as the 27.5 gm production had stopped and was compensated for by production of the 5.5 gm packets.

In Upper Egypt facilities, 5.5 gm packets were available in variable but relatively small quantities, with short periods of ORS unavailability. The 27.5 gm packets were available at the surveyed facilities of the two Lower Egypt districts in quantities far beyond their consumption level. Despite

this overstock, additional packets had been delivered to most of these facilities. It is unclear from the inventory books whether the additional deliveries were requested by the facilities, or "pushed" to them by the district stores. The fact that additional deliveries were infrequent and were not to all facilities argues against pushing. One explanation is that the 5.5 gm packets were requested, but because of unavailability at the district stores, 27.5 gm packets were substituted. This situation, however, decreased the number of 5.5 gm packets requisitioned by facility physicians when they did become available later at the district stores.

Calculations were carried out to determine the average duration for which the inventory quantity at each of the three levels (governorate, district, local) would be sufficient at current levels of demand (based on the distribution/consumption data during the previous six months). Computations revealed variability among the three facility levels, as well as between the two types of ORS. In general, when the average storage duration is long at the governorate and/or district store, it tends to be short at the facility level, and vice versa. The cumulative estimated interval (from the governorate, through the district, to the facility), exceeded the shelf life of the 27.5 gm packets in most cases, even without adding the time lapse between production and delivery to the governorate store. This result substantiates the findings of the problem analysis phase of the study.

A sample of 32 5.5 gm packets and 21 27.5 gm packets distributed to mothers at study facilities were collected on different occasions to compare the production date of the packet against the date of consumption. For some packets the mean time lapse between production and consumption at the community level was shorter than the estimated average duration that ORS was in stock. This discrepancy indicates that ORS distribution, particularly with 27.5 gm packages, is not based on the "first in, first out" basis.

Information collected on the ORS inventory system shows that neither of the two common commodity ordering systems i.e., the periodic (fixed order interval) system or the perpetual (fixed order quantity) system, had been adopted for ORS. Both the order interval and quantity varied greatly at all levels during the 18 month period, irrespective of the season. It appeared that the Ministry of Health's periodic ordering policy for pharmaceuticals at the facility level was not applied to all ORS. The investigators suggested that this was because ORS is locally produced in abundant quantities, is readily available to governorate drug stores, and its requisition at all levels is not tied to the demand (consumption) levels.

A double-round questionnaire addressed to physicians indicated that attitudes toward utilization of the NCDDP information system had improved over time. In the post-survey, 62.5 percent of the respondents reported using the information system for improvement of the ordering system, whereas in the pre-survey none had made this linkage. Problems reported included duplication of data collection, little or no use of the data on the peripheral and local levels, collection of irrelevant data, and lack of integration with the MOH information system. Many users of the NCDDP system did not appreciate its value as a management tool.

When the six pharmacists of the governorate and district stores were asked about their criteria for estimating order quantities, the responses focused on the tendency to request the largest possible quantity, based on the previous

year's level of demand. When the 24 facility physicians were asked about their criteria for estimating their need, the responses referred to work load and the previous month's consumption.

The stock level maintained was also dependent on other variables, such as the lag time between requisition and receipt of the commodity, the ordering frequency, costs of acquisition and of holding the inventory, and non-monetary shortage (stock-out) costs.

Mathematical Inventory Models

The data gathered through the new PRICOR ORS inventory reporting system were analyzed using two alternative mathematical inventory models. The objective of this exercise was to develop an analytical tool which could be used by the physician/manager at each level of the system to improve inventory management.

The first model, based on economic parameters, was found to be impractical both because of the difficulty in estimating relevant costs and because neither the costs of acquisition nor of storage of ORS appeared to be important factors in inventory decisionmaking at the local level. The second, more useful model, consisted of a set of equations relating both inventory and safety (buffer) stocks to seven key system variables: annual demand, lead time, variability in lead time, lead time demand, order frequency, order quantity, and acceptable stock-out level. This model produced valuable insights into inventory system dynamics. (See Appendix A for detailed discussion of both models).

Although direct application of the second model to inventory decisionmaking by local managers was considered impractical, the principal investigator incorporated the model into a simplified periodic ordering scheme. According to this scheme, ORS orders are placed monthly at the periphery, every two months at the district level, and quarterly at the governorate stores. The quantity to be ordered by the physician/manager at each level is estimated from three easily calculated parameters: average cycle demand, demand during the previous cycle, and inventory level at the close of the previous cycle. The quantity to be ordered is estimated by subtracting the quantity on hand at the beginning of the ordering cycle from the sum of the average monthly consumption and the actual quantity consumed during the preceding cycle. To minimize spoilage, managers are instructed to follow the inventory rule of "first in, first out" in distributing ORS.

RECOMMENDATIONS

Based on the results of all three phases of the study, the researchers made recommendations to the NCDDP management and to peripheral and local managers of rural health facilities. It was recommended that the NCDDP:

- Train and support health care providers in ORT treatment;
- Implement an outreach program during the diarrheal disease season;
- Check ORS supplies to avoid over-stocking and resultant spoilage;
- Revise and integrate the NCDDP and Ministry information systems; and
- Develop a scoring system for evaluation of personnel.

Peripheral and local managers were advised to:

- Use the periodic ordering system and inventory management guidelines developed by the PRICOR project; and
- Follow the rule of "first in, first out" in distributing ORS packets.

This system has, in fact, been implemented throughout the SRHD project area and is under consideration by the NCDDP and the Ministry of Health for use elsewhere.

APPENDIX A

Model 1

Small quantities frequently ordered keep the costs of holding the inventory low, but there is a fixed charge associated with the placement of an order independent of the quantity ordered. Model 1 aims at minimizing the sum of these costs. This model consists of a set of equations relating order quantities to costs of holding an inventory and those associated with the placement and handling of an order. The model assumes that a fixed quantity is always ordered. In its simplest form, this model only considers annual demand, order quantity, costs of one order and carrying costs of inventory. In this form, the order quantity which minimizes total cost is:

$$Q = [2D Co/Ci]^{1/2}, \text{ where:}$$

Q = order quantity

D = annual demand

Co = cost of placing and receiving one order (including transport and handling). It is assumed constant regardless of the quantity ordered.

Ci = mean carrying cost of one inventory unit (interest on value of capital tied up in inventory; losses due to expiration, spoilage, and pilferage; storage costs).

Since health service managers are, in addition, concerned with medical and social costs of stock shortages in terms of costs of alternative forms of treatment, or of lives lost or days of illness, an extension to the above formula may be made to include these costs. The shortage cost may be included into the above equation as a function of the partial expectation (a measure of the quantity expected to be short under an acceptable service level) and the medical cost of shortage of one item. The equation becomes:

$$Q = [2D(Co+P E_z)/Ci]^{1/2}, \text{ where:}$$

E = partial expectation

P = medical cost of shortage of one item.

From this equation it can be seen that quantity to be ordered increases with increasing costs of shortages.

Model 2

The second model examined uses a set of equations which determine the mean inventory level required, allowing for a safety margin in case orders arrive too late. The model relates both inventory and safety (buffer) stocks to six key variables: annual demand (consumption), lead time for placing orders (time between requisition and receipt of the commodity during which consumption continues), variability in lead time demand, order frequency, order quantity, and minimum acceptable services level. The service level defined as the fraction of prescriptions (in this case of ORS) which cannot be filled immediately because the item is out of stock, or the fraction of service days when it is out of stock. Accordingly, the specified service level may also be referred to as the maximum acceptable stock-out level. The equations introduce the concept of making allowances for variation in demand during the lead time by incorporating an estimate of the standard deviation of the demand during the time between placing the order and its receipt.

Under these conditions the average inventory required to assure that stock-outs will not be met in more than some specified fraction of cases is computed in 5 steps:

1. Calculate the standard deviation of lead time demand (SDLTD) by multiplying the lead time demand (LTD) by the standard deviation fraction:

$$\text{SDLTD} = (D \times \text{LT}/360) \times \text{SD fraction, where:}$$

D = annual demand, and the value 360 by convention refers to the number of days in the year.

2. Compute the quantity expected to be short (E_s) by the formula:

$$E_s = F \times Q/\text{STLTD, where:}$$

F = (specified) stock-out fraction

Q = consumption level during the order interval.

3. Determine the value of normal deviate (Z) from the statistical standard normal table. The value of Z corresponds to that area under the standard normal curve that is equal to 0.5 minus the value of E_s .

4. Determine the safety stock quantity (S) by the following equation:

$$S = Z \times \text{SDLTD}$$

5. The mean inventory quantity (I) equals the safety stock quantity plus half the consumption quantity during the order interval. i.e.:

$$I = S + Q/2$$

From the value of I and a knowledge of storage costs, the costs of holding sufficient stock to attain various service levels can be calculated, and used in decisionmaking with regard to minimum acceptable service levels (i.e., maximum acceptable stock-out levels).

* * *

This study was conducted from January 1984 through March 1986 by the Strengthening Rural Health Delivery (SRHD) Project of the Egyptian Ministry of Health. This summary is based on reports of the study prepared by Dr. Ahmed Nagaty, and Dr. Youssef Tawfik. Further information is available from the principal investigator, Dr. Ahmed Nagaty, Director, Strengthening Rural Health Delivery Project, Nutrition Institute Building, 16 Kasr El Aini Street, Cairo, Egypt, or from Dr. Jeanne Newman, PRICOR study monitor (Chevy Chase). The former principal investigator of the study was Dr. Youssef Tawfik, now at Management Sciences for Health in Boston, Massachusetts.

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Study Summary

ALTERNATIVE METHODS OF COMPENSATING COMMUNITY HEALTH WORKERS IN HAITI



The Ministry of Health of Haiti has adopted a strategy of primary health care (PHC) to achieve the goal of "Health for All by the Year 2000." The success of this strategy depends largely on the ability to recruit and support government health workers, or nongovernment community collaborators, who will provide community-based PHC services. The recurrent cost of financing these peripheral-level workers is too high for either the government or private institutions to absorb. In 1984-86, Save the Children Canada (AEDC), in collaboration with institutions associated with the Haitian Association of Voluntary Health Institutions (AOPS), conducted an operations research (OR) study to examine the best ways

to motivate the community health workers (CHWs) to provide preventive services that would encourage mothers to learn about, use, and maintain their competence in child survival interventions.

Given that subsidies from institutions managing the CHW programs were not an acceptable option, the researchers began by identifying alternative methods of motivating CHWs. Two types of CHWs were considered: volunteers (unpaid workers) and workers receiving some type of financial compensation.

It was assumed that even a volunteer-based system would require some form of incentive. With paid workers, the question became one of determining where the funds for payment would come from. Potential sources of funds for CHW payment included the following: money paid or contributed by beneficiaries of health-related services raised through various mechanisms (fee-for-service schemes, contributions from existing community groups, prepayment schemes, etc.); or money raised from income-generating activities carried out by CHWs.

Data were collected through community surveys and intensive studies to better understand the motivation problem and the feasibility of the proposed alternatives. Three sites provided the setting for the study: Mirebalais in the Central Highlands, Thomassique on the Dominican border, and Gros-Morne on the Northwest Peninsula. The three sites were selected for the following reasons:

1. Each site had in place a population-based community health program patterned after the same (AOPS-sponsored) model.

2. Each site had in place a different community organizational infrastructure.
3. Each site had some type of method to raise community funds, although only Thomassique used some funds for health care.
4. Each site had a different method of motivating CHWs.

The study was conducted in two phases: Phase I, an in-depth analysis of the operational problem; and Phase II, the development of a solution to the operational problem.

ANALYSIS OF OPTIONS FOR COMPENSATING CHWs

This phase comprised three different sets of studies, each exploring various alternative methods of motivating CHWs. The first set of studies looked at the feasibility of a volunteer-based system; the second set of studies looked at various fee-for-service schemes; and the third set of studies looked at the possibility of raising community (group) funds through prepaid schemes and other mechanisms.

Volunteerism

First, it was necessary to determine whether volunteerism was an option. Three sets of studies were conducted in this area to determine (1) what exactly CHWs would need to volunteer for in order to meet certain minimum coverage performance levels and have an impact on infant and child mortality, i.e., what tasks were to be allocated to CHWs and how much time and effort the workers would have to devote to these tasks to maximize their impact; (2) how CHWs viewed these responsibilities, to what extent they would be willing to volunteer, what they considered disincentives to this type of work, and what they would consider valid incentives; (3) how the community viewed the question of volunteerism, what methods the community had used to motivate volunteers, and what type of work volunteers were usually asked to do.

These sets of studies revealed that volunteerism would not be a viable option because:

1. To be effective, CHWs must be willing to work hard and CHWs are not willing to work as hard without any financial compensation;
2. People are willing to volunteer for discrete activities of short duration but not for the prolonged work that CHWs have to do;
3. No method of nonmonetary motivation currently used by villagers for volunteers would be adequate to compensate CHWs.

Fee-for-service and Related Schemes

Once the volunteer option was abandoned, the alternative was to look at various community resource mobilization schemes. Included in the latter were fee-for-service schemes, drug sales, community contributions to pay the salary of CHWs, and prepaid schemes.

The fee-for-service alternative that was explored involved the possibility that the institution sponsoring the CHWs could raise money in one of two ways, or perhaps both: either make enough money from curative care so that the curative care receipts could subsidize preventive care, or make beneficiaries pay for preventive services.

To determine whether curative care receipts could pay for preventive care, the financial records of one of the three institutions participating in the study were examined. The records revealed that receipts from curative care could not begin to pay for curative care expenses let alone subsidize preventive care activities.

To determine whether patients would be willing to pay for preventive care, 900 mothers from the three study sites (300 per site) were interviewed. The investigators used a detailed survey questionnaire that provided data on the mothers' economic status and on their pattern of expenditure for health care. From an analysis of the data, it appeared that the mothers paid a considerable amount of money for curative services and paid nothing for preventive services. People in rural areas are not in the habit of paying for preventive services. Communities perceive curative care as their primary health need, and CHWs affiliated with private health institutions do not provide curative care. In fact, people perceive health care as a "service" delivered by an outside agency.

The investigators also explored a related scheme, revenues from drug sales, by reviewing the demand for drugs at the village level, the categories of drugs being purchased, and whether CHWs could effectively tap into this market. The study revealed that the market for drugs was relatively important, but that it was an unlikely sole source of income because of the restrictions on the type of drugs the CHWs could sell.

Community Funds

The third set of studies explored the possibility that CHWs could be paid with community funds collected either through a prepaid scheme or some other mechanism.

The first question to be answered was: Can communities raise sufficient sums to pay CHWs? A corollary question was: If they could, would they be willing to use the collected funds to pay CHWs?

To find the answer to the first question, leaders, treasurers, and members of various community groups were interviewed in depth and their answers analyzed through content analysis. In addition, financial records from these community groups were consulted, when available. The three study sites presented three basic types of community organization. In one site, the government-sponsored "conseil communautaire" was prevalent. In the second site, the main form of community organization was the "tet ansam" (heads together), which were groups with a religious orientation. The third site had "groupements," small groups of five to nine members, each with its own activities.

It was found that these organizations manage to raise considerable sums of money (for a poor peasant society) from their members, particularly the "tet ansam" and the small "groupements." In one of the sites, 600 small "groupements" had combined assets of US\$ 30,000 (all amounts are based on US dollars).

Whether these community groups might be willing to use some of this money for the payment of CHWs might depend on a number of factors. These factors include: Who makes the decisions regarding how group funds are used; what are the previous patterns for using group funds (is there any precedent for paying salaries); what do the groups expect to get in return for the funds they disburse? These questions were explored through a quantitative survey of the potential beneficiaries of health worker-related services. The survey questionnaire explored whether mothers (the beneficiaries) tended to be group members; if so, did they have any say in how funds are used; if they did, what was their attitude toward using the funds for paying CHW salaries? In addition, a qualitative survey of selected mothers, group members, and group leaders was carried out to explore the same issues.

The pattern of membership and participation varied tremendously between the government-sponsored groups and the two grassroots community organizations. For the government "conseil communautaire," it was clear that mothers had little or no role in decisionmaking and had little or no information on how group money was used.

The two grassroots organizations were very different in size but very much alike in goals and attitudes. One "tet ansam" tended to have 600 members while one "groupement" had six or seven members. However, both groups showed an aversion to making a single individual (in this case a CHW) the beneficiary of group funds. There was no tradition for it and group members believed that it would be inconsistent with the true purpose of the funds. The small "groupements" viewed their money as capital to raise more money through investment in various group enterprises. A small amount of group money was set aside for personal use of its members. The "tet ansam" considered that their funds could be used for community projects such as road repair or income-generation activities. The "tet ansam" also set aside some money as a form of catastrophic insurance, to be given to members to pay for the cost of a funeral, an expensive illness, or other emergency.

The three sets of studies discussed above showed that:

1. Communities can get together and raise significant amounts of capital if they believe the purpose is valid.
2. Purposes communities considered valid were:
 - a. capital for investment in group income-generation activities,
 - b. credit, and
 - c. insurance for catastrophic events (identified at only one of the three sites).

The next step in the study was to find possible links between these purposes and the need to remunerate CHWs. The first purpose was eliminated because the CHW alone could not be considered an income-generation activity. The second and third purposes were retained for further study.

DEVELOPMENT OF THE CHW REMUNERATION SCHEME

Given all of the constraints elicited above, the researchers and consultants systematically evaluated the various options using a multiple criteria utility assessment (MCUA).

As a result, the option that appeared to deserve further exploration was that of linking remuneration of a CHW to a credit program. To explore this option further, the researchers reviewed the (scant) Haitian literature on rural credit. From this review, it appeared that traditional credit associations are quite common in rural Haiti. The associations are called "cengle" or "solde." In these traditional schemes, friends contribute a fixed amount of money each month to a general fund and take turns receiving the entire pool. Credit is a prized commodity in rural Haiti and the project presumed that mothers would be willing to contribute some money to a general fund to have access to the credit it would provide. Using this presumption as a basis, the study team conducted a sensitivity analysis of a scheme that incorporated the following elements:

1. Mothers would organize themselves into small affinity groups (similar to a cengle).
2. They would fix an amount of money each mother would be willing to contribute on a monthly basis.
3. Each mother would be offered the opportunity to buy a credit card.
4. However, she would be able to buy the credit card only if she demonstrated competence in four child survival interventions.
5. The card, if held by all mothers would entitle the group to have access to more money for credit than their pool would provide. The sponsoring agency would match their monthly contributions and the cost of the cards with an equal amount which would be available to group members for credit.

The idea was that money generated from card sales would pay CHWs who in turn were responsible for making the mothers competent in child survival interventions.

A group of 130 mothers from 13 different villages were interviewed, the scheme explained to them, and their reaction recorded. The reaction was not favorable, primarily because the total amount of money available would be too small if all mothers became eligible to borrow from it.

The researchers then proceeded to explore institutional credit mechanisms. One such mechanism is the Bureau de Crédit Agricole (BCA), which provides loans to peasants. BCA was willing to use the matched funds as a frozen guarantee and lend groups of mothers five times the amount.

Spreadsheet analysis was carried out to document the financial viability of the scheme. The full scheme, which has been introduced in Mirebalais, is summarized in the following paragraphs.

Creation of Mothers' Affinity Groups

Because the community health program in Mirebalais is population-based, each child is registered and has a health record. This permits nutrition monitoring of all children. Rosters of malnourished children are created for each village and their mothers are invited to special 3-day village seminars. Each mother of a child with severe malnutrition is asked to bring two friends to these seminars. The seminars, organized on a monthly basis, allow mothers to get to know one another. The themes of the seminars are not necessarily health related, but rather cover topics such as the role of women, working together, women and work, etc. Affinity groups are formed in the following manner: An index mother (a mother with a child with severe malnutrition) is asked to select a trusted friend. Together, the two select a third, the three together select a fourth, and so on. The size of the group depends on how long this unanimous selecting can go on, for as soon as one woman vetoes a nominee for the group, that nomination is annulled. Groups usually have between three and seven members. Facilitators provide support for the groups.

Creation of a Group Fund

When a small group is constituted, the mothers get together to decide on the creation of a group fund. The mothers may elect one of two schemes: (1) They fix monthly dues (usually between \$.60 and \$1.00 and the pot goes to one of the mothers on a rotating basis; this is how the cengle usually works. Or (2) the mothers let the dues accumulate into a "caisse" and once the amount in the "caisse" is substantial, they invest it in a group activity. They might, for example, buy a goat or a pig, or buy merchandise wholesale in Port-au-Prince and retail it in the village.

Purchase of a Health Card

Members of viable groups (those that seem to be holding together and have an ongoing mini-project) are offered the possibility of buying a credit card. Each card is priced at \$2.00. To buy a card, a mother must belong to a group, be competent in each of four child survival interventions (ORT, immunization, growth monitoring, and family planning), and their children must be up to date in their vaccinations and participate regularly in growth-monitoring sessions. However, the card is no good to the individual mother unless all mothers in a group have the card. This creates a peer-to-peer support system to encourage an ineligible mother to meet the requirements. If each group member has a card, the group is eligible for group credit.

Group Credit

To determine how much credit a group is entitled to, (1) total group assets are estimated; (2) the amount collected on a monthly basis is recorded; and (3) the cost of the credit cards is taken into account. The credit available to the group is:

Total group assets + (monthly dues x 12) + value of cards = credit available

For example, if a group has seven members, has \$20 in their "caisse," collects monthly dues of \$1 per person (or \$7 for the group), and has bought seven cards at \$2 per person (total \$14), they are entitled to:

Total group assets	\$ 20.00
Dues (\$7 x 12)	84.00
Value of cards	<u>14.00</u>
Total	\$118.00

A local agricultural bank (BCA) will lend the group the \$118.00 under the following conditions:

1. The sponsoring private voluntary organization (PVO) will put up one-fifth of the amount (or about \$24) in a bank savings account as a frozen guarantee fund; and
2. The group will pay 14 percent interest up-front.

The PVO itself can use the money from card sales to remunerate its community health workers. CHWs are paid on the basis of the number of mothers who under their instruction become competent in the four child survival interventions and who participate in services. Mothers themselves pressure the CHWs to help them become competent and if they are not satisfied with their CHW, they may ask for a replacement.

RESULTS

This project appears to have produced positive results for a number of reasons. Credit schemes such as these are attractive to rural residents because there is a great demand for credit, and private-source interest rates are very high. Because low-interest credit is so desirable, there is an economic incentive for the mothers to learn about the health interventions to have access to credit funds. As the CHW salary is based on the number of mothers who qualify for health cards, the financing scheme cleverly links the provision of preventive health interventions with revenue generation. Because the index mother is the mother of a child with severe malnutrition, this strategy ensures that mothers with high-risk children are the first to benefit from the system.

Some of the groups have developed successful income-generation projects. One group bought a mature mango tree from which they will harvest and sell mangoes. Another group bought a goat which promptly gave birth to two more. This group is now seeking to acquire a pig.

* * *

This study was conducted from December 1984 through March 1986 by Save the Children Canada (AEDC) in collaboration with institutions associated with Association des Oeuvres Privées de Santé (AOPS). This summary is based on a final report of the study prepared by Antoine Augustin (principal investigator), Joelle Jean-Julien, Vely Jean-François, Marcel François, Charles Myers, and Faith Lewis. Further information is available from Dr. Antoine Augustin, Director, Institut Haitien de l'Enfance, Association des Oeuvres Privées de Santé, B.P. 76, Port-au-Prince, Haiti, or from Ms. Marty Pipp, PRICOR study monitor (Chevy Chase).

Study Summary

THE ROLE OF TRADITIONAL BIRTH ATTENDANTS IN PROVIDING MATERNAL HEALTH SERVICES IN HAITI



Maternal mortality rates in Haiti have remained at the same high levels for the past 10 years despite the implementation of a maternal health care system that incorporates trained traditional birth attendants (TBAs). Researchers from the Complexe Médico-Social de la Cité Soleil in Port-au-Prince carried out an operations research study from 1983 through 1986 with the objective of determining the most cost-effective ways to train and utilize TBAs to help decrease maternal and neonatal morbidity and mortality.

According to the 1982 census, Haiti had a total population of five million people.

The average per capita income of US\$ 300 ranks Haiti as one of the poorest countries in the world. Port-au-Prince, the capital, has a population of one million. Cité Soleil is a slum area with a population in excess of 100,000 located on the outskirts of Port-au-Prince.

Priority health problems in Haiti include diarrheal diseases, respiratory illnesses, immunizable diseases, tuberculosis, malaria, malnutrition, and high fertility. Health care resources are unequally distributed with a disproportionate amount concentrated in Port-au-Prince. Maternal health problems are particularly severe. The maternal mortality rate has been estimated at 4 per 1000 live births. It has also been estimated that only 20 percent of all deliveries take place in hospitals while the remainder take place in homes.

The Ministry of Health (MOH) has launched a program to combat these and other health problems experienced by women of child bearing age in Haiti. This program has three major components: (1) family planning, (2) obstetrical care, and (3) training of traditional birth attendants (TBAs). At the time of the study, there were 12,000 TBAs in Haiti and 8,182 had been trained by the MOH or other health care organizations.

Several neighborhoods of Cité Soleil are served by the Complexe Médico-Social de la Cité Soleil, a multipurpose private nonprofit organization. The residents of these neighborhoods are the subjects of the Complexe's extensive health information gathering system which uses community health workers (CHWs)

to register all inhabitants on family register sheets, to identify target groups, to monitor health surveillance programs, and to record all vital events. Trained traditional birth attendants (TBAs) provide support for maternal and child health services. Each individual living in Cité Soleil is identified by a number which includes codes for the neighborhood and sector they live in, the community health collaborator or TBA assigned to them and their family. Thus, a mother in a family may have the following number:

2	09	24	135	01
neighborhood	sector	CHW	family	individual

The PRICOR study focused on the training program for TBAs in Cité Soleil. The objectives of the study were to: (1) examine the existing TBA training program and identify problems; (2) develop a training program for TBAs that provides them with the skills necessary to reduce maternal, perinatal, and neonatal mortality; and (3) test the new training program in the field. The researchers initially hypothesized that a shorter competency-based training program would lead to better TBA performance (in terms of reducing maternal, perinatal, and neonatal mortality) than the existing MOH TBA training program.

ANALYZING THE MATERNAL CARE SYSTEM

In order to identify and analyze any problems with the current maternal care system, including the TBA subsystem, the investigators collected data from Complexe records and from interviews with TBAs. Data on maternal and newborn health problems were collected from review of maternity records, neonatal death records, a study of 300 pregnant women receiving pre- and post-natal care from September to October 1983, and the 1983 Cité Soleil census.

This review revealed that maternal and perinatal health problems were indeed prevalent and severe. Major health problems of pregnant women included anemia and genital infections. Health problems common during the post-partum period included hypertension, birth canal laceration, and infections. Major causes of infant mortality were gastro-enteritis, respiratory disorders, tetanus, meningitis, jaundice, asphyxia, and malnutrition.

Components of the maternal care system in Cité Soleil included traditional birth attendants, pre-natal clinics, a hospital for delivery, and post-natal clinics. The clinics and hospital provided standard care for mothers including laboratory tests, health education, examinations, food supplements, medications, and physician-supervised deliveries.

The researchers prepared a description of how TBAs fit into the Complexe's maternal care system. Traditional birth attendants had been provided with special training in safe delivery methods, referral of high-risk cases, general concepts of public health, the importance of pre- and post-natal care, nutrition, and family planning. This training was provided by a public health nurse during a series of 27 sessions. (See Table 1 for the topics covered in each of the 27 sessions.) Once all lessons were covered, TBAs were required to pass an examination before being certified as trained TBAs. The tasks specified for TBAs included encouraging pregnant women to attend pre-natal clinics, identifying women with potential for complicated pregnancies, educating pregnant women in hygiene and nutrition, recognizing signs of labor,

performing routine deliveries, referring difficult cases, and encouraging mothers to practice family planning. Supervision for TBAs was provided by public health nurses and included monthly meetings, resupply of delivery kits, inservice training, and follow-up visits to mothers who had received TBA care.

Table 1. Standard TBA training sessions

<u>Session</u>	<u>Topic</u>
1	The TBA in the community
2	Why are TBAs trained?
3	General concepts of health and illness
4	The process of pregnancy
5	Identifying the pregnant woman, the at-risk pregnancy, and the complicated pregnancy
6	Pre-natal care and immunization
7	Nutrition in pregnancy
8	Self-care during pregnancy
9	Malpresentation
10	Delivery: preliminary preparations
11	Indications for referral
12	The TBA before delivery
13	Hand-washing technique
14	Labor
15	Indications for referral during labor
16	Review
17	Immediate post-partum care
18	Family planning
19	Contraceptive methods
20	Review
21	Supervision and continuing education
22	General review
23	Aptitude test on child health
24	Immunization of children
25	Health problems of infants
26	Health problems of infants (continued)
27	Health problems of mothers

Based on interviews with 20 TBAs, it was determined that TBAs were performing only three of their assigned tasks: encouraging pregnant women to attend pre-natal clinics, performing routine deliveries, and referring difficult cases. Reasons TBAs gave for neglecting other tasks were brevity of encounters with pregnant women, fear of being labeled "nosy," and fear of being blamed for complications in delivery.

DEVELOPING AND TESTING AN IMPROVED TRAINING PROGRAM FOR TBAs

TBA Training

The PRICOR investigators next set out to determine if a shorter competency-based training program would result in better TBA performance and thus reduce maternal and infant morbidity and mortality. Untrained TBAs were selected from the community and divided into two groups. The 18 TBAs in Group I received the standard (27-session) training course and 7 TBAs in Group II received a shorter competency-based (5-session) training course. The new training program to be tested also differed from the current program in that it placed stronger emphasis on recognition of high-risk situations.

The training sessions covered five essential topics: (1) pregnancy and its complications, (2) at-risk pregnancies, (3) complications of delivery, (4) the newborn and the post-partum period, and (5) reporting systems. These sessions were supplemented with practical exercises on hand-washing and conduct during delivery. In the area of nutrition, TBAs were trained to deliver two simple messages: (1) eat an extra meal a day (ante- and post-partum) and (2) give only breast milk to the newborn until three months of age.

Delivery of MCH Services

The 18 Group I TBAs were assigned to cover women living in the Boston, Cité Jean Claude, PCS, Brooklyn, and Wharf neighborhoods. These neighborhoods had a total population of 54,148, leading to a ratio of one trained TBA for every 3,000 persons. The seven Group II TBAs were to cover women living in the Ilene Cité and the TBB neighborhoods, which combined had a total population of 21,237. The ratio of Group II TBAs to service population was, thus, also approximately one to every 3,000 persons. The same nurse provided supervision for both groups once a month. Supervisory activities included: checking the contents of TBA boxes, replenishing TBA boxes, collecting TBA monthly activity reports, and providing inservice training. A third neighborhood, with no TBA program, was initially selected as a control, but was later dropped because the number of pregnant women in the area was very small (51), constituting less than four percent of the total sample.

Because of the Complexe's population-based registry system, the women covered by the two different groups of TBAs could be followed throughout their pregnancies and subsequent deliveries to determine the effects of the two different training programs. All of the women included in the study (a total of 2678 women) received periodic home visits by CHWs and TBAs. TBAs visited each household in their assigned area and asked whether a pregnant woman was living in the house. If a pregnant woman did reside there, the TBA met with the woman and collected basic data from her, such as age, gestational age, parity, and expected date of delivery.

After this initial visit, all women received referrals to an MCH center during their first and second trimesters and referrals to an obstetric clinic at their 7th month of gestation. At the MCH centers, pregnant women were weighed, examined by the physician, and given iron tablets, folic acid tablets, and food supplements. At the obstetric clinic, services provided to all women included weight and height measurements, blood pressure test, health education talks by a nurse, physical examination by an obstetrician,

laboratory tests (CBC, urinalysis, VDRL, and vaginal smear), and medications when appropriate. After the seventh month of gestation, all women were to be seen at least once a month. Depending on the risk category, women were advised at the clinic as to whether mandatory hospital delivery is recommended, or whether elective hospital delivery is recommended. The TBAs were instructed to recommend prenatal care at MCH centers and obstetric clinics for all pregnant women and insist on hospital delivery for high-risk pregnancies. The remainder may elect to deliver at home. The high-risk pregnancy included women who fit into any of the following categories:

- Pregnant for the first time
- Pregnant for the 5th or more time
- Previous caesarean section
- Complications in a previous pregnancy
- Suffering from a debilitating illness
- Multiple gestation
- Malpositioned or malpresented fetus
- Ante-partum hemorrhage
- Hypertension
- Excessive vomiting
- Premature labor
- Polyhydraminos
- Prolonged pregnancy
- Other complications of pregnancy.

Maternity care provided to women delivering in the hospital included a physical examination and delivery under the supervision of a physician. After the delivery, the TBAs collected data from the mother on the actual date of delivery, the place of delivery, the sex of the newborn, the weight of the newborn, the status of the newborn at birth, the status of the newborn at one month, and the status of the mother at three months post-partum.

EVALUATION AND COMPARISON OF TBA TRAINING PROGRAMS

After the TBAs had been trained and were delivering services in the communities, the researchers interviewed the women in the two groups to determine presence of risk factors during pregnancy; use of pre-natal, delivery, and post-natal services; and the outcome of the pregnancy. Of the 2678 women who entered the study, 1503 (56 percent) returned for a post-natal visit and 1175 (44 percent) were lost to follow-up. The analysis was, therefore, restricted to the 1503 cases for which both pre-natal and post-natal information were available. An attempt was made to gather extensive information on infant or maternal mortality by means of a special investigation of individual deaths, but little could be concluded on this topic because of widespread under-reporting of deaths and reluctance of mothers to discuss their child's death with strangers.

The first step in the evaluation was to compare the two groups of women with respect to a number of risk factors correlated to negative pregnancy outcome. Factors included in the analysis were youth, first pregnancy, high parity, anemia, hypertension, and infection. No significant differences were found between the two study groups for any of these factors. The researchers next looked at the health care utilization of the women in the two groups. The

mean number of prenatal visits and tetanus toxoid immunizations were slightly higher for women in Group II (served by TBAs who completed the shortened competency-based training program) than for women in Group I (served by TBAs who completed the standard 27-session training course). However, these differences were not statistically significant.

The proportion of hospital deliveries differed substantially between the groups. Nearly 64 percent of women in Group II delivered at the hospital in Cité Soleil compared to 50 percent of women in Group I. Home deliveries constituted only 12 percent of all deliveries in Group II, while 28 percent of the Group I women delivered at home. When the analysis was restricted to high-risk women, the differences between the two groups persisted. High-risk criteria were defined as (1) age less than 18, or older than 35, (2) prenatal hypertension, (3) prenatal fever, (4) first pregnancy, (5) high parity, or (6) other complications or infections. Nearly 61 percent of high-risk women in Group II delivered in the hospital located in Cité Soleil compared with 43 percent of high-risk women in Group I. Home deliveries constituted only 14 percent of the high-risk pregnancies in Group II compared to 36 percent in Group I (see Table 2).

Table 2. Health care utilization by study groups for high risk women

	<u>GROUP I</u>	<u>GROUP II</u>
Mean No. of Prenatal Visits	3.0	4.1
Percent with Tetanus Toxoid Immunizations:		
1	32.4	27.6
2	30.0	38.2
3	37.7	34.2
<u>Place of Delivery:</u>		
Choscal Hospital (Cité Soleil)	42.8	60.9
Other Hospitals	18.1	21.8
Home	35.8	13.8
Other	3.3	3.3

Group I: TBAs who completed standard MOH TBA training course.

Group II: TBAs who completed shortened competency-based TBA training course.

Pregnancy outcome was measured in terms of gestational age at the time of delivery, birthweight, stillbirth rate, and type of delivery. The results were similar for both Group I and Group II women. About 14 percent of all women included in the study delivered prematurely, 12 percent had low birthweight infants, 2 percent had stillbirths, and 2 percent delivered by Caesarean section.

DISCUSSION AND CONCLUSIONS

Synthesis of the results of these evaluations showed that there was little difference in impact on maternal or neonatal morbidity or mortality between the two TBA training approaches. The only significant difference in TBA practices was that TBAs who had attended the shorter training session were more successful in motivating mothers with high-risk pregnancies to deliver in the hospital. However, this group was almost certainly weaker in other functions, e.g., family planning, because they weren't trained in these functions.

Since TBAs who attended the short course were, by most measures, equally as effective as those who attended the long course, the researchers decided to implement the shorter, competency-based course in the Cité Soleil health program on a permanent basis. The investigators are now reviewing the results from their analysis of the entire maternal care system and from individual case studies of maternal and infant deaths to determine what other changes in the system would be appropriate to reduce morbidity and mortality.

* * *

This study was conducted by the Complexe Médico-Social de la Cité Soleil from February 1983 through March 1986. This summary is based on the final report by Reginald Boulos, Carlo Boulos, Antoine Augustin, Jim Allman, and Joe Wray. Further information is available from Dr. Reginald Boulos, B.P. 1666, Port-au-Prince, Haiti, or from Dr. David Nicholas, PRICOR study monitor (Chevy Chase).

Study Summary

INCREASING ORAL REHYDRATION THERAPY IN RURAL HAITI THROUGH COMMUNITY PARTICIPATION



There is evidence that severe dehydration is responsible for one-half of the deaths of children under five in Haiti. In response to this serious problem, the Haitian Ministry of Health (MOH) has made the reduction of deaths from diarrhea a top priority. In 1983, Haiti launched a national campaign to promote the use of ORS packets. This campaign utilizes the mass media, the health system, a social marketing distribution system, and community organizations to promote ORS.

The Haitian Association des Oeuvres Privées de Santé (AOPS) and the University of South Carolina School of Public Health conducted

an operations research study which focused on the promotion of oral rehydration therapy (ORT) in rural areas of Haiti. This study took place in the Petit Goave Health District in the Western Public Health Region of Haiti from 1984 to 1986. The researchers' broad purpose was to mobilize community resources to improve the availability, knowledge of, and use of oral rehydration salts (ORS) in the study communities. This PRICOR study was intended to complement the national campaign by organizing communities to promote ORT.

The Petit Goave Health District had a population of 295,658 in 1983. The people subsist on agricultural production including sugar cane, coffee, corn, cassava, and a variety of fruits and vegetables. Fishing is also an important economic activity. Throughout the District, as in Haiti as a whole, mortality and morbidity caused by diarrhea is a major health problem. To combat this situation, an ORT program has been active in the District since 1982.

The operational problem addressed by this study was the limited involvement of substantial community resources in the promotion of ORT. This was a particular problem in villages without a resident agent de santé (community health worker). The researchers proposed to find mechanisms whereby the community residents could organize themselves to: (1) improve the distribution and availability of ORS packets, (2) ensure that caretakers could appropriately prepare both ORS packets and home-mix ORS, (3) ensure that caretakers could correctly administer ORS, and (4) facilitate appropriate referral of severe dehydration cases. The fourth objective was eventually dropped because of lack of time.

PROBLEM ANALYSIS

Surveys

In order to identify the major obstacles to effective distribution, acquisition, and administration of ORS in the Petit Goave Health District, the researchers initially carried out a series of overlapping surveys. These were essentially mini-studies of the diarrhea/dehydration treatment process. Trained interviewers used various strategies to elicit information from health care personnel, sellers of ORS, itinerant market sellers, community leaders, households with children under five, teachers, and students.

These studies were carried out in twenty villages in Petit Goave. The researchers selected the villages in such a way that there were at least two villages representing each of the following conditions: with and without a school or church, with and without an extension agent (community development worker, national malaria program volunteer, etc.), and with and without a retail shop or market (see Figure 1). None of the villages had a resident agent de santé.

Figure 1. Classification of 'lokalites' by characteristics

	EXTERNAL AGENT		NO EXTERNAL AGENT	
	Shop or Market	No Shop Nor Market	Shop or Market	No Shop Nor Market
School and Church	Petite Guinee 22* Fauche 25	Ti Kouzin 26 L'acual 25	Baret 20 Grand Ravine 21	Ducette 24 Papette 22 Bellvue 25
No School Nor Church	Chabanne 23 Tiparadis 26	Marose 22 Non Bouzin 22	Saune 18 Nan Dalle 24	Glaize 22 Savanette 24 Chalemagne 27

* Number of Household SES and ORS Usage Surveys Completed

The researchers began by designing and testing the survey instruments to be used in the problem analysis. To make sure that the surveys were culturally appropriate, members of the study team spoke with district health staff, teachers, and owners of village shops about their experiences with villagers and ORT. Focus group meetings held with community leaders and ORT adopters in one village helped to develop the surveys further.

Eight separate, but overlapping studies were then implemented to provide data for the problem analysis. These included:

1. A diarrheal disease knowledge, attitudes, and practices (KAP) survey of over 400 adults in households with at least one child under five;
2. A study of 41 operators of commercial and voluntary association outlets (postes de vente) for ORS packets, which included observation, interviewers posing as customers, and formal interviews;
3. A survey of individuals living different distances from the postes de vente to determine their knowledge of how to use ORS and where to get the packets;
4. Interviews with 167 itinerant market sellers at three major market centers in the district to determine their potential as ORS promoters and/or distributors;
5. A quick study focusing specifically on ORS preparation and administration in a sample of 418 households;
6. A household socioeconomic study of the same respondents as the ORS usage study;
7. Interviews with approximately five community leaders in each of 18 villages to obtain their ideas about the role of the community in ORT promotion; and
8. A study of the district health facilities and ORT programs, including a general survey of health units, observations of health care personnel at work, interviews with nurses and auxiliaries responsible for ORT programs, and interviews of mothers with children under five attending the health units.

Results

Using data from the above mini-studies, the researchers identified several subproblems which contributed to high morbidity and mortality from diarrheal diseases in the Petit Goave Health District. The limited availability of and accessibility to ORS packets at the village level was found to be an obstacle to ORS usage for many people. Only 50 percent of the respondents in the KAP survey knew where they could obtain a packet. Postes de vente were poorly distributed and few respondents could give the locations of these postes in their communities.

Another subproblem was the relatively low level of ORS usage by caretakers. In the survey of ORS usage, 64 percent of the respondents (N=418) indicated

that they had heard of ORS while 48 percent claimed to have used ORS. Respondents in study villages with schools, churches, a shop, and an extension agent reported almost three times the level of ever having used ORS as those villages without these resources (71 percent vs. 24 percent). Related subproblems included inadequate caretaker knowledge of how to prepare or how to administer ORS. Only forty percent of packet users and nine percent of home-mix users could correctly describe how to prepare ORS. The highest percentage of respondents who could correctly describe how to administer ORS (30 percent) occurred in the community of Leogane.

Furthermore, caretakers did not know how to manage diarrhea/dehydration cases appropriately. Only 32 percent of those who reported using ORS were able to tell when one should administer the solution. The research team also found that services for severely dehydrated children were often misused. Those respondents in villages with a shop or market and an extension agent were most likely to report that they would seek treatment in a hospital at the first sign of diarrhea. People living closest to hospitals also reported a high rate of hospital utilization for diarrhea cases. These data suggest that people who have the option of using higher levels of health care services for diarrhea episodes may tend to overuse those services.

SOLUTION DEVELOPMENT

The solution development process involved input from a Policy Committee composed of representatives of national programs, the Petit Goave District Advisory Committee (DAC) for Health, community representatives, and the district health staff. The solution evolved into its final form over a two-month period based on successive input by these four groups.

The research team first presented the data collected during the problem analysis phase to the Policy Committee in summary form. Along with the data, they presented a diagram of components to be included in an optimal solution. This diagram consisted of four different models for the four subproblem areas: household acquisition of ORS, preparation of ORS, administration of ORS, and referral of severely dehydrated children. The researchers illustrated to the Committee how the problem analysis data related to each of the components. Using a nominal group process, the Policy Committee then developed alternative solutions for solving each of the subproblems and figured out which resources were accessible for implementing those solutions. Constraints to alternative solutions, such as the national program's emphasis on ORS packets over home-mix, the lack of resident community health workers (CHWs) in the villages, and scarce training resources, were also identified. This process was completed in four sessions.

The researchers then took the solution alternatives developed by the Policy Committee to the DAC for their consideration and revision. The DAC discussions focused on determining where the decisionmaking capability lay for implementing the various alternatives and how to gain access to the relevant decisionmakers. The solutions to the subproblems were revised based on these discussions.

The revised solutions were next presented to two leaders from each of the study communities. The main purposes of the meetings were to inform the

community leaders about the study and gain their approval. The community leaders were asked to look at the solutions in terms of feasibility and the extent to which their cooperation could be expected. The researchers made further revisions to the solutions based on these meetings.

The solution arrived at through the above series of meetings consisted of four major intervention areas: increasing packet availability, emphasizing home-mix where packet supplies were irregular, improving the management of diarrheal disease in the community, and mobilizing community resources to promote ORT. The strategies for implementing these interventions were the following:

1. Increasing packet availability by:
 - Identifying intervention communities without ORS packet outlets;
 - Working with local communities to select shop owners to become packet sellers; and
 - Training the shopowners to promote ORT, advise customers, and store the packets correctly.
2. Emphasizing home-mix ORS by:
 - Developing a standard solution recipe; and
 - Training community leaders to promote home-mix in their villages.
3. Improving the management of diarrhea by:
 - Training traditional birth attendants (TBAs) and caretakers in ORT.
4. Mobilizing community resources to promote ORT by:
 - Training agents de santé, school teachers, community leaders, religious leaders, the owners of sales posts, TBAs, and mothers' group leaders in ORT promotion; and
 - Supervising these community volunteers in promoting ORT to specific target groups.

In preparation for the training of community volunteers to promote ORT, the researchers developed appropriate training materials. They initially reviewed data from the KAP diarrheal survey and consulted villagers about the terminology used by mothers to describe various aspects of diarrhea and ORT. Using this information, the research team developed lesson plans and visual aids in Creole for ORT promotion. These materials were pre-tested in a few communities of the district.

Before implementing the proposed solutions, standardized norms were developed for: (1) the preparation and administration of both ORS packets and home-mix, (2) the storage of ORS packets, (3) hospitalization of children with severe dehydration, and (4) case management of children with severe dehydration at the clinic. These norms were based on data from additional surveys and field tests.

SOLUTION TESTING AND VALIDATION

The solution validation phase of the study consisted of four steps: a pre-test, the training of the community groups identified in the solution development, a field test, and a post-test. The final sample consisted of 10 experimental and 12 control communities.

Pre-test

A team of five field interviewers carried out a pre-test in order to establish baseline conditions in the villages. Four hundred and six households with at least one child under five years of age were visited. This survey took 35 days to complete.

Training

Following the pre-test, the researchers began preparations for the training of volunteers from the intervention communities using the training modules developed earlier. Specific educational objectives were set for each group of trainees, including teachers, TBAs, community leaders, sellers of ORS, and agents de santé. For example, educational objectives for TBAs included:

1. Skills in the promotion of ORS (packets and home-mix).
2. Knowledge of the correct use of ORS.
3. Knowledge of the locations of postes de vente.
4. Ability to recognize the signs of dehydration.
5. Skills in the organizations of mothers' clubs.
6. Skills in the promotion of breastfeeding.
7. Awareness of the dangers of bottle feeding, and
8. Knowledge of how to refer cases of severe dehydration.

Sellers of ORS were selected for training by a slightly different process than were the other groups. The researchers asked community residents to select the three most popular owners of small shops in their localities. Those selected were contacted and invited to attend training to increase their competence in promoting, selling, and storing ORS.

The trainers of the community volunteers included the District Medical Director, the District Director of Nursing, the PRICOR co-principal investigator, and a rural sociologist. The study team chose these types of individuals as trainers because they would be available again should the approach be replicated in other areas of Haiti.

The training modules were adapted slightly for each group of trainees. The trainers taught each group only those modules that were relevant to that group's educational objectives. Training methods included: lecture/discussion, use of visual aids, demonstrations, and role play. In all, 114 promoters were trained in sessions lasting from one to three days, including: 11 teachers, 19 TBAs, 24 community leaders, 8 religious leaders, 4 natural (unofficial) leaders, 28 sellers of ORS packets, and 20 mothers. Trainees were provided with per diem for the time they spent in training. A refresher course was offered one month after the first training.

Overall, the training was well received by the community volunteers. The majority of the trainees were very interested in learning about ORT. Acquiring new knowledge on diarrhea management was, however, not always easy for older and illiterate trainees (especially TBAs). These trainees often found that ORT was in conflict with their traditional beliefs. The trainers also had difficulty getting people to attend sessions on specific days.

Field Test

The field test was carried out in the 10 intervention villages over a period of two and a half months. It was originally intended that the field test would last for a period of 11 months, but because of political disturbances associated with the recent change of government, the intervention period was cut short. The researchers set four major objectives for the field test: (1) to increase the availability and awareness of ORS packets and home-mix, (2) to increase the number of caretakers of under fives who could correctly prepare ORS, (3) to increase the number of caretakers of under fives who could correctly administer ORS, and (4) to increase the use of ORS.

During the time of the field test, the volunteers promoted ORT in the experimental communities. They were assisted and supervised in this work by five agents de santé from outside the experimental villages, who were assigned by the District Health Officer to spend two days a week in the intervention villages. Each agent de santé was responsible for two villages as this would have been the normal "in-village" time of an agent de santé regularly assigned to a community. (None of the villages had a regularly assigned agent de santé.) Agents de santé are paid government employees. The PRICOR study gave them US\$ 5.00 a day over what they normally received from the government in order to cover extra expenses (travel, food, etc.) necessitated by this assignment, since they were not, as was typical, residents in or near the villages to which they were assigned.

Post-test and Results

The same team of interviewers carried out the post-test. Four hundred and eight households with at least one child under five years of age were visited. This survey took 32 days to complete. The researchers looked for changes in the awareness and availability of ORS, the use of ORS, knowledge of correct preparation of ORS, and knowledge of correct administration of ORS.

Awareness and availability of ORS. The researchers found that 28 ORS sales posts had been opened in the intervention communities by the shop owners selected by the communities; these were operating successfully. All of the shop owners were displaying signs promoting ORS and all of them were storing the packets correctly. Sellers were also able to explain how to prepare ORS correctly. Sales of ORS packets were, however, less than expected. This was due, in part, to the national committee decision to sell ORT packets at US\$.15, leaving vendors with a US\$.03 profit per packet. This profit margin was not a sufficient incentive for the vendors in rural areas because they lost a portion of their supply to humidity each time they stocked. In addition, nearly three quarters of the vendors could not tell how long they must wait before replenishing their stock. While the district offices were able to supply 87 percent of the health centers at any point, the supply flow was slow, often taking up to four weeks to replenish the units.

In the post-test, 73.5 percent of respondents mentioned postes de vente as sources of ORS as compared to 32 percent of respondents in the problem analysis survey. Among users of ORS in the intervention villages, 86 percent claimed that they were able to find ORS packets in their localities in the post-test, as opposed to only 25 percent of users in the pre-test. The researchers felt that the high level of awareness could be attributed to community involvement in selecting the sellers of ORS.

Use of ORS. The study appeared to have had little impact on the use of ORS, whether home-mix or pre-packaged. While there was a noticeable increase in the level of ORS packet use in both the intervention and control communities during the very short testing period, differences in use rates were relatively small. In the pre-test, 38.9 percent of respondents in the intervention villages reported using packets, while 42.7 percent of those in the control villages reported packet use. In the post-test, 51.6 percent of those interviewed in the intervention communities were using ORS packets (an increase of 32.6 percent) and 52.6 percent were using ORS packets in the control communities (an increase of 23.1 percent). (See Table 1 below.) The small difference between the intervention and control communities suggests that the interventions had little effect on ORS packet use. However, the changes were in the desired direction and it is possible that more significant effects would have occurred with a longer intervention period.

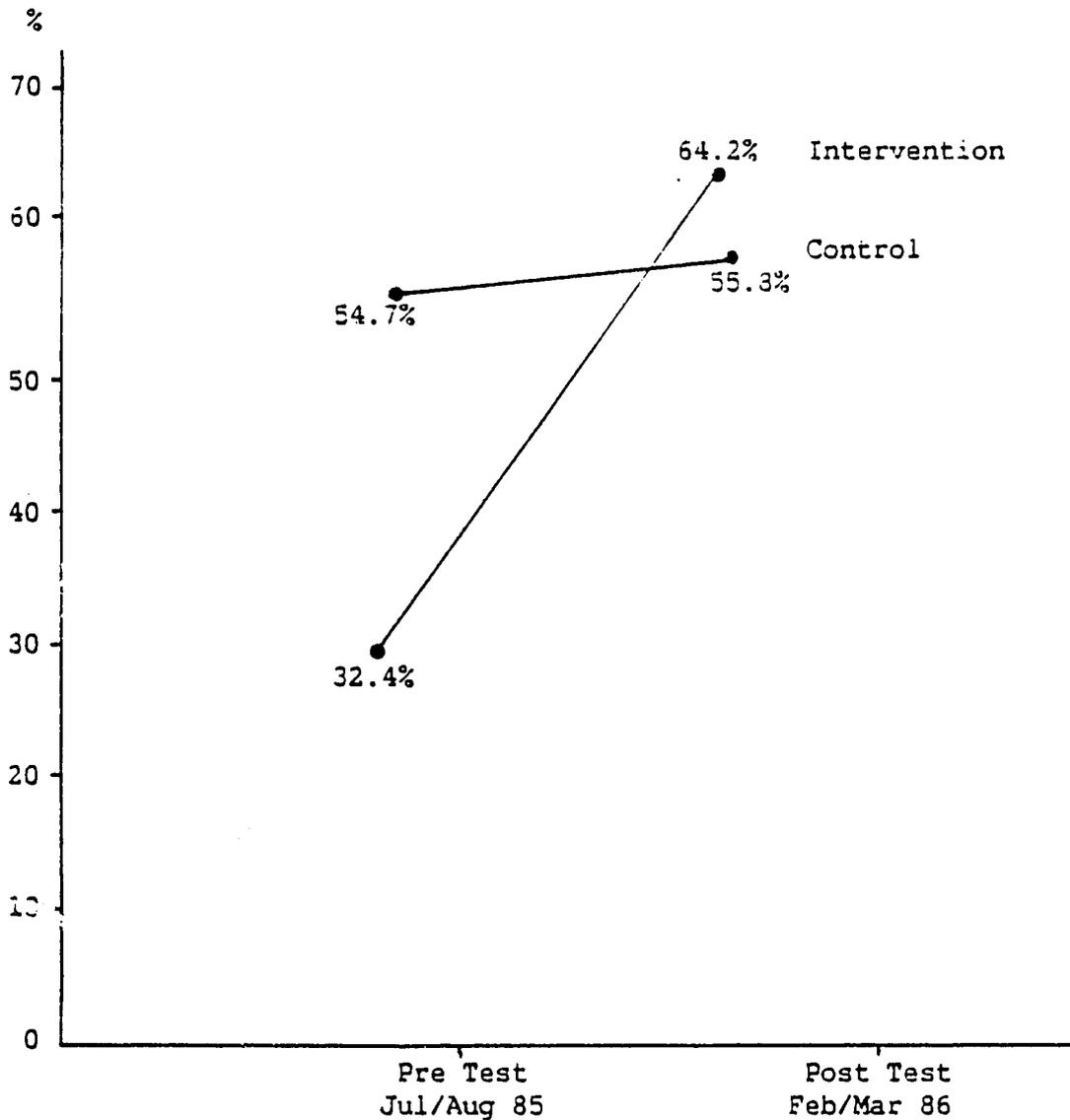
The reported use of home-mix decreased slightly in both intervention and control villages. This may be explained by the fact that the real emphasis of the intervention was on ORS packets. It is also noteworthy that the national ORT program promotes only packets.

Table 1. Comparison of pre-test (N=406)
and post-test (N=408) results
in experimental and control groups

	<u>Intervention</u>		<u>Control</u>	
	Pre-test	Post-test	Pre-test	Post-test
Use of ORS packets	38.9%	51.6%	42.7%	52.6%
Know how to prepare ORS	36.7%	58.0%	44.9%	44.3%
Know how to administer ORS	47.6%	70.5%	54.1%	67.7%

Knowledge of correct preparation of ORS. There was a significant increase in knowledge of the correct preparation of ORS in the intervention communities from 36.7 percent at the time of the pre-test to 58 percent at the time of the post-test (a relative increase of 58 percent). In the control communities, the percent of respondents who could correctly describe how to prepare ORS decreased from 44.9 percent at the time of the pre-test to 44.3 percent at the time of the post-test (a relative decrease of 1.4 percent). (See Table 1.) The change was found to be statistically significant. The increase in the intervention villages as compared to the control villages is even more marked when only ORS users are considered. (See Figure 2.)

Figure 2. Correct preparation of oral rehydration solution among reported users of ORS only



	Intervention villages:	98%
Relative Increase	Control villages:	4%

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Knowledge of correct administration of ORS. The caretakers' knowledge of correct ORS administration was ascertained by asking three open-ended questions concerning: (1) when to begin giving the solution, (2) how often to give the solution, and (3) how to give the solution. The percent of all respondents who knew when to give ORS increased from the pre-test to the post-test in both the intervention and the control villages. The relative increase was greater in the intervention areas than the control areas, but the difference was not statistically significant. Among users of ORS, the level of correct answers to this question actually decreased in both experimental and control villages. In the pre-test, 0.54 percent of all respondents in the intervention communities knew how often to give ORS. At the time of the post-test, the percentage had increased to 15.5 percent. The change in the control communities was from 9.25 percent at pre-test to 14.1 percent at post-test. Thus, the magnitude of change in the intervention communities was significantly greater than in the control communities. The same was true among users of ORS. The level of correct answers to the question on how to give ORS increased from 47.6 to 70.5 percent in the intervention areas and from 54.1 to 67.7 percent in the control areas. (See Table 1 above.) Among ORS users, the percentages were similar. (See Figure 3.)

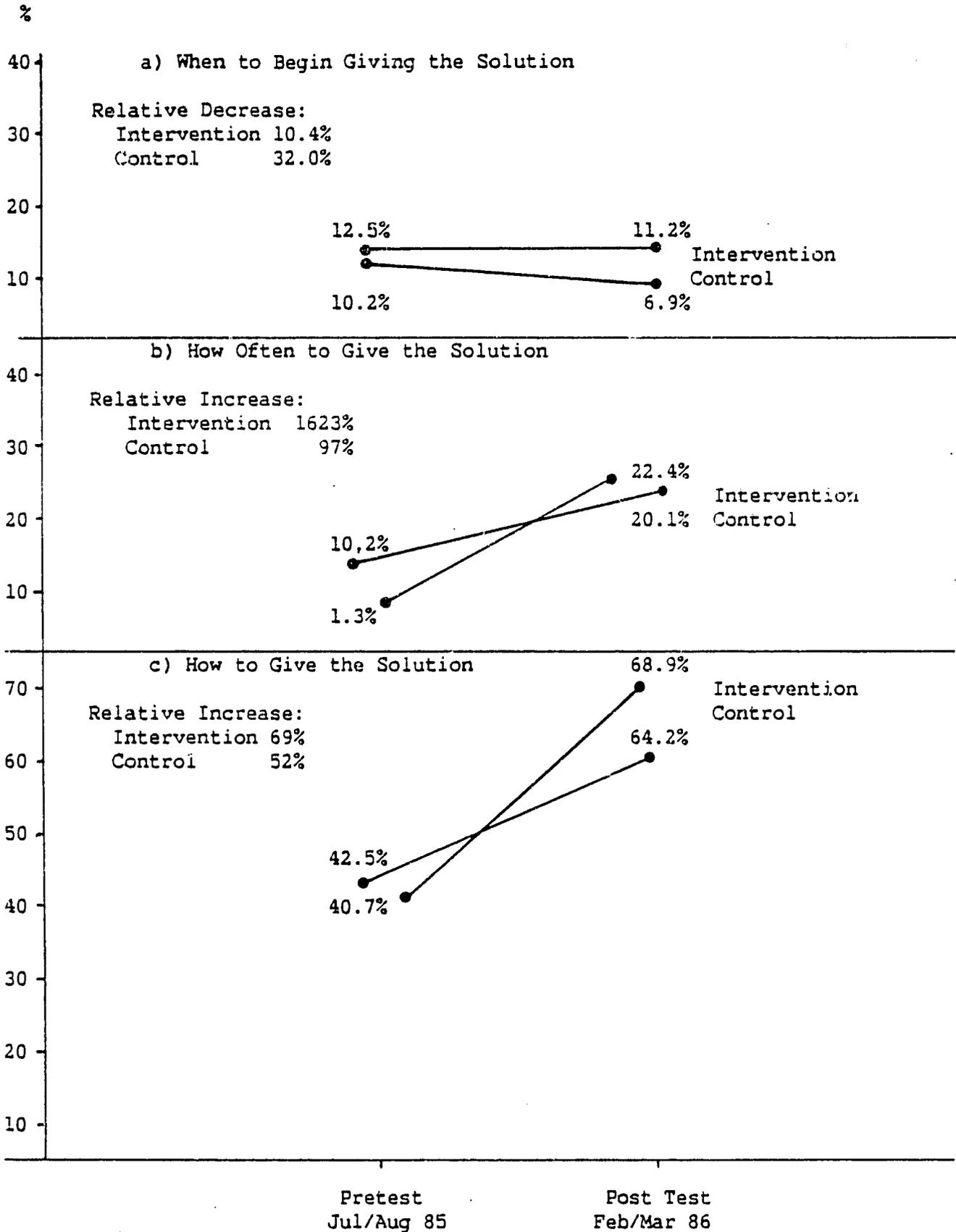
Community Participation and ORT Promotion

After dealing with the issues specifically raised by the solution objectives, the researchers examined the relationship between the study results and the level of community participation. The first question they asked was: How involved was the community in the promotion of ORS? Results from the post-test showed that the community volunteers had indeed carried out promotion activities, although not necessarily within their target groups. The volunteers reported activities such as the provision of information, demonstrations, and role playing. Forty-three percent of the respondents to the post-test said that they had been contacted by a community volunteer regarding ORT.

The second question addressed by the researchers was: How are the changes in KAP correlated with the level of community participation? The researchers felt that the active participation of the community in establishing ORS sales posts contributed significantly to the improvements in awareness of the ORS sales posts in the communities. To determine the effects of community participation on the increase of knowledge in the preparation of ORS, the researchers used a Spearman Rank Correlation Test between the level of knowledge about the preparation of ORS and the level of community effort in the intervention communities as measured by: the types of activities undertaken by the community volunteers, the methods of teaching used by the volunteers, the information given on the preparation of ORS, the number of related activities carried out, and the types of people taught. The resulting coefficient was +0.72 yielding a p value of < 0.05 . This suggested that the participation of the community volunteers in teaching mothers how to prepare ORS played a positive role in their level of knowledge.

The Spearman Rank Correlation Test was also used to assess the correlation between the level of knowledge about how to administer ORS and the level of community effort. The resulting coefficient was +0.45 (not significant). This suggested that the level of community effort in this area was not sufficient and that other factors may have intervened. The correlation was, however, in the expected direction.

Figure 3. Level of reported correct administration among users of ORS



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DISCUSSION AND CONCLUSIONS

Overall, the ORT promoters were active in the intervention villages and it was possible to measure a significant impact on caretaker knowledge about ORT after the two and a half month intervention period. However, little impact on the use of ORS packets or home-mix was registered. By way of explaining the limited impact on ORS use, the researchers noted that there were a number of constraints which seemed to have a direct impact on the study outcomes:

- The intervention lasted for a period of only two and a half months. The fact that many changes in KAP were in the desired direction but not quite significant suggests that a longer intervention might have had a greater impact.
- Political disturbances during the intervention phase may have adversely affected results. In particular, the researchers mentioned that people going from house to house collecting information were met with suspicion and resistance during the period of political upheaval.
- The slowness of data entry and processing meant that information was not always available to the researchers when they needed it.
- The absence of resident CHWs in the intervention communities may have meant that the community volunteers did not have enough support in their ORT promotion efforts.

In the final analysis, however, the researchers felt that the study was successful in showing that community resources can be used to promote ORT. Specific successes of the study included:

- The participation of community volunteers and their success in reaching 43 percent of the households surveyed with the ORT messages;
- The involvement of decisionmakers, in particular the district health staff, in making the intervention administratively feasible and potentially replicable;
- The opening of new ORS sales posts by villagers who had been trained in ORS promotion, sales, and storage;
- The training and participation of TBAs;
- The training and participation of teachers who took the ORS message to the classrooms;
- The development, testing, and use of a locally acceptable ORT curriculum in Creole;
- The development of a standard recipe for home-mix ORS whose taste was acceptable to the community and whose composition was in agreement with WHO requirements; and
- The development of a research design which involved the matching of villages according to specific characteristics.

Based on these successes, the researchers recommended that future Operations Research studies be conducted in order to determine how best to use community resources in ORT programming and related activities.

* * *

This study was conducted from March 1984 to March 1986 by the Association des Oeuvres Privées de Santé (AOPS) and the University of South Carolina. Further information is available from the principal investigator, Dr. Michel Cayemittes, AOPS, Port-au-Prince, Haiti, or from Dr. William B. Ward, Department of Health Promotion and Education, School of Public Health, University of South Carolina, Columbia, South Carolina, 29208, or from Dr. Jeanne Newman, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

FINANCIAL ALTERNATIVES TO SUPPORT EXTENSION OF BASIC HEALTH SERVICES IN HONDURAS



Researchers from the Honduran Ministry of Health and Management Sciences for Health (MSH) carried out an operations research (OR) study in several regions of Honduras during 1982-83. This study focused on identifying alternatives for financing primary health care (PHC) and on examining the potential for community financing (CF) to support of some basic health services.

Honduras is one of the poorest countries in Latin America. Nearly 60 percent of the population is classified as rural and as employed in subsistence farming, hunting, or fishing. A substantial part of the population classified as urban live in marginal barrios (slums surrounding city centers) under conditions that are more rural than urban. In this environment,

mortality and morbidity rates are high: infant mortality is currently estimated at 78/1000 live births. Diarrhea is a major cause of death, and complications of pregnancy and delivery are the leading causes of hospitalization.

The Ministry of Health (MOH) is responsible for providing health services to an estimated 85 percent of the Honduran population. In 1974, the Program for Extension of Coverage of Primary Health Care Services was established. Under this program, over 15,000 community health workers (CHWs) have been trained and more than 600 health centers have been established. During the past 10 years, the MOH budget has increased from 4 percent to 12 percent of the national budget, primarily to support this extension of coverage. The policy of the MOH has been to provide PHC services free of charge, except for a nominal fee of US\$.50 for physician consultations.

In the early 1980's, Honduras faced a major economic crisis. Since that time, the MOH budget has been severely restricted. This situation has prompted the MOH to look for alternative ways to finance health services. In order to continue the extension of PHC, it became necessary to identify mechanisms through which communities could participate in the financing of some basic health services.

The major goal of this PRICOR study was to develop alternative financing mechanisms for some PHC services. The specific objectives of the first phase of the study were to identify the Honduran population's needs for health

services, measure the costs currently being incurred by the population for health services, measure socioeconomic conditions within the target communities, identify factors that influence people's decisions about health services and expenditures, analyze the economic impact of the most common illnesses on the country, and identify the resources available for financing PHC services. In the second phase of the study, the objective was to identify several available financial alternatives, analyze their viability, and make recommendations to the MOH. It was hoped that the MOH would develop appropriate policies and field test the alternative financing mechanisms recommended by the PRICOR team.

ANALYZING COMMUNITY FINANCING OF HEALTH CARE

To collect the relevant data and ensure that the results would be credible, the PRICOR researchers used three separate methods to determine the PHC financing problems: intensive observation of a small number of Honduran families, a survey of households in four Health Regions, and case studies of existing health care programs in Honduras with community financing components.

Observation of Families

A locally-trained observer visited 25 households in marginal barrios of Tegucigalpa during October and November of 1982. She made weekly visits to each household to observe illness behavior and elicit information from the residents on demographic characteristics, health status, and financial status. Detailed histories were taken of the fertility of all women of reproductive age and of all deaths that had occurred in the household in the past year. Residents were asked to give their definitions of "medicine" and to describe the use of medicines in their households. The observer took an inventory of all the medicines in the household at the time of the visit (using the residents' definitions). For each household observed, she also wrote a basic description of the community and the health care providers that were available to the residents.

The direct observations of these 25 families revealed that they invariably used multiple sources of medical treatment for illnesses, often simultaneously. Observation of specific illness episodes was particularly useful in identifying this phenomenon. When answering the household survey (described below), people tended to report only the major source of health care and not all sources of care. Any other conclusions based on the observation of families were considered tenuous because of the small size of the sample and inadequate recordkeeping.

Household Survey

Four geographically representative Health Regions within Honduras were selected for the survey: the north coast (San Pedro Sula); the western border with El Salvador and Guatemala (Santa Rosa); the eastern border with Nicaragua (Olancho); and the central mountains (Comayagua). Sample sites were stratified by level of health service to ensure a representation of rural health services. The survey team randomly selected households at each site to

obtain 30 interviews from households that had experienced an illness in the previous 15 days.

Data were collected from every study household on composition of the household, demographic characteristics of the inhabitants, mortality in the previous year, use of health services, socioeconomic conditions, and presence or absence of illness within the past 15 days. If an illness was reported in the past 15 days, then further data were collected on the individual experiencing the illness. Respondents were asked to supply information on the severity of each illness; sources of care for the illness; costs for consultations, medicines, laboratory tests, and transportation; and the amount of time lost to illness. The households in which an illness had occurred in the past 15 days were also asked to supply an inventory of medicines in the household, information on monthly income and expenses, and opinions about the health services.

The survey team completed 1,017 household interviews in 29 sampling sites during the first three months of 1983. In these households, 1,648 illnesses were reported and 910 interviews were conducted with members of the households who had experienced illnesses. Some of the key results of this household survey are presented below.

Approximately 89.5 percent of the households had at least one member who had experienced an illness in the past 15 days. In some households, more than one person had experienced an illness during that period. Approximately 45 percent of these illness episodes had been treated at home. Treatment by private physicians was sought for approximately 24 percent of the illness episodes. Combined institutional MOH services constituted 31 percent of the sources of care for illness.

Mean reported expenses incurred per illness episode were a surprisingly high US\$ 8.28. However, the median of US\$ 1.00 per illness episode suggests that the mean is influenced by a smaller group of illness episodes with much higher expenses. The mean expenses for illnesses treated at home were approximately US\$ 2.50. Most of those expenses were for medications. Mean expenses for treatment by private physicians were US\$ 34.45. Mean expenditures at MOH facilities depended on the level of care (see Table 1). For all the sources of care combined, payment for medications accounted for 50 percent of illness expenditures. Reported monthly household health care expenditures averaged US\$ 20.82 (11.4 percent of total monthly expenses) and were the third highest expense after food and clothing.

Surprisingly, health care expenses consumed only 8.5 percent of monthly expenses for urban residents, versus 12.9 percent for rural residents (see Table 2). The researchers hypothesized that this may be due to higher morbidity and mortality rates, the limited income of rural residents, and the relative scarcity of health care providers requiring rural residents to travel outside their communities to seek care. Ninety-four percent of the respondents reported a willingness to pay for MOH services.

The PRICOR researchers estimated that private expenditures for health services consumed close to 11 percent of the 1983 gross national product (GNP) in

Table 1. Expenditures for illness by source of treatment

SOURCES	No. of Cases	%	Costs (US\$)									
			Consultation		Medication		Transport		Other		Total	
			MED	MEAN	MED	MEAN	MED	MEAN	MED	MEAN	MED	MEAN
Family	501	31	-	-	.50	1.85	-	-	.25	.17	.50	2.01
Self	255	15	-	-	.50	3.65	-	-	.25	.06	.50	3.66
Private M.D.	229	14	7.50	12.38	7.50	13.65	2.00	4.14	.25	4.35	25.00	34.45
CESAR	220	14	.25	.10	.25	.20	.25	.22	.25	.20	.25	.72
CESAMO	148	9	.50	.91	.25	1.72	.25	2.15	.25	1.50	2.00	6.32
MOH Hosp.	123	8	.50	1.51	.35	1.91	.25	4.00	.25	5.35	4.00	12.76
Guardian	50	3	.25	.14	.25	1.98	.25	.54	.25	.06	.25	2.72
Others	98	6	.25	3.85	1.00	7.35	.25	2.20	.25	3.15	2.50	15.30
TOTALS	1634	100	1.00	2.08	1.00	1.20	.25	1.20	.25	1.34	1.00	8.28

- Observations:
1. Marked difference between the median and mean. The mean was used to estimate national expenditure projections. Median was used to establish ability to pay.
 2. Medications consumed 50 percent of private expenditures.
 3. Overall mean and median expenditure/illness episode much higher than anyone anticipated.
 4. Other includes indigenous healers and represents significant expense source.
 5. MOH Hospitals are theoretically "gratis", yet patients spend significant sums for services not available there.

Table 2. Mean Monthly (US\$)

	<u>TOTAL</u>	<u>%</u>	<u>RURAL</u>	<u>%</u>	<u>URBAN</u>	<u>%</u>
1. FOOD	82.26	45.1	74.95	44.1	97.76	45.7
2. CLOTHES	25.24	13.8	24.58	14.5	27.08	12.7
3. HEALTH CARE	20.82	11.4	21.76	12.9	18.17	8.5
CONSULTS	7.86	4.3	8.93	5.3	4.86	2.3
MEDICINE	8.60	4.7	8.44	5.0	9.05	4.2
TRANSPORT	3.20	1.8	3.16	1.9	3.30	1.5
OTHERS	1.16	0.6	1.23	0.7	0.96	0.5
4. HOUSING	17.58	9.6	15.30	9.0	23.80	11.1
5. LOAN PAYMENTS	8.47	4.6	7.73	4.6	10.53	4.9
6. OTHERS*	<u>28.17</u>	<u>15.4</u>	<u>24.53</u>	<u>14.4</u>	<u>36.81</u>	<u>17.2</u>
	\$ 182.54	99.9%	\$ 170.07	100.1%	\$ 214.15	100.1%

* No other expense item was more than 3 percent of the total.

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Honduras. Comparing these estimated expenditures with operating budgets for the MOH and Honduran Institute for Social Security (IHSS) for that same year, total health expenditures were estimated to consume approximately 14 percent of the GNP. Clearly, private expenditures for health services are a major economic force in Honduras.

Case Studies

Using standardized protocols where appropriate, the study investigators completed 10 case studies of clinics, health centers, or hospitals that were charging for services or actively receiving community support. A team of three to five researchers visited each institution for up to a week. Through direct observation and discussions with informed people, the team determined the environment in which the community financing project operated. Information was gathered on: socioeconomic and geographic characteristics of the area; the number, types, and utilization by area residents of other health care providers; other existing health-related community interventions; and other relevant aspects of the environment. The team gathered data on the institution from interviews with facility staff, direct observation of facility practices, and, when possible, from analysis of the utilization and financial records of the institution.

The research team also interviewed the people of the community to gain insight into the user's perspective. Through a standardized questionnaire, data was gathered from patients waiting to be seen at the facility. These questionnaires provided information on socioeconomic status, care-seeking patterns, any changes in health service utilization resulting from the cost-sharing requirement, perception of the quality of care provided by the facility, ability and willingness to pay, and preference for cost-sharing alternatives. Discussions were held with community leaders to obtain their views on the health facility and the payment mechanisms used.

Following data collection, the PRICOR research team developed concise analytic descriptions of the effects of community financing at each health care facility. The team considered the impact of the community financing on the community in general, on individuals within the community, on the study facility, and on other health care providers in the area. Using the results of this analysis, the researchers drew conclusions concerning the effectiveness and viability of the community financing mechanism.

The results of the case studies generally reinforced what had been learned from the observation of families and the household survey. In all 10 case studies, patients showed a willingness to support and/or pay for health care services, provided they felt the services were of high quality. It did not matter whether the charges were for consultations, medications, or other services; the most important factor in the decision to pay was the total charge. The ceiling appeared to be between US\$ 4.00 and US\$ 5.00 per visit. It was strongly suspected that higher total charges would result in a decline in the demand for services. The case studies also suggested that, as demonstrated in many of the study facilities, it would be feasible to develop administrative mechanisms for the management of funds by nurse auxiliaries if adequate supervision could be provided.

ALTERNATIVE FINANCING MECHANISMS

The PRICOR researchers developed alternative financing mechanisms from the information collected during the analysis of the financing problem and from interviews with key personnel in the MOH, other government officials, community leaders, directors of labor unions and cooperatives, health care workers, and health professionals. Seven financing alternatives were chosen for investigation:

1. Extension of "cuotas" (charges to recover costs of services) beyond the fees currently charged for physician consultations.
2. Payment for medications, through "popular pharmacies," health facilities, and community medicine chests.
3. Community contribution of labor for construction and maintenance of health centers.
4. Community rotating funds based on medications or services.
5. Expansion of population coverage under the Honduran Institute for Social Security.
6. Contracting for health services by cooperatives.
7. Interchanges with the private sector involving private practitioners, local businesses and business organizations, service clubs, and retail stores (e.g., commercialization of oral rehydration salts).

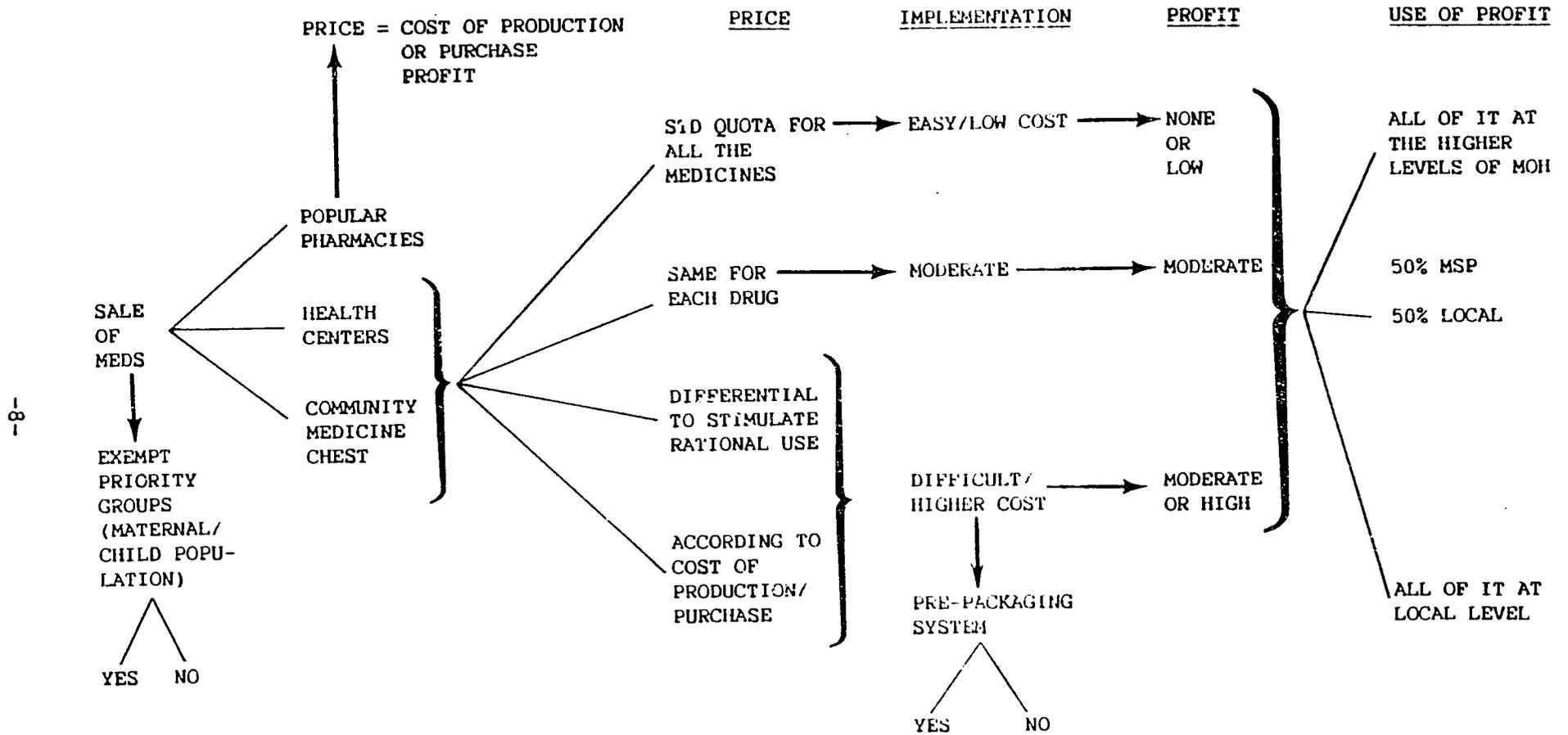
Two analytical techniques, decision flowcharts and positive/negative/interesting (P/N/I) force field analysis, were used. A multidisciplinary group, composed of the PRICOR researchers, representatives from the central MOH, and representatives from the PHC system at the regional and area levels participated in the development of decision flowcharts. These flowcharts were designed to define more precisely appropriate financing alternatives. For each alternative the participants charted the decisions required before implementing the given financing mechanisms and showed how various decisions were interdependent. Attempts were made to be quantitative wherever possible.

Using this process, the group eliminated some of the alternatives. Working with cooperatives was not considered feasible for the MOH on a national basis. Expansion of the coverage of IHSS was also eliminated because the group felt that further research would be necessary to determine the feasibility of such expansion. Decision flow charts were used to further subdivide some other financing alternatives into separate schemes. For example, the mechanism of payment for medications was divided into two separate alternatives: fixed charges for all medications, and charges that would vary according to the medications actually provided to the patient (see Figure 1).

The same multidisciplinary group used P/N/I force field analysis to evaluate the financing alternatives. Using a combination of brainstorming and reasoned

Figure 1

DECISION VARIABLES
SALE OF MEDICATION



analysis, the group generated a descriptive list of all foreseeable outcomes for each alternative and rated those outcomes positive, negative, or "interesting" (neither positive nor negative). The data gathered in the first phase of the study was used to give substance to this process. The technique proved to be simple and effective in sifting through the implications of each alternative and in deciding whether or not it merited further testing. In retrospect, the participants realized that they would not have arrived at the same conclusions if they had worked individually or if they had not used a structured analytical technique, albeit a simple one.

Using the analytical techniques described above, the group reached a consensus on the financial alternatives to be recommended to the MOH for field testing. The four alternatives chosen were: (1) standard fees for services (cuotas), (2) payment for medications, (3) community contributions of labor for construction and maintenance of health centers, and (4) rotating drug funds to be managed by local health committees.

POLICY APPLICATIONS OF RESEARCH FINDINGS

The data on common illnesses, illness behavior, and expenditures on drugs gathered for the PRICOR study convinced decisionmakers in the MOH of the importance of making low-cost, high-quality, essential medications available to all Hondurans. Several mechanisms (some of them proposed by the PRICOR study) are now under study or are ready for field testing: a system of "popular pharmacies"; community rotating funds for medications; commercialization of ORS; and expansion of Lab-PANI, an independent, government-sponsored pharmaceutical production facility.

There has been, however, a considerable gap between the adoption and implementation of these policies to extend the availability of basic drugs. Centralized government administrative processes made the adoption of innovative, community-level financing projects difficult. Many technical-level MOH personnel are committed to the provision of free PHC services and resist any attempts to institute charges for users of PHC facilities and personnel. At the policy level, frequent changes in MOH personnel prohibited any continuity of interest in implementing the policies adopted. There was significant legislative and governmental resistance to allowing community residents to manage "state funds," as would have been necessary for the community rotating funds and the "popular pharmacies."

As an indirect result of this study of PHC financing alternatives, the MOH has instituted a policy that will allow hospitals to recover an increased portion of their operating costs. The MOH has directed all hospitals to recover a minimum of 30 percent of their annual operating costs through fees for services from patients. The budgets of all the hospitals were cut by five percent to stimulate cost recovery. In 1984, hospitals overall recovered an average of 4.2 percent of their annual operating budgets, a 30 percent increase over 1983.

The operations research (OR) technique had an impact on how the Honduran MOH makes decisions. A Science and Technology Unit has been created within the MOH to coordinate OR studies. Resources have been invested in this effort,

including full-time personnel and microcomputers. Ongoing OR studies include: a study of the effectiveness of trained versus untrained traditional birth attendants (TBAs); a feasibility study of the commercialization of ORS; and a comparison of alternatives for expanding hospital services without reducing PHC services.

RECOMMENDATIONS

The PRICOR team made final recommendations based on the results of the research and realization of the constraints to community financing of PHC services described above. They recommended that the emphasis on cost recovery for hospitals be continued over the next three to five years. Despite the resistance at the technical level, the researchers recommended that rotating funds for medications be implemented in communities. A field test was suggested that could become the basis for expansion on a national level should the environment become more supportive in the future. Finally, the PRICOR team recommended that the operations research studies being carried out by the Science and Technology Unit be continued, with special emphasis on the study of TBAs and the study of the commercialization of ORS.

THE FUTURE OF COMMUNITY FINANCING AND OPERATIONS RESEARCH IN HONDURAS

This PRICOR study provided valuable data on community financing of health care and stimulated policy decisions in several areas. A data base now exists that can be used to analyze a variety of community financing alternatives. Policymakers in the MOH and other government agencies now appreciate the significant amounts that Hondurans are already spending on health care services. As a result of the research, one community financing scheme was implemented (hospital cost recovery) and others are planned. It is not known if the legislative, attitudinal, and practical constraints to the implementation of the study recommendations will be overcome in the near future.

Operations research proved to be an effective decisionmaking tool for the Honduran MOH. The multiple sources of data gathered in the first phase of the study gave policymakers a reliable source of information on which to base their decisions. The simple analytical techniques used to analyze financing alternatives were considered to be quite helpful in the solution development process.

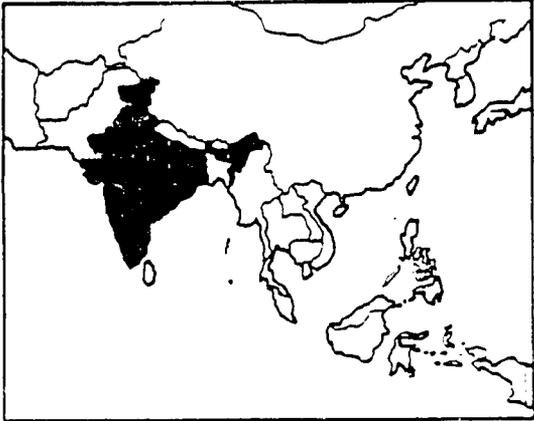
* * *

This study was conducted from August 1982 through December 1984 by the Ministry of Health of Honduras and Management Sciences for Health, a nonprofit organization based in Boston, Massachusetts. This summary is based on a final report of the study submitted by MSH and the Honduran MOH. Further information is available from the principal investigator, Dr. Frederick Hartman, MSH, 165 Allandale Road, Boston, Massachusetts 02130, or from Dr. Jack Reynolds, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

FINANCIAL, ORGANIZATIONAL AND MANAGERIAL PROBLEMS OF COMMUNITY HEALTH PROJECTS IN INDIA



To meet the basic health needs of underserved rural populations of India, numerous voluntary agencies have started community health projects in the last two decades. In their efforts to improve health care delivery, these projects have had to develop solutions to a number of financial, managerial, and organizational problems. An operations research study, conducted by researchers from the Institute of Rural Management, Anand (IRMA) in India and the U.S.-based Management Sciences for Health (MSH), examined eight such voluntary health projects operating in different regions of

India during 1985-86. The researchers identified and analyzed the most important operational problems faced by the health projects, and suggested solutions to resolve these problems.

India currently has a population of 758 million. The birth rate is 33 per thousand and the death rate is 12.5 per thousand. The infant mortality rate is estimated at 114 per 1,000 live births. Life expectancy is 55 years. The leading causes of death among children under five are respiratory infections, diarrheal disease, and malnutrition. Diseases preventable by immunization, namely tetanus, whooping cough, diphtheria, polio, and measles, are still common. Many people suffer from malaria and other vector-borne diseases.

Although the Indian government has a large network of primary health care (PHC) manpower and facilities, these health resources cannot reach everyone who is in need of basic health care services. For this reason, many voluntary organizations have started health projects in rural villages, city slums, and other areas where PHC services are inaccessible. The Indian government actively encourages and cooperates with such voluntary health projects and allows them to develop and follow their own policies regarding PHC delivery, within overall national guidelines. The eight voluntary health projects studied by IRMA and MSH were located in many different states of India and included: (1) Kaira District Mothers and Infants Health Programme, Tribhuvandas Foundation; (2) Comprehensive Rural Health Project, Jamkhed, Maharashtra; (3) Mini Health Center Project, Adayar, Tamil Nadu; (4) Christian Fellowship Community Health Project, Santhipuram, Ambilikai, Tamil Nadu; (5) Community Health and Development Project, M.G.D.M. Hospital, Kangazha, Devagiri, Kerala; (6) Social Work and Research Centre, Tilonia, Rajasthan; (7) Jaipur District Rural Health Program, Jaipur, Rajasthan; and (8) Agrindus Health Project, Banwasi Seva Ashram, Govindpur, Mirzapur, Uttar Pradesh. (See Table 1 for basic information on the eight projects.)

Table 1. Basic characteristics of voluntary health projects included in the PRICOR study

<u>Name</u>	<u>Location</u>	<u>Date of Initiation</u>	<u>Population Now Served</u>
Kaira District Mothers and Infants Health Programme	Anand, Gujarat	1980	427,500
Comprehensive Rural Health Project	Jamkhed, Maharashtra	1971	250,000
Mini Health Center Project	Adayar, Tamil Nadu	1971	20,462
Christian Fellowship Community Health Project	Ambilikkai, Tamil Nadu	1976	124,000
Community Health and Development Project	Kangazha, Kerala	1978	20,000
Social Work and Research Centre	Tilonia, Rajasthan	1972	80,000
Jaipur District Rural Health Program	Jaipur, Rajasthan	1983	99,167
Argindus Health Project	Agrindus, Uttar Pradesh	1968	250,000

The goal of this study was to identify the solutions which had been developed in response to the financial, organizational, and managerial problems in these eight health projects over their years of experience, and to share those solutions with existing and emerging health projects. Objectives to be met towards reaching this goal included: (1) eliciting information on financial, organizational, and managerial problems from the people most directly involved in the eight projects, (2) analysis of data to determine the most pressing problems and the most promising solutions, and (3) dissemination of the study results to various community health programs in India and other countries so they might benefit from the experience of these programs.

METHODS USED TO EXAMINE EIGHT VOLUNTARY COMMUNITY HEALTH PROJECTS

Based on a literature review and their experience in the field, the senior members of the research team developed a preliminary list of the financial, organizational, and managerial problems faced by voluntary health projects. With this list in hand, the team conducted an initial visit to each of the eight projects. At each project, the researchers met with the project director in order to refine the list of problems, add new problems, and rank the problems in order of priority. This served as the groundwork for developing the survey instruments to be used in the study.

Questionnaires were developed for community members, community leaders, project directors, and project staff. These questionnaires were pretested at the Tribhuvandas Foundation. After the questionnaires were finalized, they were administered to different groups of respondents in each of the eight sites. For the survey of community members, three villages from each project were selected according to the criteria of distance from the project center, duration of participation in the health project, and distance from a PHC subcenter. Within each large village, the researchers picked three or four wards and selected a random sample of 23 households within each ward. In small villages, the 23 households were selected from the list of households for the entire village. One or two community leaders were interviewed in each village. These leaders included presidents of panchayats (village councils), panchayat members, and other prominent people of the villages. Senior research team members conducted interviews with the executive directors of the eight health projects. In each project, samples of the staff were interviewed. Where the number of staff was small, the team interviewed everyone. Otherwise, samples were drawn from strata defined by type of staff position and level of operation. All the community health workers (CHWs) in the selected villages were interviewed.

In addition to these surveys, the researchers, with the assistance of project staff, filled out institutional schedules and conducted focus group discussions in each project area. The institutional schedules were filled out in order to gather data on sources of finances, activities, and achievements of each health project. For each project, two villager focus group discussions were conducted with 10 to 35 participants per group. In addition, the staff of each project participated in a focus group discussion of their own.

After the data from all eight health projects had been collected and analyzed, the researchers prepared some preliminary reports. Then they organized a three-day workshop in Anand for representatives of the projects, other agencies, and the government. In addition to data from the surveys and focus group discussions, the participants provided relevant data from their experiences. The purpose of the workshop was to discuss the priority problems and alternative solutions identified through the study, develop conclusions, and make recommendations.

RESULTS: FINANCIAL, ORGANIZATIONAL, AND MANAGERIAL PROBLEMS

The research team took all the data from the surveys, institutional schedules, and focus group discussions and analyzed them to identify the most significant

financial, organizational, and managerial problems experienced by the voluntary health projects and their solutions to these problems. The three different problem areas are discussed separately below.

Financial Problems

The researchers found that the financial challenge for all the health projects was threefold: (1) to generate adequate financial and other resources for health, (2) to increase efficiency in use of those resources, and (3) to distribute benefits equitably among all members of the communities being served. The projects met these challenges in a variety of ways.

Generating more resources. All of the eight health projects had to generate resources for the initial expenses involved in setting up a PHC program. The researchers found that all of the eight projects met initial expenses with a significant amount of external support (from 51 to 100 percent of costs), since community members do not have the financial resources necessary for starting a project. Four of the health projects met virtually all their expenses in their first year of operation from external sources. As the projects matured, their dependence on external support did decrease, in relative terms, for five of the eight projects and for the average of the eight projects. Ideally, most of the projects would like to be independent of external support (resources obtained outside the local communities served by the project) for two reasons: (1) to permit greater freedom of decision at the local level and (2) to assure project continuity should external funding be discontinued. When asked whether or not it is possible to start a community health program without external funding, four project directors responded, "No," and four said, "Yes." Those who felt it was possible realized that it would take much longer to build a health program entirely from community resources.

Six of the eight project directors felt that, once a health program is well established, it would be possible to meet recurring expenses without external funds. None of the eight projects had achieved complete self-sufficiency, but all projects raised more local funding in absolute terms in 1983-84 than during their first year of operation. However, the absolute increase in the amount of local funding did not necessarily lead to a higher percentage of local versus external funding in covering the projects' total expenditures. Indeed, some suggested that, rather than seeking full independence from external funding, one measure of project success would be its ability to mobilize external resources.

Typically external resources for starting the projects came from charitable organizations, foreign or national. Once the projects started, the most common type of external support received by the eight projects was governmental, either from the central or state level. Government support was in the form of vaccines, family planning supplies, medicines, and direct payment of project expenses. The majority of projects also received some financial support from nongovernmental external donors.

Obtaining significant financial participation from the communities being served was a common goal of all the projects. Types of contributions made by community members included: labor, land, buildings, membership or health insurance fees, fees for drugs, and fees for services. Labor was perhaps the single largest local contribution, although it was difficult to quantify.

Only two of the eight projects charged fees for membership or health insurance, but three more were planning to do so in the near future. The Tribhuvandas Foundation charged 1 rupee per month or 10 rupees (Rs.) per year. From the first year of operation, when the membership fees constituted only 2.4 percent of total income of the Tribhuvandas Foundation, prepaid membership fees have grown to cover 30 percent of the budget in 1984. The Adayar project charged a minimum annual insurance fee of Rs. 12 for those with monthly family incomes below Rs. 300. The fee was scaled upward to a maximum of Rs. 300 per year for those earning Rs. 2,500 or more. One of the major attractions for members of the Adayar project was the high quality of service provided by the referral hospital.

Members of the Tribhuvandas Foundation and the Adayar Project were asked whether they thought the coverage charge was "too high, about right, or too low." Almost two-thirds (N=93) thought that the charge was about right. Most of the remaining respondents thought the fee was too high. Respondents suggested fees ranging from 0 to 8 rupees per month. Using an indirect approach, reasons for not joining the health projects were explored. The researchers asked community members why others do not become members. (This approach avoided any embarrassment that respondents might have felt when referring to their own financial situations.) Eighty-five percent of the respondents reported that others could not afford to pay the charges. The next most frequently mentioned reason, that the program did not provide the services they needed, was mentioned by only 10 percent of the respondents. The directors and staff of the two projects also noted that, for those who had been lucky enough to remain healthy, there was a tendency not to re-enroll in the health program.

For those projects that charged user fees for drugs or services, managers had to decide (a) how much to charge for each type of service and (b) whether or not to charge all clients the same fees. Most of the eight projects charged some fee for curative services. Some programs, such as in Jamkhed, charged more than the marginal cost for curative services in order to subsidize preventive services. Most projects did not charge for preventive services, such as immunizations, family planning, prenatal care, growth monitoring, or nutrition supplementation. Most project directors and staff members thought that charges for PHC services should be levied in accordance with ability to pay rather than equal charges for all. All projects followed this practice with some variation.

Increasing efficiency. Many of the projects found that it was easier to reduce costs than to raise a commensurate amount of funds. This was particularly true for recurring expenses. Many project directors urged caution in purchasing or constructing buildings. The success of a community health program is highly unpredictable, so they suggested that funds might be better spent on developing the health program than on the acquisition or construction of a building. Instead of obtaining their own buildings, the directors suggested using buildings contributed by the community or renting buildings whenever possible. To reduce transportation costs, some of the projects used two-wheeled rather than four-wheeled vehicles. One project even passed the capital costs on to the staff by loaning them the funds to purchase the vehicles. Approaches suggested for lowering drug costs included: using generic and biological drugs, restricting drug purchases to the basic drugs

recommended by WHO, purchasing from suppliers at competitive prices, distributing through project and commercial channels where prices can be monitored, and establishing revolving drug funds.

An important cost reducing strategy used by many of the projects was the mobilization of existing, but underutilized, government resources. In some cases, it was a matter of making community members aware of opportunities. In other cases, projects have become executing agencies for the government. For example, the Agrindus Project assumed responsibility for distributing food rations in a project area, where previously only one percent of available rations had been distributed.

Promoting equity. The researchers discovered that the projects had used several different methods to promote equal access to health care. The basic approach was to offer health services in the villages themselves, close at hand to the rural poor. Also, all eight projects made some allowances for differences in ability to pay. Tribhuvandas Foundation, for example, charged no fees for about 20 percent of clients. Jamkhed charged for curative services according to the doctors' judgment of the client's ability to pay. Some projects offered some preventive services, such as family planning, at negative prices, i.e. with material benefits for the family planning acceptor. Projects with membership or health insurance fees distributed health resources in the community in accordance with health needs and had the net effect of increasing equity since many of those served would not have otherwise received service. Many of the projects instituted income-generation activities for the villagers. These activities allowed the villagers to afford better food and health services.

Organizational Problems

All of the eight health projects studied were committed to the idea of community participation in the planning, administration, promotion, and delivery of primary health care services. The project directors gave various reasons for this approach. They stated that community participation promotes: low cost health services, more health services in the community, health services that address community needs, community development, individual development, responsibility for the project, use of indigenous knowledge and expertise, freedom from dependence on professionals, and consciousness raising. For one or more of these reasons, the projects chose to work closely with local organizations in organizing their PHC programs. This approach posed several challenges including: (1) working with local organizations, (2) convincing community members to participate in the health projects, and (3) ensuring depth of community participation, (i.e. community members participate, not only as recipients of services, but also as planners, managers, and service providers).

Working with local organizations. The eight projects worked with local organizations that may be characterized as: either new or previously existing, related or not related to other local organizations, and single or multi-purpose. The Tilonia and Jaipur projects worked with previously existing multi-purpose organizations which were related to other local organizations. The Tribhuvandas Foundation, the Jaipur Project, and the Kangazha Project created new single-purpose organizations which were related to other local organizations. New multi-purpose organizations which were

unrelated to other local organizations were created at Jamkhed, Ambilikai, and Agrindus. The Adayar Project was the only project that created new single-purpose organizations which were unrelated to any other organizations in the villages. See Table 2. Each type of local organization presents the PHC project with different opportunities and limitations. While collaboration with existing organizations will lessen the burden of raising new resources for new projects, their vested interests would, typically, tend to compromise the freedom of organization and operation that a community health project needs. Hence, new projects should collaborate with existing organizations only when such collaboration will not compromise the ideals they stand for.

Table 2. Types of local organizations affiliated with the eight study projects

Type of Organization	Related to Other Local Organizations	Not Related to Other Local Organizations
Single-Purpose PHC organization (all newly formed)	Kaira District mothers and Infants Health Programme	Mini-Health Center Project
	Jaipur District Rural Health Programs	
	Community Health and Development Project	
Multipurpose Organization (Newly formed organization including PHC)		Comprehensive Rural Health Project
		Christian Fellowship Community Health Project
		Agrindus Health Project
Previously existing organization adding PHC	Social Work and Research center	
	Jaipur District Rural; Health Program ¹	

The Jaipur District Rural Health Program initially collaborated with a previously existing multi-purpose organization. The PHC project subsequently became an independent single-purpose organization related to the older multi-purpose organization.

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Promoting community participation. The interviews with community members, project staff, and project directors were used to investigate the pros and cons of joining the health projects from the villager's point of view. When community members at the Tribhuvandas Foundation and the Adayar Project were asked why they became members, the majority of respondents (76 and 70 percent respectively) cited the availability of health services in their communities. Project directors and staff agreed with this assessment. Other reasons cited by large percentages of the respondents included supplementary food distributed by the project, the quality of treatment, the possibility of hospital referral, and ease of communication with project staff.

Community members of the Tribhuvandas Foundation and the Adayar Project were also asked an indirect question about others' reasons for not joining the health projects in hope of obtaining more objective responses than might have been obtained by asking directly for the respondents' reasons. By far the most frequently cited response (85 percent) was that others could not afford to pay. (See Table 3 for other responses.) A substantial percentage of the staff, 15 percent, also thought the failure of community members to avail themselves of the program services had to do with money, either the lack of funds or inappropriate charging policies.

Table 3. Percentage of responses to the question
"Why do you think others in this village do not become members?"

Reason others do not become members	Tribbuvandas Foundation %	Adayar %	Total %
Cannot afford to pay	39	80	85
Program does not provide needed services	4	18	10
Program does not provide medicines and drugs	0	10	4
Program personnel not available	2	5	3
Program personnel not competent	2	3	2
Program personnel favor special group	2	0	1
Number of respondents	(53)	(40)	(93)

Source: Community Members Survey, Item 511

Note: Because respondents were permitted multiple responses, the percentages sum to more than 100.

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Staff members most often mentioned affluence as an obstacle to project participation. Thirty-two percent of the staff replied that the more well-to-do villagers use private doctors and therefore do not want to use the program services. Other reasons given for affluent community members not participating in the health projects included the CHWs' lack of professional training and client feelings of social superiority. In some projects, members of local organizations tended to be from more affluent classes, and although they were not threatened by the health project activities, neither did they or their families benefit directly. Without such personal benefit, some well-to-do members lost interest and dropped out. The projects dealt with this problem by urging elites to help those less fortunate than themselves, stressing problems such as sanitation and clean water which benefit all members of the community, and offering services (such as hospital referral) which elites cannot easily duplicate through private channels.

The directors and the staff of the projects supplied further reasons why community members do not join the health projects. Many felt that people did not join simply because they were not aware of the program. Illiteracy contributed to this lack of awareness. The caste structure in the villages was also seen as an impediment to participation. It was often difficult for villagers to learn to work together on health projects or share health services. For example, when the Tilonia Project built new wells, the elites tried to prevent the lower castes from using them. Another problem was the low priority that many community members placed on health vis a vis their other needs, except in moments of crisis, when health assumed the highest priority. Some community members did not participate because their vested interests conflicted with the project objectives.

The researchers asked staff members of all the projects what methods could be used to enlist community support. Eighty-one percent thought that house-to-house visitation was the most effective method. Other methods mentioned by large percentages of the staff members included community meetings (62 percent), collaboration with local organizations (44 percent), collaboration with influential persons (31 percent), and the delivery of services (19 percent).

It was also suggested that certain activities or policies should be followed from the start in order to facilitate community participation. Experience from some of the eight projects argues strongly against starting with lavish free services for which the project must later seek community funds. When fees were charged for previously free health services, there was great reluctance on the part of the community to pay. Another useful strategy employed by the projects was to combine health with broader development efforts. This may compensate for the fact that many villagers put a low priority on health. Some project staff and directors argued that it would be best to start with a service for which there is an acute community need. This type of service would be likely to win the project more acceptance in the community.

Ensuring depth of community participation. Depth of participation is characterized by community involvement in such activities as planning of program activities, health education and promotion, and service delivery by the people themselves. The respondents to the community survey were asked

what type of meetings they had attended related to the health project in their area. People most frequently participated in meetings for health education and meetings dealing with program finances. Fewer respondents mentioned attending meetings to select the CHW. Three of the health projects have organized ways to ensure the participation of community members in decision-making above the village level. Since many project activities are planned at a higher level than the village, it would seem to follow that users in these three projects would have more input in program planning than in the other projects.

Managerial Problems

The researchers chose to focus on a critical management topic: the management of personnel. This topic was deemed important firstly, because personnel expenditures constituted the largest budget item for all programs studied, and secondly, because of the crucial role local personnel play in their popular involvement with the community at the village and all other levels. In the area of personnel management, challenges for the health projects included: (1) defining personnel needs, (2) recruiting effective personnel, and (3) retaining personnel over time.

Defining personnel needs. The management of personnel is integrally related to the particular type of program structure and level of operations of each program. Nonetheless, there are elements common to all programs.

All projects found it important to define needs for professional personnel, such as doctors and nurses. To reduce both costs and social distance between health providers and the community, many of the projects have tried to reduce the need for professionals by training local people to perform functions that might have been performed by doctors or nurses. All the eight projects use physicians, although the role of the physician varies considerably from project to project. If the role of the physician was largely clinical, then communications skills were not so crucial as in the case where the physician was expected to train paramedical personnel and CHWs. Selection criteria for the two roles, therefore, differed.

Among the eight projects, the roles of community health workers (CHWs) differed remarkably. For example, in some projects the CHW provided few health services and mainly promoted better health practices and referred patients to higher level personnel. In other projects, CHWs performed a variety of health services. Clearly the training required for these disparate roles was radically different.

Recruiting and retaining personnel. The projects recruited for a variety of different staff positions including physicians, registered medical practitioners, support staff, and community health workers. Several of the projects incorporated traditional medical practitioners and birth attendants (TBAs). One of the projects, Tilonia, early in its history employed nine TBAs. Tribhuvandas Foundation has found that trained TBAs have been their best community health workers.

Professionals: The researchers asked the project directors, "How can projects do a better job in recruiting skilled personnel?" Some directors stressed paying high salaries and giving professionals responsibility. Others felt that projects need to look for professionals who are dedicated to serving the poor and are not as worried about high salaries and security. Project staff felt that housing and salaries were most important in attracting doctors and nurses. If the project cannot provide good material benefits, the directors suggested providing non-monetary rewards, such as encouraging initiative, providing job security, supporting personnel against unfair opposition, and recognizing good service.

Many projects had experienced problems in recruiting physicians. One project offered only Rs. 1,400 per month to physicians and another project offered Rs. 1,000. These salaries competed with salaries of Rs. 1,800 plus accommodations to physicians working in government primary health care centers. Other difficulties included the lack of adequate clinical facilities and the lack of adequate schools for the children of staff. Directors suggested that it was easier to recruit doctors if their work was related to hospitals, where they could use their clinical skills and serve more as medical consultants than as key trainers or service providers.

Paramedical and support staff: The directors had divergent views regarding the recruitment of paramedical personnel who in India are termed "registered medical practitioners" (RMPs). One group favored integrating them into the projects to give them insight and skills in primary health care. Others cautioned that if RMPs gained credibility through their association with the projects, they would use their enhanced status to exploit the community. The project directors also emphasized the importance of maintaining high levels of job satisfaction among non-professional staff, such as drivers, secretaries, and maintenance workers.

Community health workers: CHWs present special recruitment, selection, compensation, and training problems. All of the eight health projects use CHWs, although in different capacities as discussed above. The researchers found three different methods of selecting CHWs in the eight projects: (1) joint selection by the project leadership and a local organization or local leaders (Tribhuvandas, Jamkhed, Adayar, Jaipur Trust), (2) joint selection by the project leadership and the entire village (Kangazha), and (3) selection largely by the project staff (Ambilikkai, Agrindus, Tilonia). Problems experienced in recruiting and selecting CHWs included caste discrimination, low remuneration, lack of interest by those most qualified, and favoritism on the part of village leaders.

How a CHW is trained is integrally associated with the tasks he or she is expected to perform, and his or her functions, in turn, depend in part on the project structure. In projects where there were relatively accessible and comprehensive services available at the intermediate level, the CHW tended to serve mainly as a health promoter and referral agent. CHW training was correspondingly short, ranging from one to two weeks. Six of the projects fit this model. In contrast, CHWs working for the Jaipur Trust had three months training and carried out more tasks than did most CHWs in the other projects. These CHWs received an initial three months of training and subsequent refresher courses every two weeks.

The problem of how to compensate the CHW is crucial if projects are to recruit and retain village level personnel. CHWs constituted the largest single category of personnel, but few projects could afford to pay salaries competitive with government or commercial enterprises. The CHW salaries paid by the eight projects ranged from no salary in Agrindus to Rs. 325 per month in Kangazha. There were clearly some intangible benefits for CHWs, such as respect and appreciation of their fellow villagers. Some projects paid the CHW from the central office and used the occasion when they came for their pay as opportunity for refresher training meetings. In other projects, the local village organization such as the milk cooperative was responsible for paying the CHW.

Relationships Between Managerial, Financial, and Organizational Variables

The researchers were also interested in finding any correlations among variables in the three problem areas. First, they examined the relationship between percentages of local financing and length of personnel training in the eight projects. They hypothesized that the more thorough the training of the intermediate level and community health workers, the more capable they would be in resolving local health problems, and consequently, the more willing community members would be to pay for such services. The rank correlation for length of training and percentage of local financing was only .55, indicative of a positive but not a strong relationship. Second, the researchers examined the relationship between length of CHW training and community use of services. They hypothesized that more training would augment the confidence of the villagers in the CHW's competence and, therefore, increase use of CHW services. The rank correlation between length of CHW training and community members' stated use of CHW services was -.49. Clearly, the data did not support the hypothesis that longer training is associated with higher community use of services.

SUMMARY AND CONCLUSIONS

During the three-day workshop at Anand, the participants examined the preliminary results of the PRICOR study and considered their programmatic implications. The participants felt that it would be a major error to force a single orthodox pattern upon new community health projects. In fact, they felt that a major lesson of the study was that community health projects can successfully follow quite varied financial, organizational, and managerial strategies. On the other hand, the participants found common successful strategies among the projects. They believed that these patterns warranted replication in diverse geographical and cultural settings.

Financial Problems

The PRICOR investigators found three major approaches that were used to finance the health projects. First, all projects raised some funds and in-kind assistance from outside the community for starting up the project. Half the project directors felt that external resources were absolutely essential at this point. Second, the projects obtained resources for recurring expenses from a variety of local and external sources. Local sources included donations of land, labor, and buildings; fees for drugs and services; and membership and insurance fees. The government was an importan

source of external funding. Third, projects pursued a policy of relentless cost containment. These approaches were not mutually exclusive, but the different projects emphasized different strategies.

To increase efficiency, the eight health projects used various strategies to economize on buildings, transport, and the purchase and use of drugs. Strategies included: using existing buildings, allowing project personnel to own and maintain two-wheeled vehicles, and reducing drug costs by restricting purchases to basic drugs recommended by WHO, purchasing in bulk at competitive prices, and distributing through selected, reliable vendors at fixed prices.

The single most difficult financial problem cited by the project directors was how to achieve greater community self-reliance. In particular, how can programs involve community members in contributing toward the cost of preventive health services disassociated from current health problems and in developing resources for treating incurable diseases like blindness? Local organizations proved to be important resource bases.

Organizational Problems

Based on the experience of the eight health projects, the researchers concluded that starting with existing or related community organizations, instead of new organizations, helped achieve broad coverage more quickly and more easily - at least over the short run. The Tribhuvandas Foundation and the Jaipur Trust both started with existing milk cooperatives and achieved rapid growth. Jamkhed and Agrindus started new organizations and required a long period to achieve broad coverage. However, the fast and efficient start achieved through existing organizations may not necessarily result in greater breadth of participation in the long run. There is some evidence that a pre-established organization, if it represents only part of the community, may perpetuate restricted participation.

Overall, multi-purpose organizations demonstrated an advantage in breadth of participation, i.e., high percentages of community members who participated. However, in terms of depth of participation (community involvement in project planning, management, and service delivery), only newly organized multi-purpose organizations achieved greater participation. In previously existing multi-purpose organizations, members tended to assume fewer active roles.

In support of multi-purpose organizations, some respondents explained that their projects had achieved wide participation by starting with a strongly felt need in the community, even if that need was only indirectly related to health. On the other hand, adherents of single-purpose organizations warned of potential bankruptcy of multi-purpose organizations, where failure of a single activity could drag down the entire organization.

Community poverty was a real barrier to the projects in achieving broad community participation, but so was wealth. Not only did poor people refrain from joining health schemes, but affluent community members gravitated to private physicians. Serving the entire spectrum of economic strata therefore required, on the one hand, services to attract the wealthy, and on the other hand, methods of drawing in the poor. To serve the affluent community members, an organizational structure which permitted referral to good hospital service proved to be an effective strategy. To reach the poor, project staff

and directors stressed the importance of income-generating activities and the need to start with strongly felt needs in the community.

Managerial Problems

All projects employed both locally and professionally trained personnel. A higher mix of externally trained personnel was coupled with a fast start and lower initial costs but higher recurring costs, whereas a higher mix of locally trained personnel was associated with a slow start and higher initial costs but lower recurring costs. The lower recurring costs resulted from both lower salaries and fewer resignations from locally trained personnel. Most projects also found that recruiting professional personnel with proper credentials was difficult. The common solution to these problems was to train local residents to carry out tasks that physicians and nurses might otherwise do.

Projects found that over-specification of tasks had the effect of increasing staff size and reducing the ability of the project to respond to health needs in a flexible manner. This lack of flexibility was particularly apparent during emergencies. To combat this tendency to over-specify, some of the projects trained professional staff in support skills and assigned them to do some of their own support work. For example, health workers were allowed to drive and maintain their own two-wheeled vehicles instead of riding as passengers with drivers of more expensive four-wheel vehicles.

The training of community health workers is one of the largest investments the projects make. Thus, it was a sobering discovery that duration of the training period was not associated with higher percentages of community members using the project services. The researchers cautiously suggested that this finding was confounded by other variables not measured.

Other Problems

In the course of the three-day workshop, the directors of the eight projects and the other participants identified two important additional problems faced by volunteer health projects. First, they noted that there were no mechanisms whereby project directors and other staff could learn the managerial skills necessary to run a health project. Second, a system for information-sharing among the many volunteer health projects in India was needed.

RECOMMENDATIONS AND FUTURE ACTION

Collaboration With the Government

Because they felt collaboration with the government was so important, the participants in the workshop at Anand developed a set of specific recommendations for enhancing collaboration with the government. The following recommendations were made to the directors of voluntary health projects:

- Give due credit to the government for joint achievements.
- Keep on requesting support time after time.
- Take requests for support to higher-level as well as lower-level officials.

Recommendations for facilitating collaboration with voluntary health projects were also made to state and federal officials:

- Simplify government regulations for obtaining support and establish committees at the state level to approve, disburse, and monitor funds for voluntary health programs.
- Increase the level of the overall health budget.

Information-Sharing and Management Training

As a step toward meeting the need for information-sharing between projects and for management training, the participants recommended that the Institute of Rural Management at Anand (IRMA): (1) establish a literature repository on volunteer health projects, (2) incorporate training on how to manage a rural health project in their management training course, (3) place management trainees in the voluntary health projects as interns during their training, and (4) facilitate more operations research studies to solve problems in PHC delivery. The Volunteer Health Association of India (VHAI) has agreed to provide some funds towards the literature repository. The Institute of Rural Management Anand will distribute the PRICOR study findings widely so that other voluntary health projects facing similar problems might benefit from solutions that have been effective elsewhere and is currently exploring the possibility of fulfilling the other functions recommended at the workshop.

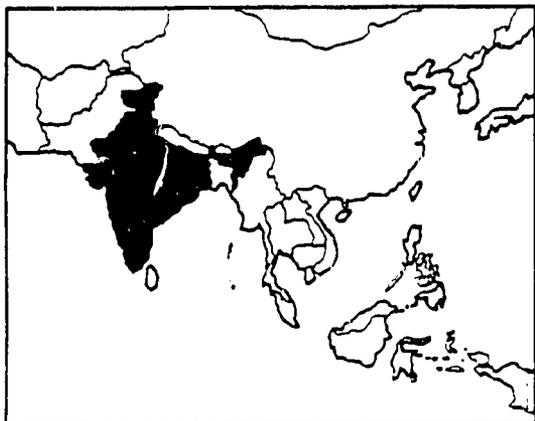
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The study was conducted from January 1985 through March 1986 by Management Sciences for Health (MSH) in collaboration with the Institute of Rural Management, Anand (IRMA), Gujarat, India. This summary is based on the final report prepared by Henry Elkins, D. Nagabrahmam, S.C. Sharma, and George Varky. Further information may be obtained in India from Professor D. Nagabrahmam (IRMA), and in the U.S. from the principal investigator, Dr. Henry Elkins, Jr., MSH, 165 Allendale Road, Boston, Massachusetts, 02130, or from Dr. Jeanne S. Newman, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

IDENTIFICATION OF AN OPTIMUM DISTRIBUTION SYSTEM FOR VACCINES IN RURAL INDIA



[The following summary is taken in large part from an article prepared by PRICOR researchers and staff for a 1987 issue of the international journal, Socio-Economic Planning Sciences and appears here with permission of the journal's editors.]

Researchers from Management Consultancy and Services (MACONS) in Secunderabad, India, conducted an operations research (OR) study to identify the most critical operational problems in Karnataka State's vaccine distribution system and to develop a planning and managerial tool for restructuring the system. The year-long study, carried out in cooperation with the Directorate of Health and Family Welfare of Karnataka State (in southern India), took place in three districts of the northern part of the state during 1985-86.

BACKGROUND

Primary health centers (PHCs) and subcenters, the main vehicles for delivering primary health care in rural areas in India, function under a number of constraints including poor infrastructure and inadequate communications. Shortage of skilled staff is compounded by the multiplicity of health programs being implemented in the field. As in other developing countries, limited financial resources, both capital and operational, prevent health administrators in India from reducing many of these constraints. It thus becomes imperative to find managerial solutions to the problems faced by the PHCs.

Throughout India government services provide DPT (diphtheria, pertussis, tetanus) and polio immunizations for children. DPT/polio immunizations are given together in 3 doses, normally at ages 3 months, 4 months, and 5 months. The monthly interval between doses may be extended to 2 months. All 3 doses should be given by 12 months of age. The purpose of this PRICOR study was to identify a vaccine distribution system that would ensure the regular supply of these vaccines to rural areas.

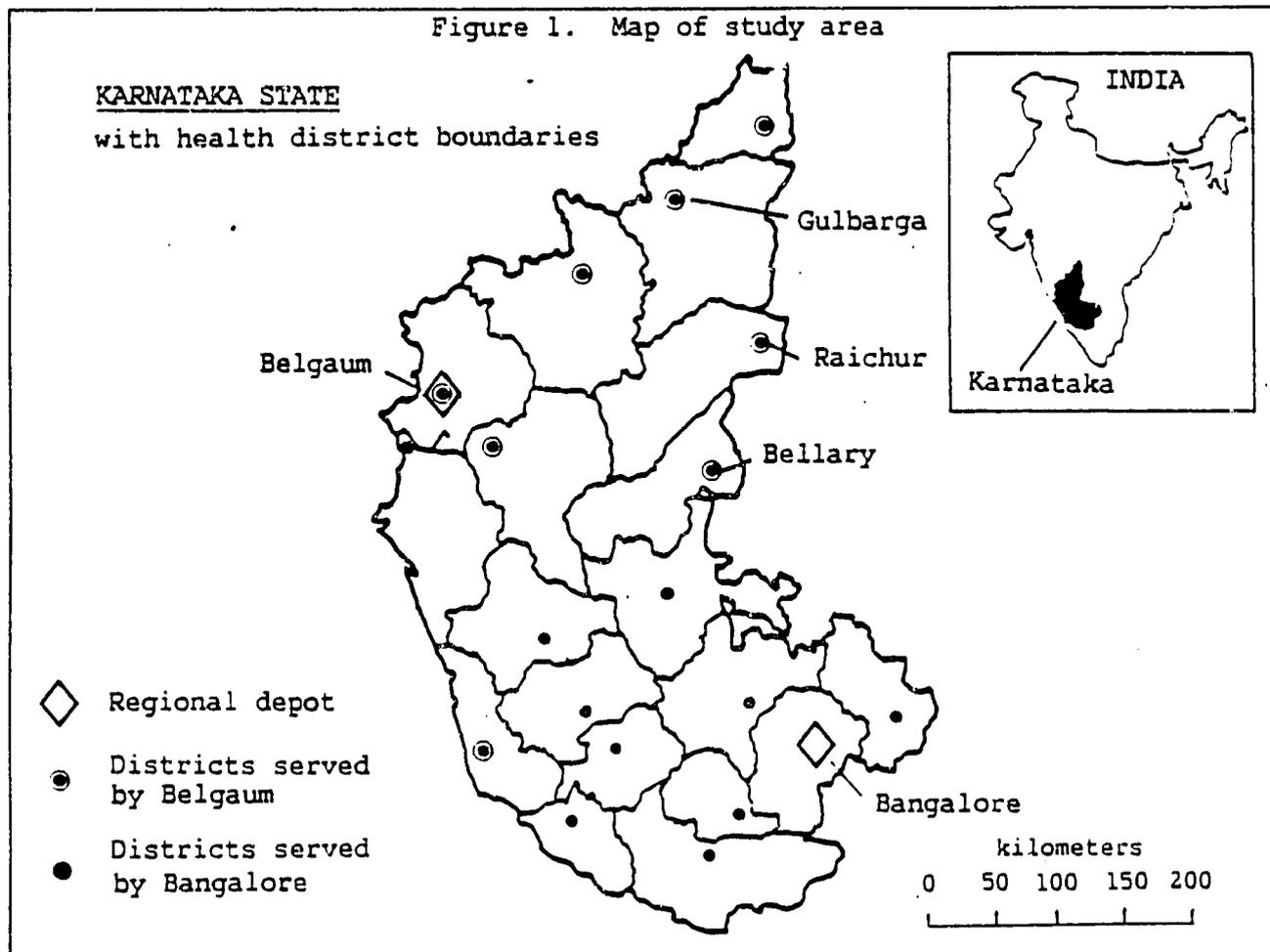
The states in India are divided administratively into districts. Each district has from 12-25 PHCs and in general, each PHC serves a population of 80,000-150,000 people. The PHCs have a number of subcenters, each covering a cluster of villages.

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The immunization system can be divided into two main parts: (1) the supply of vaccines to the final immunization points, i.e., the subcenters, and (2) the immunization of the target population. In the first step in the supply system, each state receives the vaccines directly from the manufacturers at a small number of regional vaccine depots. The vaccines are then collected from the regional depots by the districts; the amount assigned to each district is based on its operational targets and requirements. The districts then supply the vaccines to the PHCs from where the supply to the subcenters is controlled. The study area, Karnataka state, has two regional vaccine depots; the regional depot studied, Belgaum, supplies vaccines to eight districts (Figure 1).

Karnataka State is in south India. Belgaum, situated in the northwest part of the state, supplies districts in the northern part of Karnataka while the other regional depot, Bangalore, supplies districts in the southern part.

Systems for storage and distribution of DPT/polio vaccines must be designed to maintain the potency of the vaccines by keeping them cold at all stages. Potency also depends on duration of storage. DPT/polio vaccines should be kept at temperatures between 2°C and 3°C, so a cold chain must be maintained. The regional depots store vaccines in cold rooms, while the districts and PHCs use refrigerators. However, the subcenters usually do not have access to refrigerated storage so vaccines received there must be used almost immediately.



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IDENTIFYING WEAKNESSES IN THE VACCINE DISTRIBUTION SYSTEM

The study covered three agricultural districts in northeastern Karnataka: Raichur, Bellary and Gulbarga. These three districts are supplied by the regional depot located at Belgaum. Twelve PHCs - four from each district - were studied and their immunization data for a 42-month period collected and analyzed. The analysis identified certain weaknesses in the existing system. These are as described in the four sections below.

Vaccine Supplies to the Regional Depot

The supply of vaccines to Belgaum regional depot was found to be irregular and to show a seasonal pattern. Table 1 gives data for the first six months of the program year for three years, 1982-85. (The "year" as described here is the fiscal year, which in India starts on April 1.) If the supply had been regular, each entry in the monthly columns of the table would be about 100/12, i.e., 8.3 percent, and the totals would each be about 50 percent. It can be seen that the supplies in the first half of the year were consistently less than this. Conversely, supplies in the second part of the year were relatively large. The data shown in Table 1 represent the mean of three years' data; in some of the individual years the supplies in the second half of the year were more than three times the supplies in the first half. Further, there were large variations in the time between deliveries (inter-arrival times), and in the quantities received at each delivery. This irregular supply to the regional depots in turn affected the supply of vaccines to the district health offices and to the PHCs.

Table 1. Mean percentage of annual supplies of DPT and polio vaccines received at Belgaum during April-September, 1982-1985

Vaccine	Month						Total
	Apr	May	June	July	Aug	Sept	
DPT	2.0	1.0	1.2	6.8	9.5	10.4	31.0
Polio	1.3	3.9	2.6	6.5	6.2	7.4	27.8

Vaccine Supplies to the PHCs

The supply of vaccines from the regional depot to the PHCs was also irregular and showed periods with large receipts and long periods in which no supplies were received at all. Table 2 gives sample data for two of the PHCs studied. If the supply had been regular, the values for each quarter would all be 25 percent. The quarterly figures in the table show considerable variation around this value.

Table 2. Percent distribution of annual DPT vaccine deliveries by quarter and year, in two PHCs

PHC	Year ¹	Quarter				Total
		1	2	3	4	
1	1982-83	57.1	-	-	42.9	100.0
	83-84	66.7	-	33.3	-	100.0
	84-85	25.0	25.0	50.0	-	100.0
2	1982-83	60.0	20.0	-	20.0	100.0
	83-84	76.9	23.1	-	-	100.0
	84-85	97.9	-	-	2.1	100.0

¹Program year goes from 1 April to 31 March.

Irregular delivery patterns such as these increase the number of stockouts (times when vaccine is out of stock) and can also result in overstocking (times when stocks exceed the PHCs' refrigerator capacity). Irregular delivery also increases the variation in the immunization workload for the staff. Moreover, irregular delivery can cause the time gap between successive doses for the children to be greater than the prescribed limit and thus increase the chance of ineffective immunization.

Vaccine Storage at PHCs

The breakdown rate of refrigerators at the districts and the PHCs is very high. At the time of the study, 50 percent of the PHC refrigerators in one district and 43 percent in a second district were not in working condition. The time taken for repairs to be completed is also high, sometimes more than a year. Poor maintenance inhibits the capability of the PHCs to keep adequate stocks of vaccines in proper storage conditions.

Population Coverage by the Subcenters

The population coverage by subcenters under the immunization programs varies greatly (Table 3). Since each child born needs three doses of the vaccines, the number of vaccinations for each 1,000 population would be approximately three times the crude birth rate, which was estimated to be 29.8/1,000 in rural Karnataka in 1983, i.e., 89.4. Even allowing for some modification in this figure due to death in early infancy (discussed later in this summary), the expected immunization rate would be much higher than the rates shown in the table. Not only does the table show great variation in coverage (0 to 50+

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percent), but it also shows that on the whole the coverage rate was very low. The reasons for low coverage could be:

1. Frequent stockouts and long intervals between vaccine supplies;
2. The time it takes for staff to travel to PHC's to get the vaccine, to go through the necessary administrative procedures, and to procure the ice needed to maintain the vaccine at proper temperature;
3. The heavy workload of staff due to other programs; and
4. Inadequate monitoring and supervision of subcenters by the supervisory staff of the PHCs.

Table 3. Percent distribution of sub-centers by number of doses of DPT administered per 1000 population, by year

Year	Number of doses per 1000 population					Total
	0	1-5	6-15	16-50	50+	
1982-83	33.1	8.4	15.6	32.8	10.1	100.0
1983-84	39.4	8.6	17.9	27.4	6.8	100.0
1984-85	40.6	11.4	12.3	27.7	8.0	100.0
Expected ¹	0.0	0.0	0.0	0.0	100.0	100.0

¹Assuming 3 doses per child aged less than 1 year, and a crude birth rate of 29.8/1000, or approximately 90 doses per 1000 population.

DEVELOPING A SIMULATION MODEL OF THE DISTRIBUTION SYSTEM

A study of the subsystems identified the need for a formal model of the complete vaccine distribution system. The problem was not just one of using a standard operations research model to determine the optimal route, stocking policy or storage capacities, but rather one of developing a combined policy for all structural and operational variables. There were two other reasons why this situation differed from the classic inventory control problem and suggested a simulation approach:

1. The delivery times and quantity of vaccine supplies were not under the control of the user.

2. The problem required a multiple rather than single definition of an acceptable service level. The proportions of children not getting even their first dose, getting their first but not second, and second but not third all needed to be assessed and kept at certain minimum acceptable levels.

Moreover, a simulation approach can provide the decisionmaker important insights into the relationships among components and the uncertainties involved in the system. By using a simulation model to marginally alter the operation of the supply system and/or the order and stocking system, or to change the immunization coverage policy, the decisionmaker can be shown the various levels of activities and resources required to achieve preset targets. The rationale for introducing a systems approach to planning and controlling this system could then be easily understood by systems managers, who would in turn be in a position to make decisions based on suitable information.

Objectives of Simulation Exercise

The objectives of the simulation exercise were to identify those input conditions which:

1. Maximize coverage. Coverage was defined as the number of children who receive the required doses of the vaccines within the prescribed time period.
2. Minimize incomplete immunizations, also termed wastages. Incomplete immunization was defined as failure to receive the full number of doses within the prescribed time period, i.e., receiving no immunization at all, or only one or two doses before one year of age.
3. Minimize the number and duration of stockouts at the districts and PHCs.

The model should also:

4. Provide policy options to the decisionmaker by identifying or calculating the resources necessary for different levels of coverage, the optimal ordering policy, etc.

Model Specifications

The model was specified in terms of constraints on the potential solutions and decision variables, i.e., program variables under the control of the system manager, as described below.

Constraints. The model was designed to take into account the following constraints:

1. Variability of supply of vaccines to Belgaum, the regional supply depot. The variability has two components: (i) a seasonal variability, i.e., difference between the first and second half of the year, and (ii) variability in quantities delivered and in inter-arrival times.
2. The given capacity for storage at districts and PHCs.
3. Upper and lower limits on the workload of field staff providing services.

The first two constraints were constraints only in the short term and later could be decision variables. The manufacture of vaccines is carried out at a limited number of points and, if the quantity to be supplied to the regional depots is known, it should be possible to reduce seasonal variation, the variation in quantities delivered, and inter-arrival times. The imposed capacity constraint represents the effective refrigerator capacity; if this could be increased it need not be a constraint in the long run.

Decision variables. The model allowed the decisionmakers to see the probable effects of altering the following parameters (inputs): (1) target for coverage, (2) ordering policy, (3) stock allocation policy, and (4) location and quantity of buffer stocks.

Model Description

The model was designed in the form of four subsystems interacting with one another during the simulation exercise: the demand generation, stock distribution, vaccine supply, and immunization subsystems. Each of the four subsystems is briefly described below.

Demand generation subsystem. This subsystem generates the weekly demand for immunization from each population cluster. Every child who has reached 13 weeks (3 months) of age contributes to the demand for the immunization activity. The different inputs are based on population, population growth, birth rates, and infant mortality rates, as follows:

1. Population (P_x) .. the base-year population in cluster x .
2. Growth rate .. annual population growth rate estimated from the decennial growth rate for Karnataka between 1961 and 1971, and between 1971 and 1981.
3. Birth rate (BR_j) .. estimated birth rate in year j .
4. Monthly birth rate (MBR_i) .. births in month i , based on the existing seasonal pattern of births, and expressed as percentage of annual births. Birth rates are highest in July and lowest between December and February.
5. Random variations .. the birth rate was assumed to vary randomly between ± 10 percent and ± 30 percent.

6. Infant mortality rate (IMR_j) .. the infant mortality rate in year j .

From these inputs, the model makes the following calculations.

1. Target population .. population in cluster x in year j = P_{xj} , where

$$P_{xj} = P_x (1 + \text{growth rate})^{(j - \text{Base Year})} \quad (1)$$

2. Births in month i of year j in cluster x = $B_{xi,j}$, where

$$B_{xi,j} = P_{xj} (BR_j) * (MBR_i) * (\text{Random variation}) \quad (2)$$

3. Fresh demand in month i of year j at cluster x = $D_{xi,j}$ where

$$D_{xi,j} = (B_{x,i-3,j} - 0.6 IMR_j) * (\text{Target population}) \quad (3)$$

$B_{x,i-3,j}$ is used because births in month $i-3$ become eligible for immunization in month i . Children who do not reach the age of three months are represented by 0.6 IMR; subtracted from the number of births. The neonatal mortality rate for India in the year 1979-80 was 76.2 per 1,000 births. Additional deaths between one and three months of age were estimated using the infant mortality rate for India (123.8 per 1,000 births in 1979-80).

During the simulation exercise demand is generated for each week and each population cluster.

Supply subsystem. This subsystem simulates the supply of vaccines to the regional vaccine depot, Belgaum. The inputs to this subsystem are the following:

1. D .. total annual quantity to be supplied, i.e., total expected demand for vaccines from all the districts supplied by Belgaum. This would be calculated from $D_{xi,j}$ for all population clusters (x) and all months (i), as explained in the demand generation subsystem.

2. Q_1, Q_2 .. mean quantities received from April-September and October-March.

Q_1, Q_2 were taken as percentages of annual demand and hence as demand increases; if the targets are varied, Q_1, Q_2 will also vary. The total quantity received at Belgaum in each year was made equal to the targeted demand.

3. T_1, T_2 .. mean times between arrivals of vaccines at Belgaum from April-September and October-March.

4. Z_1, Z_2 .. standard deviations in quantity and inter-arrival times from April-September and October-March.

Vaccine distribution subsystem. This subsystem for distribution of vaccines covers the following:

- 1a. Orders to districts by PHCs, and
- 1b. Allocation and supply by the districts to PHCs.
- 2a. Orders to the regional depot by the districts, and
- 2b. Allocation and supply of vaccine stocks from the regional depot to the districts.

The ordering system judged most easily implemented was one based on a fixed reorder level. This was used in the model, as shown below.

- 1. Maximum stock level = Buffer stocks + Expected consumption during the month + Expected consumption during the supply lead time
- 2. Amount to be ordered = Maximum stock level - Existing stock - Pending orders

The maximum stock levels for the PHCs and districts are fixed at the beginning of each year based on projected demand for that year. Pending orders arise if stock has already reached zero and stocks ordered have not been supplied.

A priority ordering system was also tested. To reduce wastage, priority orders were to be placed for vaccines required in the very next period for children ready for their second and third doses of vaccine.

Immunization subsystem. The model was designed to allow for some departures from the stated immunization schedule. The flexible design specified only that immunizations were to be given in three doses, the first dose after 13 weeks of age and the third dose before the child reaches 52 weeks of age, with a minimum time gap of four weeks between doses.

This subsystem uses five arrays. These include three arrays representing children ready for different doses of vaccines - (first, second and third) - and two waiting arrays representing children who have received either the first or second dose and are waiting for the next (second or third) dose. These waiting arrays ensure an appropriate interval between successive doses of vaccines. Only children in the first three arrays can be immunized. As soon as children reach 13 weeks of age they enter Array 1, move to Waiting Array 1 after receiving the first dose, and enter Array 2 after the prescribed interval. Similarly, after receiving the second dose, children move to Waiting Array 2 where they wait for the prescribed period before entering Array 3 where they wait for the third dose. The child moves out of Array 3 after receiving the third dose. Children also move out of these five arrays if they pass the maximum age for immunization at any time. Children who move out of the system before receiving the full three doses represent wastages, i.e., incomplete immunizations. The immunization subsystem uses a priority rule for immunization. In each array the oldest children are immunized first. This reduces wastages.

The workload of field staff has been taken as a constraint. In the absence of the other health programs being part of the model (which would have allowed the model to take into account the workload imposed by other programs), an upper limit was placed on the weekly immunization workload of the field staff. This varied between 110 and 130 percent of the mean weekly load. Computation of the mean weekly load was based on the annual demand.

Model outputs. Outputs from the simulation model are:

1. Mean number of stockouts;
2. Mean stock - at each point;
3. Maximum stock - at each point;
4. Workload - mean and standard deviation for each of the three doses;
5. Wastages - the number of incomplete immunizations at each of the three stages - before first dose, between first and second dose, and between second and third dose;
6. Mean age at each dose - for all three doses.

Model operation. The model dealt with 20 population clusters, i.e., 12 PHCs and all eight districts supplied by the regional depot at Belgaum. It also dealt with 21 stocking points, i.e., these 20 population clusters and the regional depot at Belgaum.

The model was simulated on a computer. Each simulation run was for a 10-year period with each cycle covering a week; hence the simulation had 520 cycles. This was to remove the effect of random fluctuations and the startup/initial values for the different variables. During this 10-year period, the population, birth rate, and infant mortality rates kept changing, as estimated and explained earlier.

The main input variations tested in the different simulation runs were the following:

- | | |
|-----------------------------------|---|
| 1. Supply condition | a. Normal, i.e., with seasonal and other variations in quantities supplied and inter-arrival times, as at present
b. Reduced variations
c. No seasonality |
| 2. Supply to PHCs and districts | a. Unrestricted quantities supplied
b. Restricted supply (annual supply restricted to annual target) |
| 3. Target for population coverage | a. 75% of eligible children
b. 100% of eligible children |
| 4. Buffer stocks | At different proportions of the given capacity for storage at the districts and PHCs. |

The other option, which was initially used but later found unimportant, was a priority ordering for selecting children to be immunized.

RESULTS OF SIMULATION RUNS

Table 4 gives the results of a sample of simulation runs for one PHC. These results were produced when various combinations of input conditions were made to the model. As the simulation runs were taken for a long period, the figures for the other PHCs were similar.

The first run specifies certain levels of buffer stocks at various distribution points, with normal variations and unrestricted quantities supplied to PHCs and districts. The target coverage level was set at 75 percent. The resulting mean age at first dose was high (39.51 weeks) and the numbers of incompletely immunized children were relatively high, as were the percentages of stock-outs at PHCs and maximum stocks needed. Changing the levels of buffer stocks at PHC level (runs 2 and 3) reduced levels of incomplete immunization to a certain extent. In contrast, even with lower buffer stocks, changing the target to 100 percent coverage (runs 4-6) resulted in a great lowering of mean age at first immunization and in no children being incompletely immunized, a definite improvement from the previous target level set at 75 percent coverage achieved. This was accomplished with lower buffer stock levels, fewer stock-outs and lower maximum stock levels, though the mean stocks had to be a little higher. The reason for the lower target levels requiring higher buffer stocks was the existence of unplanned-for demand, as target is less than the actual demand existing in the system. The PHC staff may not be able to refuse to immunize children who turn up for immunization, even if by doing so the targeted figure for immunizations is exceeded.

Restricting quantities that districts and PHCs may order (runs 7-9), but keeping other conditions similar to those in runs 4-6, accomplished certain improvements (reduction in stock-outs, maximum stock, and mean stock levels) and slightly lowered mean age at first immunization, while still showing no incomplete immunizations. Reducing variations in supply (runs 10 and 11) made a little further improvement, as did removing seasonality of supply (runs 12, 13). Other simulation runs showed that keeping buffer stocks at Belgaum did not improve performance much. The most effective points for the buffer stock are the PHCs, as they are the final storage points and face great uncertainties in demand from subcenters. Moreover, there is no mechanism for "borrowing" vaccine supplies from neighboring PHCs. Small quantities of buffer stocks at the districts were found to be beneficial.

CONCLUSIONS AND DISCUSSION

The many simulation runs indicated that the most important supply condition to be achieved was the removal of seasonality of supplies. If this could be achieved, stocks of vaccine would be at a minimum level and performance would still be optimal in terms of immunization coverage. Having a high target level, with stocks at PHCs rather than elsewhere, and reducing variability in quantities and inter-arrival times, were also helpful in achieving good coverage with minimum stocks.

Table 4. Specimen results from simulation runs

Run no.	Inputs to model			Outputs from model						
	Buffer stocks (No. months mean consumption)		Max. stock	Mean stock	% of stock outs at PHCs	Mean age (wks) at 1st dose	Mean no. of children per PHC per week being incompletely immunized			
	Belgaum District	PHC					No doses	1 dose only	2 doses only	
Supply condition: Normal, unrestricted quantity. Target: 75 %										
1.	0	0.5	0.75	1782	352.91	31.92	39.51	10.04	5.71	2.52
2.	0	0.5	1.50	1901	519.69	18.65	37.94	5.24	3.32	1.67
3.	0	0.5	1.75	1987	600.27	17.12	37.65	4.41	2.55	1.70
Supply condition: Normal, unrestricted quantity. Target: 100 %										
4.	0	0.25	0.75	1417	483.48	21.15	16.55	0	0	0
5.	0	0.25	1.00	1577	617.79	11.73	14.98	0	0	0
6.	0	0.25	1.50	1736	934.29	5.19	14.30	0	0	0
Supply condition: Normal, restricted quantity. Target: 100 %										
7.	0	0.25	0.67	1219	468.63	15.96	14.58	0	0	0
8.	0	0.25	0.75	1275	514.96	9.23	14.39	0	0	0
9.	0	0.25	1.00	1430	675.52	2.88	14.14	0	0	0
Supply condition: Seasonal variations, reduced other variations, restricted quantity. Target: 100 %										
10.	0	0.25	0.67	1219	472.98	15.68	14.53	0	0	0
11.	0	0.25	0.75	1275	523.29	7.88	14.26	0	0	0
Supply condition: No seasonality, other normal variations, restricted quantity. Target: 100 %										
12.	0	0.25	0.50	1107	421.94	20.38	14.62	0	0	0
13.	0	0.25	0.75	1263	563.19	2.50	14.05	0	0	0

The simulation exercise demonstrated the relative effects of the different managerial policies and actions, and was successful in differentiating between those likely to be effective and those likely to be ineffective. Using a model such as this may help in decisionmaking where processes are complex and interactive and where making decisions would otherwise be dependent on a combination of judgment and intuition.

Although the conditions used in this simulation model apply to DPT and polio immunizations, the model could be used for other types of vaccines. This could be done by making suitable adjustments in the number of doses to be given, the minimum age for giving the 1st dose, the minimum and maximum interval between doses, the age at which the beneficiaries or potential beneficiaries go out of the system, and conditions affecting supply from the manufacturer to the health centers. The model could also be adapted for other field conditions and other drugs.

It was noted earlier that the refrigerator breakdown rate at the districts and the PHCs was high and the time taken for repair was also high. There is a need to ensure that the districts and PHCs do not go without refrigerated storage as the vaccines have to be protected from spoilage. In the absence of development of repair and maintenance facilities at the districts, it would be necessary to maintain a few spare refrigerators there which could be used for replacing any nonfunctioning refrigerator at the PHCs. The number of spare refrigerators required for each district can be identified by applying a queueing model given the service level desired.

As a result of conducting this study using the simulation approach, the project team believes that this approach can prove useful in demonstrating the effects of different managerial policies. The model was successful in differentiating the relative effectiveness of each and should be used more extensively as a problem solving tool in public administration areas. The crucial element in this exercise was the model building. If the model is built to represent the most pertinent elements, simulation may provide answers to many complex problems.

* * *

This study was conducted from April 1985 to March 1986 by Management Consultancy and Services (MACONS). This summary is based on a final report of the study prepared by K. Subramanyam and S.C. Gekhar. Further information is available from the principal investigator, Mr. Subramanyam, Executive Director, MACONS, 77 West Marredpally Secunderabad - 500026, India, or from Dr. Jeanne Newman, PRICOR study monitor (Chevy Chase).

Study Summary

PRODUCTIVITY ANALYSIS OF HEALTH FACILITY STAFFING PATTERNS IN JAMAICA



[The following summary is taken in large part from an article prepared by PRICOR researchers and staff for a 1987 issue of the international journal, Socio-Economic Planning Sciences and appears here with permission of the Journal's editors.]

In 1983, researchers from the Department of Social and Preventive Medicine of the University of the West Indies (UWI) and Price Waterhouse Associates, Management Consultants, undertook an operations research (OR) study to investigate productivity problems of primary health care (PHC) teams throughout Jamaica. The three year study was carried out at the request of the Health Management Improvement Project (HMIP) whose goal is to improve the delivery of PHC by improving

management within the Ministry of Health (MOH). The objectives of the study were to: (1) develop a methodology for measuring the productivity and cost effectiveness of PHC teams; (2) describe how the various categories of personnel in the health centers distribute their working time among certain predefined activities; (3) determine how productive and cost effective PHC teams are now and how these factors relate to coverage of the population with essential services; and (4) develop strategies to improve productivity and to work with the MOH to implement selected strategies on a trial basis.

BACKGROUND

As a result of increasing concern in Jamaica regarding the need for improved primary health care in the late 1960s, a new system of PHC was developed. The system was designed to make basic health care available and accessible to all the population.

The plan was implemented in the 1970s throughout the country. It was based on the delivery of preventive and curative services through a network of health centers (HCs), each offering services through a variety of clinics held according to a regular schedule. The HCs range from those offering only basic maternal and child health services and serving small populations of about 4,000 persons in the most isolated areas (Type 1 HCs), to HCs of intermediate

level and size of population served (Type 2 HCs), to those offering a full range of preventive and curative medical and dental services, situated in areas of greatest population density (Type 3 HCs).

Type 1 HCs are usually staffed by District Midwives and Community Health Aides (a type of health worker with only a few weeks' training). Type 2 HCs are staffed, in addition to the staff found in a Type 1 HC, by a Public Health Nurse, a Registered Nurse, and a Public Health Inspector. The services these staff offer are supplemented by the services of a doctor or Nurse Practitioner who visits periodically. (A nurse practitioner is an experienced nurse given advanced training to enable her to treat certain common conditions under the supervision of a doctor.) Type 2 HCs serve about 12,000 population. Type 3 HCs have, in addition to staff of Type 2 HCs, full-time doctors and/or Nurse Practitioners and serve about 20,000 population. The HCs are linked by their patient-referral system and by staff with shared responsibilities for more than one type of HC.

The diversity of staffing patterns and clinic scheduling and the need to make best use of scarce human resources, whose salaries constitute a major part of the PHC budget, prompted the MOH to request the OR study. Phase I of the study sought to determine current levels of staff productivity, Phase II to suggest strategies for improvement in productivity, and Phase III to implement and evaluate the chosen strategy on a pilot basis. Phases I and II are described below, followed by a discussion of a plan for strategy implementation.

PHASE I: ASSESSMENT OF STAFF PRODUCTIVITY

The HC provides preventive and curative services to its target population through a series of six clinics (antenatal, postnatal, child welfare, family planning, curative, dental) held at the HC. The major resources utilized in the delivery of these health services are personnel allocated to the HC. Since personnel cost is the major item in the PHC budget, maximization of personnel productivity is desirable and was the objective of this work.

Approach

Productivity is defined as effective utilization of resources. A large variety of factors, such as demand for services, personnel skills and motivation, working environment, and operational factors such as management policies, affect the productivity of HCs and HC personnel. The purpose of a productivity study is to identify the extent to which these factors adversely affect productivity so that practical steps can be taken to overcome the problem(s) and increase productivity. A productivity improvement strategy should therefore consider the limitations and constraints imposed by the environment. For example, a budget cut rules out strategies that require additional expenditure.

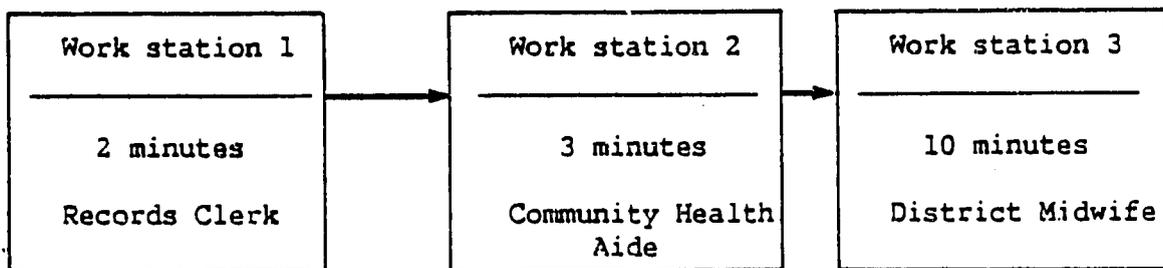
The PHC system was designed to improve the health status of the population by providing the required preventive and curative services. The present productivity analysis therefore addressed operational factors and was linked to the serving of patients by HCs and their clinics. In the present context, a productivity index should reflect what *has been* achieved by a HC with respect to serving patients compared with what *could have been* achieved with

given resources. Utilization of personnel resources can be expressed as utilization of personnel time and skills, and skill levels are reflected in the level of earnings (cost) of a staff category. Assessment of productivity was therefore done by computing two productivity indices: (1) an output index, involving measures of time, and (2) a cost-effectiveness index, involving time and cost.

In the description of productivity by these indices, the general framework used was the way in which the HCs operate through clinics where patients are served by staff at a series of work stations, i.e., points where the staff interact with the patients in activities related to patient care. The 'critical' work station (CWS) was defined as the one at which the patients spent the most time; it was therefore the limiting factor in determining output of a clinic, and thus a key factor in measuring productivity. The CWS always happened to be the one where the most highly skilled and highly paid member of staff, e.g., the doctor, was serving the patients. The other work stations, staffed by less skilled personnel, were termed 'noncritical' work stations.

Patient flow through work stations is illustrated by Figure 1, which shows an example of the flow of patients at a child welfare clinic in a Type 2 or Type 3 HC. The timings shown in Figure 1 are arbitrary; they were chosen mainly for arithmetical simplicity, though they are not unlike actual data. An imaginary situation is illustrated in which a patient is served at each of the work stations (WSs) in turn, getting 2 minutes' attention from the Records Clerk at WS1, 3 minutes' from a Community Health Aide at WS2, then 10 minutes' attention from a District Midwife at WS3. It is seen in this example that the CWS is WS3, from which output could be six patients per hour. Similarly, the outputs of WS1 and WS2 could be 30 and 20 per hour, respectively. The output of the clinic is determined, however, by average time devoted to each patient by the staff member at WS3. In this example, the relatively low output of patients from WS3 would force the personnel at WS1 and WS2 to be underutilized. The indices of productivity that were formulated depended on this general scheme for data inputs.

Figure 1. Specimen of patient-flow through work stations



To calculate the output index (OPI), the *actual* service delivered (the number of patients served by the various clinics) was expressed as a percentage of the service that *could have been* delivered with the given levels of staffing

of the clinics. The cost-effectiveness index (CEI) was the cost of the time the staff actually spent in serving patients at the clinics expressed as a percentage of the cost of all the time of staff engaged in conducting the clinics.

The first index, OPI, was computed using service times for patients at CWSs only. In the above example, if 15 patients were attended at the clinic, actual throughput hours would be 2.5 (i.e., 15 patients at an average of 10 minutes each). If the clinic operated for four hours, the available productive hours would be four (4) and the productivity would be reflected by the proportion (2.5)/4. If two CWSs had been operating, the available productive hours would be eight (8) and the output index, OPI, would be (2.5)/8. A further modification to these calculations will be explained later in this section.

The productivity index does not reflect the underutilization of personnel attending noncritical WSs. If, however, the cost of all personnel providing services at a clinic - the cost of all the staff for the period the clinic is in operation - is computed and compared with the cost of time actually utilized by personnel in serving patients, the cumulative utilization is reflected. As costs of employing personnel vary with personnel type, cost can be calculated as the number of hours spent giving service, multiplied by the cost per hour for each staff type. The second index, CEI, was therefore computed by expressing the cost of staff time spent at both the critical and noncritical work stations as a proportion of the cost of total staff time allocated to a clinic.

Calculation of the CEI therefore required values for the cost per hour of each type of personnel working at a clinic and the amount of service time actually provided by each type of personnel (to give cost units utilized), and personnel costs for a clinic (to give cost units available). CEI is the proportion of cost units utilized/cost units available. To give an example, hourly costs of personnel shown in the example in Figure 1 were, in Jamaican dollars: Records Clerk, \$4.20; Community Health Aide, \$3.92; District Midwife, \$6.02. Therefore, the CEI would be:

$$\text{CEI} = \frac{15 (2 \times 4.2 + 3 \times 3.92 + 10 \times 6.02)}{60 \times 4 (4.2 + 3.92 + 6.02)} = 35.5 \quad (1)$$

Since it was the intention to describe productivity of a HC by taking into account performance at its component clinics, aggregate values for all six types of clinics (antenatal, postnatal, child welfare, family planning, curative, dental) were used to calculate OPI and CEI. Where not all of these clinics were held at any HC, the values from whatever number of clinics the HCs did hold were used. The indices therefore represented the performance of a HC rather than of any individual clinic. Also, since staff need occasional breaks from work, a personal allowance factor was built into the computations, this was in recognition of staff's need to spend a proportion of time during clinic hours for personal use. This was arbitrarily set at 15 percent, though the nature of the model would permit any other value to be used. The productivity indices were therefore modified to include an 'output factor' (output factor = 1 - personal allowance). Output factor would be 0.85 in the above example.

The two indices of productivity which were used may therefore be represented as:

(i) Output index, OPI

$$\text{OPI} = \frac{\sum_{6 \text{ clinics}} \text{Actual throughput hours}}{\sum_{6 \text{ clinics}} \text{Available throughput hours} \times \text{output factor}} \quad (2)$$

(ii) Cost-effectiveness index, CEI

$$\text{CEI} = \frac{\sum_{6 \text{ clinics}} \text{Cost units utilized}}{\sum_{6 \text{ clinics}} \text{Cost units available} \times \text{output factor}} \quad (3)$$

CEI for a HC could further be modified to:

$$\text{CEI(HC)} = \frac{\sum_{\text{All clinics}} \text{Cost units utilized}}{\sum_{\text{All clinics}} \text{Total cost units allocated to HC} \times \text{output factor}} \quad (4)$$

The difference between expressions (3) and (4) is in the denominator. The cost of staff time allocated to six clinics will differ from the total cost of staff allocated to the HC according to the ratio of the sum of the times scheduled for the six clinics included in the analysis and total working hours for the HC. The difference may be in the use of HC time for other clinic activities (e.g., for the care of skin conditions) or for activities such as training, meetings, or home visits.

The development of the indices of productivity defined above provides a basis for defining the objective of productivity improvement strategies quantitatively. In this case the objective function was the maximization of the cost-effectiveness index for each health center (CEI(HC)).

Further, staff not only provide direct care for their patients but engage in a number of other activities such as administration, traveling, training, preparation, and tidying. It was recognized that in making any recommendations regarding staff time, the amount of time needed for such activities would have to be measured and allowances made. An investigation was therefore carried out to determine proportions of staff time spent in various types of activity, which for the present purpose were summarized into the broad groupings of: (1) direct patient care, (2) other essential activities, and (3) unproductive activities. This part of the investigation was referred to as the activity analysis. The proportion of time spent in unproductive activities would also play an important part in arriving at strategies for improving productivity.

Methods

Data from which to compute the two indices of productivity and to perform the activity analysis were collected in 1984 by observation of clinic and staff activities at a sample of HCs. From the 375 HCs in Jamaica, a sample of 96 was chosen by a combination of cluster and stratified random techniques. The strata used were parish (a geographically defined administrative area), rural or urban location, and HC Type (1, 2, or 3). The clusters were associated Types 1, 2, and 3 HCs. Two types of observations were then made, each based on further sampling stages, as described below.

The first type of observation was made to obtain data on work station service times for patients. From this data the two indices could be computed. One of each of the six types of clinic held at each of the 96 chosen HCs was observed for one session. At the start of the session, the observer inquired about the likely number of patients attending, then chose a sampling proportion such that systematic sampling might provide about 10 patients for observation. Where this approach was not possible, observers haphazardly identified 10 patients for observation during the clinic procedures. Having identified the patients, the observer recorded the time they spent with staff at each of the work stations, the types of staff attending those work stations, and the duration of the clinics. Observations were made in this way on about 400 clinics and 4,000 patients. Mean service times at each work station were then calculated (Table 1).

From those results, mean service times for each of the six clinics in all three types of HCs in the sample were calculated. For example, at antenatal clinics, the mean service time for patients at the CWS in Types 3 and 2 HCs was 13 minutes and at Type 1 HCs it was 10 minutes. The means used were for the whole sample.

Indices of productivity were then calculated. The methods used may be illustrated by reference to expressions (2) and (3), ignoring for the moment the summation signs, and to the first row of Table 2. Columns 1 and 2 of Table 2 are identifying details of the HC. The values in columns 3 and 4 were obtained from the health information system of the Ministry of Health, showing that in 1983 (the last completed year prior to the present study) HC No. 1 had 386 visits by antenatal patients. Since the national mean service time at the CWS was 13 minutes, the CWS of the antenatal clinic at HC-1 'produced' the equivalent of $386 \times 13/60$ hours, i.e., 84 hours work in 1983 (column 4). Since the number of clinics held in 1983 was 43 (column 5) and the mean duration of antenatal clinics in Type 3 HCs was 3.6 hours, with two (2) CWSs, (found by observation), the total available hours for 1983 was estimated to be 310. The output index, OPI (column 7), therefore, was $84/310$, i.e., 32 percent. The value shown in column 8 (\$7,430) was calculated from hourly payment of antenatal clinic staff, for all the antenatal clinics in the sample in 1983, with information on annual salaries for each category of staff being provided by the Ministry of Health. The value in column 9 is the product of the number of productive hours (column 4) and the hourly cost of staff for an antenatal clinic at that HC. The value for CEI, shown in column 10, is derived from the value in column 9 expressed as a percentage of the value in column 8.

Table 1. Specimen of data collected from a health center showing personnel types and mean patient servicing times (minutes) at each work station, in six clinics

Clinic type	Non-critical work stations.		→	Critical work stations		→	Non-critical work stations	
	Antenatal	RC	3		DMW/PHN	13		-
	CHA	3						
Postnatal	RC	4		DMW/PHN	13		-	
	CHA	5						
Child welfare	RC	3		DMW/PHN	9		RN	3
	CHA	4						
Family Planning	RC	3		RN/DMW	8		-	
	CHA	2						
Dental	RC	1		DS	2		DN	5
	DA	1						
Curative	RC	2		RN	6		NP	5
	CHA	3		MD	8		Ph	15

→ Indicates direction of patient flow

Abbreviations used:

CHA	Community Health Aide
DMW	District Midwife
DA	Dental Assistant
DN	Dental Nurse
DS	Dental Surgeon
NP	Nurse Practitioner
Ph	Pharmacist
PHN	Public Health Nurse
RC	Records Clerk
RN	Registered Nurse
MD	Physician

The method for calculating OPI and CEI for health centers was found by aggregating values for six clinics for a HC as indicated by expressions (2) and (3), using values such as those shown in Table 2: columns 4 and 6 (for OPI) and 8 and 9 (for CEI). As shown by the top line of Table 3, OPI (37 percent) and CEI (13 percent) are the values of the productivity indices for the HC, as opposed to the individual clinics (e.g., antenatal). The values in column 6 of Table 3 (15 percent) is the result of calculations for CEI(HC) as shown by expression (4), i.e., division of the value in column 5 by the value in column 4.

The second type of observation was used to get data for activity analyses. At each of the 96 HCs in the sample, one of each category of staff based there full time was randomly selected. Each selected staff member was observed for one day in the course of work using the work sampling technique. Trained field assistants used a prepared sheet which listed down the side 60 randomly chosen one-minute intervals between 8 a.m. and 4:30 p.m. At the stated times they observed the selected staff member to see what he or she was doing during the interval and recorded this in brief phrases, as a precoded category of activity. The observations were made at either the HC or at any other location where the staff member happened to be (such as traveling or home visiting) while on duty during the day. In this way, 22,121 observations on 381 staff members were made.

Explanation of the observers' purposes was given fully and honestly, in advance, to all staff concerned. All observers were given brief training that emphasized the importance of careful and discreet behavior. The patients were not told of the observers' purpose.

For each staff category, calculations of mean proportions of time spent in each type of activity were made. In making the calculations, adjustments in these results of activity analyses for doctors and dental surgeons were made to allow for the shorter numbers of working hours required of them, according to their terms of employment with the Ministry of Health.

Calculations of the two indices of productivity were made on a microcomputer using spreadsheet software.

Results

Table 2 presents a sample of antenatal clinic productivity analyses and shows the values of the two productivity indices (OPI and CEI) for antenatal clinics at 10 of the 96 HCs in the sample. Table 3 shows results of calculations of OPI and CEI for the same 10 HCs.

The mean values of the two indices of productivity in the sample of 96 HCs were 40 percent for the output index (OPI) and 20 percent for the CEI(HC). These results indicated considerable scope for improvement in productivity. It should be noted here that though the 20 percent for CEI(HC) does indicate that only 20 percent of the total cost of personnel of the sampled HCs is utilized in patient care, the maximum possible value cannot exceed about 45 percent. This is because the activity analysis (Table 4) showed that over 35 percent (it varied among staff categories) of personnel time was allocated to 'other essential' activities, while the personal allowance input to the model was 15 percent. This leaves only about 50 percent of the time available for patient care, and considering that the noncritical work stations will have a degree of underutilization and also that some excess service capacity will have to be allocated to HCs, the higher values of CEI(HC) can be expected to fall between 40 percent and 45 percent.

Table 4 shows results of activity analyses according to staff category. For example, the first line of the table shows that Community Health Aides spent a mean of 26 percent of their time in 'patient care,' 32 percent of their time in 'other necessary' activities, and 43 percent of their time in 'unproductive' activities. Corresponding percentages of time for other types of staff are shown on the following lines of the table. The percentage of

Table 2. Specimen productivity analyses for ten antenatal clinics

HC No.	HC type	No. of patient visits (1983)	Total productive time (hrs.)	No. of clinics held (1983)	Total available time (hrs.)	OPI (%)	Total cost units available (\$)	Cost units utilized (\$)	CEI %
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
01	3	386	84	43	310	32	7,430	808	13
02	2	141	31	20	98	37	1,601	324	24
03	1	241	40	67	214	22	2,274	359	19
04	3	618	134	46	331	48	7,949	1,294	19
05	2	339	73	43	211	41	3,441	779	27
06	1	38	6	19	61	12	645	57	10
07	3	1901	412	175	630	77	10,290	3,982	46
08	3	444	96	49	176	64	2,881	930	38
09	1	105	18	63	202	10	2,138	156	9
10	3	655	142	48	346	48	8,294	1,372	19

unproductive time, even taking into account a suitable amount for personal allowance, again indicated the scope of the problems and the need for strategies to improve productivity.

PHASE II: STRATEGIES FOR IMPROVEMENT

Analysis of data and experience gained during Phase I of the study, along with discussions with senior personnel from the Ministry of Health, suggested that the major factors contributing to low productivity were:

1. Lack of an adequate system for manpower planning at the regional/national levels;
2. Inappropriate allocation of manpower to HCs in relation to demand for services. The distribution of personnel cost per 1,000 population (available from the model) indicated that, among HCs of a given type, allocation of personnel to some HCs was several times that of other HCs;

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Table 3. Specimen productivity analyses for ten health centers

HC No.	OPI (%)	CIE (%)	Total cost units allocated (\$)	Total cost units utilized (\$)	CEI(HC) (%)
(01)	(2)	(3)	(4)	(5)	(6)
01	37	13	222,050	33,096	15
02	36	20	41,800	13,508	32
03	32	24	17,500	3,126	18
04	38	19	197,050	44,084	22
05	30	46	90,040	34,648	38
06	33	25	17,500	1,773	10
07	63	31	190,850	21,109	11
08	30	19	176,650	26,121	15
09	18	14	24,400	1,521	6
10	57	36	186,000	54,613	29

3. Lack of explicit criteria for establishment of clinic durations and schedules in relation to expected demand;
4. Lack of an effective performance monitoring system of clinics, and the HCs' information system not being directed to management decisionmaking.

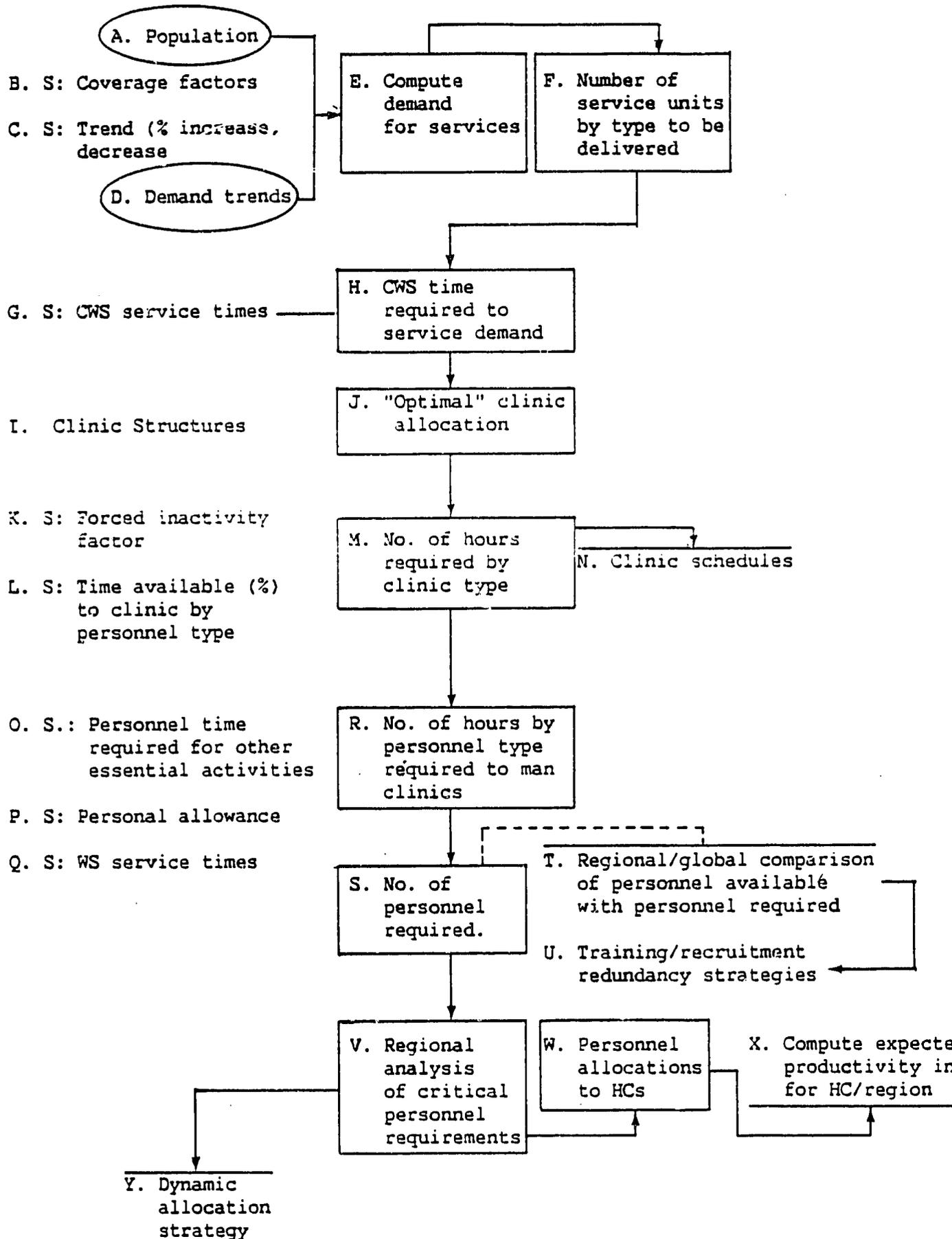
The study made it clear that senior management at the Ministry and regional levels required an effective tool to analyze the factors pertaining to the primary care planning environment. This was necessary in order to make decisions regarding location of HCs, allocation of manpower, and clinic programming and scheduling in relation to population demand and coverage. A model was therefore developed in conjunction with a 'task force' appointed by the Permanent Secretary of the Ministry of Health. The task force was a small group of senior health personnel which met several times with the project leader. The model was developed using a spreadsheet program on a microcomputer.

Table 4. Mean percent of time spent in various types of activity, by staff category

Staff category	No. of staff observed	No. of observations	Type of activity			Total
			Patient care	Other necessary	Unproductive	
Community Health Aide	93	5,424	26	32	43	100
District Midwife	72	4,175	33	23	44	100
Public Health Nurse	43	2,454	34	42	22	100
Enrolled Assistant Nurse	22	1,264	33	29	39	100
Registered Nurse	40	2,303	37	30	32	100
Nurse Practitioner	26	1,504	38	26	36	100
Medical Officer	18	1,066	41	10	49	100
Dental Surgeon	13	768	23	7	69	100
Dental Nurse	21	1,207	27	20	55	100
Dental Assistant	17	1,004	17	35	47	100
Clerical Officer	16	952	30	43	27	100

As a result of discussions between the task force and the project leader, it was agreed that the productivity improvement strategy would include the combination of antenatal, postnatal, child welfare, and family planning clinics into general purpose 'preventive' clinics with emphasis on provision of health care for mothers and children. These preventive clinics would be distinguished from 'curative' medical clinics. The integration of the preventive clinics, it was predicted, would bring about greater productivity for the preventive services by achieving better balance in clinic workloads for the staff. Experience suggested that some clinics (e.g., family planning) had clinic times scheduled for them in excess of demand and thus underutilized the staff. The integrated preventive clinics should also appeal to patients by giving them greater flexibility in choosing days on which to attend. For example, the opportunity to combine a child welfare visit with an antenatal visit should be attractive to patients and stimulate demand, thus permitting clinics to achieve greater coverage. Dental services were not included in the model since separate staff are used, and organizationally the dental services differ somewhat from the other services.

Figure 2. Outline design of planning model



KEY S: = Variable for sensitivity analysis

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Figure 2 is an outline of the planning model. It was designed to do the following:

1. Compute demand (number of people in a given period) for preventive and curative services (E) from either inputs of population size (A) and coverage factors (B) or from demand trends over recent years (D) and projections from these (C), using appropriate projection techniques.
2. Convert (E) to the number of service units (F) to be delivered by considering the expected number of visits to be made in relation to each condition occurring in the population.
3. From (F), compute CWS time required (H) to service this demand, using knowledge of CWS service times (G) from Phase I.
4. From certain designated clinic structures (I) (these were certain designated configurations of staff designed to achieve an appropriate balance of different types of personnel), select one structure in keeping with HC and clinic type. Some structures had more than one person able to provide service at a CWS.
5. Calculate the number of clinic hours required (M) and prepare clinic schedules (N), using (H) and (J), adjusted according to the number of CWS personnel and also according to an estimated 'forced inactivity' factor (K) allowing for such circumstances as 'bottlenecks' in patient flow, and an output factor (L) (see expression (2)). The proportion of time spent in 'forced inactivity' was available from the activity analyses, though not shown in Table 4.
6. Compute staff requirements (S) according to (R) and the time required by personnel for 'other essential' activities (O), personal allowances (P), and work station service times (Q).
7. Make a comparison (T) of staff required (S) with the actual numbers of staff available, hence providing information to develop training, recruitment, and redundancy strategies (U).
8. Compare critical personnel needs for different regions (V) which will provide the information required for the implementation of strategy (Y) for the dynamic allocation of personnel, and will provide a basis for personnel allocations to HCs (W). Thus a computation can be derived of the expected CEI for a HC or region (X).
9. Facilitate sensitivity analyses. Values of those variables marked "S" can be changed and results computed in minutes using this computerized model. Sensitivity analyses would enable managers to project clinic scheduling and manpower requirements resulting from changes of policy regarding the "S" variables.

Some of the data required for the computations were available from Phase I of the study (CWS service times, forced inactivity factor, and allowances for time needed for 'other essential' activities). Other data were available from the information system or other documents and manuals of the Ministry of Health (goals for coverage, demand trends, conversion factor for E to F). Yet

other values were determined from assumptions or judgments of senior personnel on the task force (L). If any of the input data seem inappropriate, however, the values can easily be changed and the resulting outputs of the model will quickly be calculated by the computer.

PLAN FOR IMPLEMENTING A STRATEGY TO IMPROVE PRODUCTIVITY

After consultation with senior management personnel at the district and national levels, a pilot implementation plan using the above model for 14 HCs in two districts in western Jamaica was completed.

Table 5. Comparison between current and proposed allocation of personnel and personnel costs in pilot health districts.

District No.	Personnel						Personnel costs (\$JA)	
	Current (Proposed)						Current	Proposed
	Records Clerk	Comm. Health Aide	Dist. Mid-wife	Public Health Nurse	Reg. Nurse	Doctor/Nurse Practitioner		
1	1(4)	13(13)	8(17)	3(6)	4(5)	1(3)	302,100	398,200
2	1(2)	12 (6)	4 (5)	2(1)	6(2)	1(2)	260,200	183,300
Total	2(6)	25(19)	12(22)	5(7)	10(7)	2(5)	562,300	581,500

Table 5 shows an example of outputs from the model for the two pilot health districts in which the productivity improvement strategy will be tested. Comparisons of current levels of staffing and levels proposed by the model show that the model would variously allocate more personnel than are presently staffing the HCs (e.g., four Records Clerks instead of one in the first district) or fewer personnel (Community Health Aides in the second district) or the same number of personnel (Community Health Aides in the first district). The cost of the proposed changes in staffing increases in one district and decreases in the other, with a slight increase in cost overall. The outputs from the model, however, depended on certain specified inputs, which in this case were personal allowances of 15 percent, and, most importantly, an increase in coverage of antenatal services from 70 to 80 percent and an increase in coverage of postnatal and child welfare clinics from 60 to 80 percent. The model calculated that CEI(HC) would be 34 percent, i.e., very much above the current national average of 20 percent. This fairly high projected productivity level was attributable to the model's clinic

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scheduling and manpower allocation to achieve better utilization of staff time by allocating appropriate balances of different types of personnel to clinics and preparing clinic schedules and durations in relation to anticipated demand.

The model selected an appropriate team code (Table 6) for each clinic (code 1, for example, is a grouping of one Community Health Aide and one Midwife and would often be selected by the model for smaller target populations). Staff should be allocated to the clinics in accordance with the team code given. The model gave a clinic schedule for the 14 HCs, as shown by Table 6, indicating days on which preventive and curative clinics should be held and their expected duration.

Table 6. Personnel allocation and clinic programming model, 14 HCs in two districts

HC No.	Target population	No. of clinic per week *p**C	Team+ code		Daily clinic (hours)												Total	
			P	C	Mon.		Tue.		Wed.		Thur.		Fri.		P	C		
1	2,054	2	1	1	1	3.5	4.0	3.5	0	0	0	0	0	0	0	7.0	4.0	
2	12,669	4	5	3	3	3.8	3.4	3.8	3.4	3.8	3.4	3.8	3.4	0	3.4	15.2	17.0	
3	10,176	5	4	2	3	3.7	3.8	3.7	3.8	3.7	3.8	3.7	3.8	3.7	0	18.5	15.2	
4	2,353	2	1	1	1	4.0	4.6	4.0	0	0	0	0	0	0	0	8.0	4.6	
5	1,885	2	1	1	1	3.2	3.7	3.2	0	0	0	0	0	0	0	6.4	3.7	
6	6,543	3	5	2	3	4.0	3.2	4.0	3.2	4.0	3.2	0	3.2	0	3.2	12.0	16.0	
7	1,595	1	1	2	2	2.9	1.6	0	0	0	0	0	0	0	0	2.9	1.6	
8	3,680	3	2	1	1	4.1	3.6	4.1	3.6	4.1	0	0	0	0	0	12.3	7.2	
9	6,294	3	3	2	1	3.8	4.1	3.8	4.1	3.8	4.1	0	0	0	0	11.4	12.3	
10	3,685	3	2	1	1	4.1	3.6	4.1	3.6	4.1	0	0	0	0	0	12.3	7.2	
11	1,152	1	1	2	2	2.2	1.2	0	0	0	0	0	0	0	0	2.2	1.2	
12	6,020	5	5	1	3	4.1	3.9	4.1	3.9	4.1	3.9	4.1	3.9	4.1	3.9	20.5	19.5	
13	3,221	3	2	1	1	3.6	3.2	3.6	3.2	3.6	0	0	0	0	0	10.8	6.4	
14	1,205	1	1	2	2	2.6	1.2	0	0	0	0	0	0	0	0	2.6	1.2	

*P = Preventive
 **C = Curative
 +Code 1: 1 CHA and 1 DMW can serve a population of 6,800
 Code 2: 1 RC, 1 CHA, 1 DMW, and 1 PHN can serve a population of 12,250
 Code 3: 1 RC, 2 CHAs, 1 DMW, 1 PHN, and 1 RN can serve a population of 18,000

The model was also used to determine the most productive clinic structure and the personnel needed to meet *current* demand. The model showed that current demand could be met with fewer personnel, a reduction in total personnel costs of from 9 to 18 percent (depending on certain assumptions about quality of existing care), and an increase in the CEI(HC) to 30 percent. It is hoped that the plan designed for increased coverage will be implemented for a trial period of 3 months, and that there will be monthly reviews of actual versus projected performance. The results of field testing will indicate whether refinements are needed. The model was designed for use on a wider (national) scale as a dynamic planning and evaluation tool.

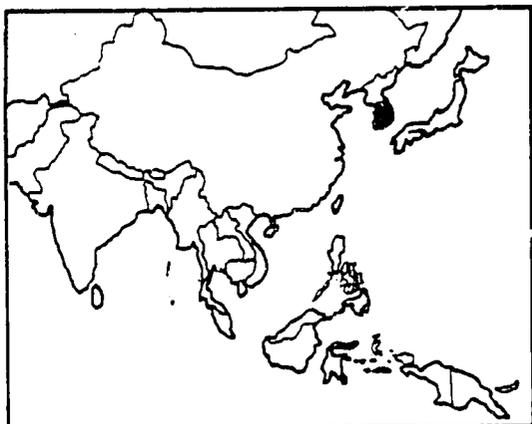
* * *

This study was conducted from June 1983 through March 1986 by researchers from the Department of Social and Preventive Medicine of the University of the West Indies and Price Waterhouse Associates, Management Consultants, Jamaica, with the cooperation of the USAID-funded Health Management Improvement Project in Jamaica and the Jamaican Ministry of Health. This summary is based on a final report of the study prepared by Patricia Desai and Bobby Zachariah. Further information is available from Mrs. Desai at the Department of Social and Preventive Medicine, University of the West Indies, Mona, Kingston 7, Jamaica; from Mr. Zachariah at Price Waterhouse Associates, Box 372, Kingston, Jamaica; or from Dr. David Nicholas, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

SUPPORTING PRIMARY HEALTH CARE PROGRAMS IN KOREAN RURAL COMMUNITIES THROUGH EXISTING VILLAGE ORGANIZATIONS



From January 1983 through January 1986 Korean researchers conducted an operations research study from January 1983 through January 1986 to address the problems caused by insufficient attention to preventive and promotive health activities in rural areas of Korea. A research team composed of members from the Schools of Nursing, Public Health, and Business Administration of Seoul National University tested the feasibility and effectiveness of primary health care (PHC) programs that incorporated non-health community

organizations as support structures. The objective of the study was to determine whether or not this support from village organizations would enhance health worker effectiveness and productivity in conducting preventive and promotive health care tasks.

BACKGROUND

Korea is a rapidly industrializing country with a population of over 41 million people and a total land area of 98,807 square kilometers. However, in many rural areas people have limited access to health care and suffer from a variety of health problems more typical of less developed countries. Common problems include: unassisted births, low immunization coverage, high rates of anemia, high incidence of tuberculosis, and inadequate weaning foods. Many people do not utilize PHC services, but rather diagnose and treat illnesses themselves using modern drugs or traditional remedies.

Recently, the Korean government has placed a high priority on the development of the social services sector. Efforts to improve the health status of the population have focused on extending primary health care services to the poor, extending health insurance to cover a majority of the population, and improving environmental conditions. As a result of research conducted at the Korea Institute of Population and Health, the plan for improving the health of the rural population includes support for the training and deployment of community health practitioners (CHPs) to provide PHC services to rural areas.

CHPs are licensed nurses who receive special training in village-level health care. The government plan specifies maternal and child health, family planning, prevention of communicable diseases, minor medical treatment, health

education, and environmental sanitation as areas for which CHPs should be responsible. The CHP program is, however, only in the experimental stages and there are no established guidelines for effective program implementation. The need for such guidelines was an impetus for this study.

The researchers had previously examined existing surveys, CHP reports, and had conducted on-site observations of the CHPs working in the villages. They concluded that CHP effectiveness and productivity needed improvement, especially in the areas of preventive and promotive health care. Other studies suggested that the incorporation of non-health community organizations as support structures for the CHPs might boost CHP effectiveness. The PRICOR study was basically used to determine which kind of community organization involvement would work best in this role. The research team carried out the study in three phases: (1) baseline data collection and analysis, (2) alternative solution implementation and process evaluation, and (3) post-intervention evaluation.

BASELINE DATA COLLECTION AND ANALYSIS

The researchers initially selected three counties in Kyeonggi province to participate in the study on the basis of similar population size, CHP service stability, similar economic status, and absence of other community organization projects. Two were randomly assigned to be experimental groups and the third was assigned to be a control group. Once these counties had been selected, the study team traveled to the communities and began to develop working relationships with community leaders, community health practitioners (CHPs), and officials of local, provincial, and central government. This was accomplished through multiple visits, meetings, telephone calls, and letters. Channels of communication were established between CHPs, the community people, and referral facilities. These contacts set the stage for working closely with the community.

Baseline data were collected by means of a household survey; CHP activity records; and surveys that focused on the characteristics of CHPs, community leaders, and the study villages. These sources of data were combined to give an idea of baseline conditions in the study communities.

The sample for the household survey was selected through proportional random sampling. Among the total households (HHs) in each county, one HH was randomly selected out of every five HHs. The resultant sample included 421 HHs in Icheon, 400 in Yan Pyong, and 405 in An Sung for a total of 1,226 HHs. Senior nursing students were employed to collect information about demographic characteristics, health status, health service utilization, and health care expenditures.

Forms were developed for collection of data on CHP activities and costs of the CHP post. These were basically in the form of checklists. These forms were distributed to and filled out by the 17 CHPs working in the study areas. Additional questionnaires were developed to determine the personal characteristics of CHPs, community leaders, and the communities. These last questionnaires were administered to 313 community leaders and to 138 villages.

Although the baseline data analysis was not completed in time to contribute fully to the next phase of the research, major problem areas were identified based on partial analysis and other information available on health needs in Korean rural communities. The researchers identified problems related to health service needs and utilization patterns of the communities, the health care delivery system, and the leadership capacities of the communities.

Problems having to do with unmet health service needs included:

1. The emigration of the younger generation to urban areas caused many hardships, including health problems, for those people left in the rural areas;
2. A high birth rate indicated the need for maternal and child health and family planning services; and
3. The morbidity rate was high and many people were relying on self diagnosis and treatment, purchasing drugs at local pharmacies.

Problems with the health care system, and in particular with the CHP program, were identified through the analysis of CHP monthly activity records. These included: (1) the focus of CHP activities on clinic-based medical care services for minor illnesses rather than preventive and promotive tasks; (2) the limited availability of funds to finance preventive and promotive services provided by CHPs; and (3) the inaccessibility of public transportation between CHP posts, villages, and health care service referral facilities. The community surveys brought to light the fact that most community leaders had limited knowledge about health care and did not serve as good role models for the community in health matters.

ALTERNATIVE SOLUTION IMPLEMENTATION AND PROCESS EVALUATION

Implementation

The researchers proceeded to field test the incorporation of non-health community organizations as support structures for the CHP programs in the study areas. They decided that it would be helpful to distinguish between informal community organizations and formal community organizations in this study. Thus a quasi-experimental design was developed using two experimental groups and one control group. Experimental group I (Yang Pyong county) incorporated Bansang-Hoe (formal village organizations) as sub-structures for PHC services. Experimental group II (Icheon county) incorporated various informal community groups, such as mothers' clubs, 4-H clubs, church groups, agricultural cooperatives, clan meetings, and development committees, as sub-structures for PHC services. In the control group (An Sung county), CHPs continued to provide PHC services without the assistance of any community organizations.

In the study areas where CHPs were to work with community organizations (Yang Pyong and Icheon), the following interventions were planned:

1. Further training of CHPs with a focus on outreach activities and preventive/promotive care
2. Establishment of better communication between the CHP and the community through existing community organizations
3. Education of community leaders about the importance of community participation in PHC and education of CHLs, to emphasize their role in the health care system, and
4. Development and training of community leaders to serve as communicators, health educators, motivators, and health care providers.

Before beginning work in the communities, investigators reviewed existing teaching materials for use in the CHP and CHL training sessions. They then developed a series of educational leaflets for use by the trainers and later by the CHPs and CHLs for community education.

Over the next few months, the researchers conducted training sessions for the CHPs in Yang Pyong and Icheon. These took the form of three-day workshops during which the CHPs were oriented to the PHC approach and trained in concepts of community development. The focus of the workshops was on the CHPs' role in preventive and promotive care which could be accomplished through community outreach activities. Other specific topics included: (1) how to identify, train, and utilize community leaders; (2) how to establish and utilize health information systems; and (3) how to utilize the referral system.

After their own training, CHPs were expected to train the leaders of the community organizations to be community health leaders (CHLs). The leaders participated in a series of short sessions held in their communities over a period of 14 months. In the beginning the researchers had a larger role in the training, but in the later training sessions the CHPs took charge. The content of each of the five rounds of training is summarized below.

Training session 1	Basic concepts of the PHC approach, the importance of community participation, and the role of community leaders in PHC services.
Training session 2	Use of the CHL monthly activities checklist.
Training session 3	Prenatal care, delivery services, post-partum care, family planning, abortion, weaning, food supplements, immunizations, and general infant care.
Training session 4	Emergency first aid techniques, including: taking vital signs, controlling bleeding, treatment of fractures, and artificial respiration.
Training session 5	Prevention and treatment of hypertension, diabetes mellitus, cancer, hepatitis, and drug abuse.

Once training was complete, the new CHLs were expected to carry out a variety of health education and service activities on their own in the communities using leaflets and films provided by the study team. These were in the

general areas of (1) facilitation of communication between the CHP and the community residents (e.g. passing on health information from the CHP to the community people and reporting community reactions and health problems to the CHP), (2) health education, (3) provision of minimal health care services, and (4) initiation of community health activities in the village. The CHPs were to supervise them in these activities.

Process Evaluation

After the CHLs had been active in the experimental counties for several months, the researchers carried out a process evaluation. The evaluation served to see whether the CHLs were reaching the population in need, to motivate and assist the CHLs in their health activities, and to inform the communities about the CHLs responsibility and availability. One-third of all CHLs in Yang Pyong and Icheon were interviewed, as well as a sample of community residents in both counties.

In response to the survey, the CHLs said that they had tried to inform the community about the activities of the CHP and tried to inform the CHP about health problems in the community. They also indicated that they had discussed MCH, family planning, chronic health problems, and health hazards with community people when the topics came up in conversation. The specific activity reported most often by the CHLs was giving information on PHC in general.

The CHLs complained, however, that their new role was not recognized by the community. The villagers did not know about their new status as community health leaders and thus did not consult them about health matters. This discouraged the CHLs from performing the health education and information tasks assigned to them. The impression held by the CHLs was confirmed by the survey of community residents; most of the people in the sample had little information about the CHLs and their roles. In response to this problem, the CHPs conducted educational sessions for villagers on the CHLs' roles, and the study team held a two-day workshop for CHPs to bolster their enthusiasm.

POST-INTERVENTION EVALUATION

A final evaluation was carried out in order to compare the effectiveness and efficiency of the PHC services delivered by CHPs in the three study counties. Each CHP program was evaluated according to: a) the effectiveness of the program in terms of selected health and health service indices, b) the productivity of CHPs and CHL in terms of quantity of services provided, and c) efficiency in terms of the cost incurred per population served. The comparisons were made using three different methods: simple statistical analysis, a computer simulation technique, and a cost effectiveness analysis. The information from the baseline survey, a final household survey, and the CHP/CHL checklists for the 15-month period served as data for these analyses.

Data Collection

After the study activities had been underway in Yang Pyong and Icheon for a 15-month period, the researchers carried out the post-intervention household survey. The same households surveyed in the baseline survey were contacted

again. The final sample survey was somewhat smaller than the baseline sample because in some areas, families had moved away and in other areas, CHPs had left their jobs. Final activity records were collected from the CHPs and CHLs participating in the study.

Statistical analysis. The first analysis method used was basic statistical analysis using frequencies, means, and percent distributions. The researchers made comparisons between the baseline data they had collected in 1983 and the post-intervention data collected in 1985. Comparison variables included: episodes of acute illness, family planning practice, antenatal care, deliveries, postnatal care, immunization, and CHP activities.

Between 1983 and 1985, the number of acute illness episodes in Yang Pyong and An Sung (the control/comparison area) decreased. There was no significant change in the number of episodes in Icheon. In both surveys, the most frequently reported acute illnesses were upper respiratory diseases and digestive disorders. The rate of treatment for acute illness episodes increased in all three counties. The number of people who utilized the CHP post for treatment of these acute illnesses decreased in all three counties. In both 1983 and 1985, CHP post utilization was higher in Yang Pyong (experimental group I) than Icheon (experimental group II) or An Sung (control group). The second most popular source of care in both Yang Pyong and Icheon, and the most popular source of care in An Sung, was the local drugstore. (See Table 1.)

Table 1. Institutions utilized for treatment in episodes of acute illness

	Yang Pyong				Icheon				An Sung			
	1983		1985		1983		1985		1983		1985	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CHP post	134	55.1	96	60.8	88	38.4	65	35.9	87	34.9	65	34.2
Hospitals	30	12.3	14	8.9	54	23.5	49	27.1	42	16.9	35	18.4
Health Center	9	3.7	0	0	7	3.1	5	2.8	5	2.0	0	0
Oriental Medical Practitioner	6	2.5	4	2.5	5	2.2	5	2.8	7	2.8	6	3.2
Pharmacy	64	26.3	44	27.8	75	32.8	56	30.9	108	43.4	83	43.7
Other	0		0		0		1	0.5	0		1	0.5
Total	243	100.0	158	100.0	229	100.0	181	100.0	249	100.0	190	100.0

Family planning practice rates in 1985 had increased by 15.4 percent in Yang Pyong, 19.0 percent in Icheon, and 15.3 percent in An Sung from the 1983 rates. The researchers accredited these increases to the efforts of health care personnel and the national family planning campaign. In both experimental and control areas, users of permanent family planning methods, such as vasectomies and tubectomies, increased most significantly over the two-year period. The number of users of temporary methods actually decreased in both of the experimental counties, while it stayed the same in the control county.

Antenatal care rates showed a slight decrease overall. These rates were highest in An Sang for both time periods, possibly because of the higher degree of urbanization in this county. In Yang Pyong, however, there was a notable increase in the number of mothers utilizing the CHP post for antenatal care from 1983 to 1985. Yang Pyong was the only county of the three in which CHP posts were the major sources of antenatal care in 1984-85. The numbers of babies delivered in hospitals increased in all three counties. For home deliveries, more births were attended by CHPs in 1985 than in 1983. This trend was most noticeable in Yang Pyong where 25.6 percent of the births reported in the survey were attended by CHPs. Related to the increased number of hospital deliveries, the rates of postnatal care increased from 9.3 to 31.5 percent in Yang Pyong, from 3.4 to 32.3 percent in Icheon and from 8.1 to 32.0 percent in An Sung.

Immunization rates increased in all three counties. In 1985, the polio vaccination rate in Yang Pyong had increased 35.1 percent over the 1983 rate, bringing the rate to 97.1 percent. Polio vaccination rates in Icheon and An Sung increased by 27.0 percent and 23.6 percent respectively. Similar increases occurred in the rates for D.P.T, measles, and B.C.G. vaccinations.

The researchers also compared CHP performance before and after the study intervention using the monthly activity checklists. For clinic-centered activities, performance was judged on the basis of total cases per CHP per month in each service area. The average total number of clinic-based cases seen by each CHP per month was 130.7 in Yang Pyong, 90.8 in Icheon, and 121.5 in An Sung. Data were also analyzed for medical care and treatment services, maternal health services, child health services, tuberculosis control services, and family planning services.

Outreach activities were judged on the basis of total number of sessions conducted by the CHPs, the total number of persons attending or participating, and the time in minutes spent by the CHPs performing that activity. On the basis of this analysis, the researchers concluded that the CHPs in Yang Pyong were most consistent with the project emphasis on preventive and promotive services in their delivery of clinic-centered activities, even if they did not always deliver the largest number of total cases. In outreach activities, the CHPs in Yang Pyong were rated "outstanding" in comparison with the other groups in almost every category.

Simulation model. Using Dynams, a computer simulation model of the PHC system was developed. The system was described in terms of five sub-systems: (1) acute disease care, (2) chronic disease care, (3) infant care, (4) maternal care, and (5) family planning. An education sub-system was added

into the model as an experimental input. This model was used to compare the effects of using a formal community organization as a support structure for PHC service provided by CHPs with the effects of using an informal community organization as a support structure.

In the simulations of the study conditions, village councils represented formal community organization support for CHPs, and mothers' clubs represented informal community organization support for CHPs. In comparing the two simulation runs, the researchers found that that PHC service utilization was higher for a PHC program supported by a village council than for one supported by a mothers' club. Education time and the number of pharmacy users were lower in the village council alternative than the mothers' club alternative. These results implied that support of the PHC program by the village council was more efficient than the mothers' clubs, even with less educational input. When attendance of the mothers' clubs was doubled in the computer simulation, PHC and CHP utilization barely rose to the levels attained originally with the village council. Sensitivity analysis was used to validate the simulation model.

Cost-effectiveness analysis. During the study period, data were collected from the CHP and CHL monthly activity checklists on the operation and maintenance costs of the CHP post. CHP post expenditures were totaled for each study group and placed into the general categories of personnel, travel, per diem, transportation, material and supply costs, and other direct costs. The total annual recurrent costs of the three CHP programs were calculated and compared. Experimental group I (Yang Pyong) was the least costly at W2,774,251 Korean Won (around US\$ 3,468) and the control group (An Sung) was the most costly at W3,600,531 (around US\$ 4,501). The exchange rate varied from approximately 750 Won to the U.S. dollar to approximately 850 Won to the U.S. dollar during the study period. To give readers an idea of the approximate value in U.S. dollars, I have used a rate of 800 Won to the dollar.

Effectiveness was measured by the number of services provided per CHP and the number of activities accomplished per CHL during the study period. In terms of the numbers of services per CHP during the study period, experimental group I (Yang Pyong) produced a total of 2,206.05 services per CHP, experimental group II (Icheon) produced a total of 1,141.45 services per CHP, and the control group (An Sung) produced 1,281.2 services per CHP.

Cost-effectiveness ratios were calculated for the services provided by the CHPs and the activities done by the CHLs. Cost-effectiveness of each CHP program was defined as recurrent cost per unit of service provided by the CHPs. Cost effectiveness ratios for the CHP programs in Yang Pyong, Icheon, and An Sung were 1,257.6, 2,772.3, and 2,810.3 respectively. Cost-effectiveness ratio for the CHL programs in Yang Pyong and Icheon came to 1493.1 and 1925.4 respectively. Based on this analysis, the researchers concluded that formal organizations were the most cost-effective way of supporting PHC services delivered by CHPs.

CONCLUSIONS

The conclusion that PHC services supported by formal organizations are the most effective and efficient of the alternatives considered in the study was thus confirmed by three separate methods of data analysis. The researchers felt that, unless informal community organizations were considerably strengthened, they would be much less effective than formal organizations in supporting PHC services. One explanation for these results may be that, in Korean rural communities, power is concentrated in official, formal organizations, such as the village councils. This gives these organizations much greater influence and ability to support CHPs in their PHC activities.

The results of the study have already had an impact on the Korean community health practitioner (CHP) program. Because the researchers worked closely with government officials throughout the study, they were able to communicate results to the officials and get response even before the study finished. For example, early in the study, the project team informed government officials about the transportation problems faced by CHPs. Soon after, the government provided the CHPs with motorcycles. Toward the end of the study, the government responded to the study findings, by providing funds and guidelines for the development of village health workers to assist CHPs.

The researchers held a dissemination workshop in November of 1985 to further share the results of the study. This meeting was attended by government officials, health researchers, directors of CHP training programs, and CHPs.

* * *

This study was conducted from January 1983 to January 1986 by the Department of Nursing of Seoul National University. This summary is based on the final report of the study prepared by Yeo Shin Hong, Soo Il Kwak, Eun Ok Lee, Seon Ja Rhee, and Kwang Woong Kim. Further information is available from the principal investigator, Dr. Yeo Shin Hong, Department of Nursing, College of Medicine, Seoul National University, 28, Yundeun-Dong, Chongno-Ku, Seoul, Korea or from Dr. Stewart Blumenfeld, PRICOR study monitor (Chevy Chase).

Study Summary

PLANNING AND EVALUATING COMMUNITY FINANCING IN KOLAHUM DISTRICT LIBERIA



[The following summary is taken in large part from an article prepared by PRICOR researchers and staff for a 1987 issue of the international journal, Socio-Economic Planning Sciences and appears here with permission of the journal's editors.]

Although considerable resources, both public and private, have been devoted to improving primary health care services in Liberia, there remains a pressing need to ensure the financial sustainability of these services. Few government resources are allocated to rural services, and when external funding for rural PHC services is withdrawn, the project very often collapses. As a result health problems have

remained acute. In response to the problem of project sustainability the Liberian Ministry of Health (MOH), in cooperation with the Christian Health Association of Liberia (CHAL), sought to identify and develop effective community financing schemes to offset totally, or in part, the cost of PHC services. From January 1984 through June 1985, they conducted an operations research study in the Kolahun District in Northwest Liberia.

HEALTH NEEDS AND EXISTING SERVICES

The Christian Health Association of Liberia is a coordinating organization for religious-based voluntary agencies providing health services in Liberia. Because the resources of the Government of Liberia are very limited, organizations which belong to CHAL provide most of the primary health care (PHC) services to rural populations. Through CHAL these agencies cooperate in the purchase of drugs at bulk rates and the training of village health workers. CHAL also facilitates general information sharing and has recently begun a program of modest grants to encourage small-scale operations research by their member agencies to solve their operating problems. The Ministry of Health and CHAL work cooperatively in the delivery of existing health care services in the Kolahun District. This study of financing strategies is a result of their established and ongoing concern to provide PHC where resources are scarce.

The Kolahun District in particular, and Liberia in general, has specific health related problems which are of great concern to national leaders. Education has not solved the problem of illiteracy, which is estimated to be

80 percent for the nation as a whole and 85 percent in the rural areas. Overcrowding and poorly constructed housing, unsafe drinking water, and inadequate means of waste disposal all have great impact on the health status of the population. Life expectancy at birth is 45-48 years. A poor concept of nutrition and the scarcity of animal protein continue to contribute to malnutrition-related morbidity and mortality. Children under five, and lactating and pregnant women are most seriously affected by poor health status. The infant mortality rate is estimated at 153 deaths per 1000 live births with 50 percent of all deaths occurring in the under five age group. The primary causes of death for children under five are diarrhea and dehydration, broncho-pneumonia, measles, malnutrition, neonatal tetanus, malaria, tuberculosis, and meningitis.

Health care for the District's 72,000 people is provided through three health centers and 14 health posts. Each health center is staffed by a minimum of two Physicians Assistants, one Certified Midwife and one Practical Nurse, while the health posts are staffed by at least one Physicians Assistant and one Certified Midwife. Village level health care is provided by traditional healers, including Traditional Birth Attendants (TBAs), who have been given training in PHC skills.

From 1975 to 1979, USAID and the Government of Liberia carried out a multi-million dollar nationwide rural health project. This included the building of health facilities, the training of health personnel, and the provision of free drugs and supplies. Government supplies have become drastically reduced since the end of that project. In response to the demand for essential drugs a large number of "medicine stores" appeared, selling drugs at very inflated, and often prohibitive costs. Access to affordable drugs was improved through the establishment of a successful revolving drug fund (RDF) with an initial \$10,000 loan from the Gbandi Farmers Cooperative. These funds were used by the RDF to purchase generic and brand name drugs from CHAL at bulk rates. They then marked up the price by 25 percent for sale to clients. This has made drugs available at the District Center at a cost far below that offered at private medicine stores. The drug sales scheme has generated money to reinvest in the drug inventory and to repay the loan from the farmers cooperative.

STUDY PURPOSE

The objective of this operations research study was to develop effective financing scheme(s) by which communities could generate funds to pay for all, or part, of the costs for PHC services. The schemes developed had to satisfy the following conditions:

1. The costs of the financing scheme(s) chosen would be less than the income generated from the scheme(s);
2. A high portion of the target population (children under five, and lactating and pregnant women) would utilize the essential services provided;

3. A high percentage of households would participate; and
4. The villagers themselves would be able to sustain the scheme(s).

METHODOLOGY

The study was divided into three phases using the PRICOR operations research model. In the first phase, conducted during January and February of 1984, the problem was analyzed in detail. During the second phase, carried out from March through June, alternative solutions were developed and systematically examined. The third phase, lasting 12 months and ending in June 1985, consisted of a field test of the financing schemes chosen in the second phase.

Phase I: Analysis of the Problem

In January 1984 three villages were selected to participate in the study. Selection was based on accessibility, strategic location in the district, and willingness to participate.

VILLAGE	POPULATION	DISTANCE FROM KOLAHUN DISTRICT CENTER
Fanjhalahun	539	20 miles
Taninahun	261	7 miles
Kondubengu	280	10 miles

In each village three meetings were held with the town council and village leaders. During the first meeting the concept of community financing for primary health care was introduced. Villagers were asked to select two individuals, with at least a 10th grade education, to be trained to conduct a Health Service Utilization Survey in their villages. The second meeting provided the opportunity for discussion followed by a question and answer period. The individuals selected by the villagers were introduced to the project team. At the third meeting discussion continued and a date for training the survey technicians was announced.

In February the Health Services Utilization Survey was conducted to gather information on situational variables in each village and to aid in community sensitization to the new PHC program. Demographic data gathered in this survey indicated that these villages were characterized by households headed by men aged 55 and over. Most of these household heads (72 percent) had no formal education and 76 percent were farmers. Household incomes were low; 70 percent reported an annual household income of less than \$200, and 41 percent reported incomes less than \$100 per year. These reported incomes are less than the national average of \$230 a year.

Discussion during the village meetings focused primarily on four issues:

1. What services would be provided?

In order for the community to pay for its primary health care services, it was agreed that the following services would be made available:

- a. Treatment for common illnesses with appropriate referrals, drugs, and supplies. This would require the development of a drug supply system.
- b. A coordinated immunization campaign. Mothers would be mobilized to bring children for immunization, and an effort would be made to locate those children who had not been immunized.
- c. Health promotion activities such as health talks.
- d. The registration of births and deaths in each village.

2. Who would provide the services?

Due to the shortage of health professionals and health care workers, it was agreed that a Community Health Worker (CHW) and a Traditional Birth Attendant (TBA) would deliver the PHC services in each village. Village Health Committees (VHC) were to be formed to take responsibility for the management of the PHC services in each village. A member of each VHC was to be selected and trained as the village CHW. Selection of VHC members and the CHW were left entirely in the hands of the village council and other leaders. Traditional authority was thus incorporated in the creation of new roles and community management of PHC.

3. Who would participate?

It was agreed that services would be available to everyone regardless of ability to pay. Reduced rates for those unable to pay would be based on criteria developed by the village health committee.

4. The price of benefits to be provided.

It was agreed that the services would not be free. There would be at least some cost-recovery, the specifics of which would be developed in the second phase of the study.

A major concern of villagers during these discussions was the supply and availability of drugs. The large revolving drug fund at the District Center provided a resource and model for the creation of smaller revolving drug funds at the village level. However, village interest and appropriate strategies for implementing and managing a village owned revolving drug fund had not been explored before this study began. Comparing the prices of drugs at local medicine stores and the District Revolving Drug Fund (DRDF) indicated that even with an additional 25 percent mark up over and above that of the DRDF at the village level, drugs would be less expensive than those at the local

medicine stores (Table 1). This identified the District Revolving Drug Fund as a possible model to be considered in the solution development phase of the study.

After the PHC financing problem and its different components were understood, community leaders were ready to enter the next phase of the project and develop suitable solutions for financing PHC.

Table 1. Comparison of drug prices

	Local Medicine Store	District Revolving Fund	District + 25%
Asprin tab.	1 for 5 cents	3 for 2 cents	6 for 5 cents
Tetracycline capsules	1 for 10 cents	1 for 3 cents	4 for 15 cents
Ampicillin cap.	1 for 10 cents	1 for 5 cents	4 for 25 cents
Cloroquin tab.	1 for 5 cents	1 for 2 cents	2 for 5 cents
Cloroquin inj.	1 for 30 cents	1 for 10 cents	2 for 25 cents
Cloramphanicol capsules	1 for 25 cents	1 for 3 cents	4 for 15 cents

Phase II: Solution Development

A series of at least four meetings were held with community leaders and the VHC in each village during this phase. At these meetings eight possible financing schemes, tried in other parts of the world, were introduced and explained. The objective was to select the scheme(s) which village leaders thought would be most effective in raising funds to pay a substantial share of their PHC costs. The eight schemes considered were: (1) fee for service, (2) drug sales, (3) personal prepayment, (4) production based prepayment, (5) income-generation schemes, (6) community or individual labor, (7) donation or ad hoc assessments, and (8) festivals or raffles. Each scheme was discussed in terms of the study conditions, its strengths, weaknesses, appropriate uses, likely problems, and sustainability.

A preference matrix was used to select the financing strategies to be tested in the solution development phase. This simple matrix helps a group select from a list, those elements which are more desirable by ranking them by preference. In this case each of the eight financing schemes were examined by listing them in both the rows and the columns of the same matrix (Table 2). An "X" was placed in the square where the scheme listed in the horizontal row was preferred to the scheme listed in the vertical column. The financing schemes were then ranked by adding the number of Xs in the appropriately labeled horizontal row.

The preference matrix illustrated in Table 2 shows the results of this method in one of the three study villages. In this case, Drug Sales in the horizontal row was preferred as a financing scheme to Personal Pre-payment listed in the 3rd column. An X was placed in the square at the intersection of these two financing schemes. The Xs in the Drug Sales row total 7, the highest value, indicating that Drug Sales is the most preferred financing scheme considered here. The number of Xs for Fee-For-Service was 0, ranking it the least preferred scheme.

A preference matrix was used by each of the three study villages in the selection of preferred financing schemes. In each case the same four schemes ranked highest: (1) drug sales, (2) community labor, (3) production-based prepayment, and (4) donations or ad hoc assessment. A strategy combining these four schemes was selected for implementation in each of the study villages.

Drug sales. After the initial purchase of a minimal drug stock, the drug fund would be reimbursed, and the inventory maintained, through the sale of drugs. An additional 25 percent mark-up would be added to the drug price for resale in the village, for a total mark-up of 50 percent from CHAL bulk rates. This mark-up would provide funds for the maintenance and expansion of the drug stock in each village, and would also have the potential for generating funds for other PHC services in the long run.

Community labor. The community labor scheme was selected to work in two ways. First, it was to be applied to proceeds gained from communal rice fields, since it is a common practice in each village to make a communal rice field every year. Each village decided that part of the proceeds from the communal rice field would be applied to PHC. Second, the scheme of community labor would provide support for the CHW. It was agreed, in every village, that people would provide labor in the CHWs' fields as compensation for their time and expertise spent in delivering PHC services. Because traditional Healers are compensated in this way, community labor seemed a ready made solution to the problem of support for a new health care provider.

Production-based prepayment. People in each of the villages grow limited amounts of cash crops, mainly coffee and cocoa, in addition to rice (the staple). Revenues from these cash crops are available once a year. In each village it was agreed that participating households would contribute part of the money earned from these harvests to PHC funds.

Ad hoc assessment. It was agreed that each village would generate funds to capitalize its own revolving drug funds through ad hoc assessment. "Seed money" was collected to enable the village RDFs to purchase a minimal stock of essential drugs from the Kolahun District Revolving Drug Project.

Before these schemes could be implemented each village had to establish a Village Health Committee (VHC) and select a CHW for training. The training of the CHW was funded and conducted by CHAL. Each village already had a trained TBA and in some cases it was the TBA who was trained as the CHW.

Table 2. Preference matrix

Row scheme preferred to column scheme	Fee for service	Drug sales	Personal prepayment	Production based payment	Community labor	Individual labor	Donation and ad-hoc assessment	Festival raffles, etc.	Total
Fee for service	-	0	0	0	0	0	0	0	0
Drug sales	X	-	X	X	X	X	X	X	7
Personal prepayment	X	0	-	0	0	0	0	X	2
Production based prepayment	X	0	X	-	0	X	X	X	5
Community labor	X	0	X	X	-	X	X	X	6
Individual labor	X	0	X	0	0	-	0	X	3
Donation and ad-hoc assessment	X	0	X	0	0	X	-	X	4
Festivals raffles, etc.	X	0	0	0	0	0	0	-	1

Key X = Preferred
0 = Not preferred

By the end of Phase II the villages of Mbaghahun and Balahun were added to the study. These villages joined the study in order to participate in a program to bring PHC to their villages. In these communities close interaction existed between the investigator and the village leaders in the identification of health care needs and discussion of primary health care and financing problems. The financing schemes identified in the three study villages were introduced and examined for replicability. They were then implemented using the same framework (VHC management and CHW care) established for the initial three villages.

Phase III: Implementation of the Selected Financing Schemes

During the 12 month test period the financing schemes selected in phase II were implemented in five villages. During this time PHC services were provided on a limited basis and supported by the Ministry of Health and CHAL. The community was to provide at least part of the financing through the management of their chosen financing schemes.

A revolving drug fund was established and managed in each village by the VHC (of which the CHW was a member). A treasurer was elected to manage the funds generated through the sale of drugs and other activities. The treasurer was a member of the committee other than the CHW, except in one village where the CHW was also the treasurer.

Monthly visits to each village were made by a member of the project team. A visit check list was used to monitor the status of the VHC, CHW, community health activities, and the status of each financing scheme being used. Problems in the management of funds and activities were discussed and conflicts resolved where necessary.

RESULTS

Drug Sales

All of the revolving drug funds sustained the 25 percent mark-up in sale price at the village level. Stocks of drugs increased and diversified. Drug and supply costs remained low enough that sales revenues per case treated by the CHW also remained low: \$0.27 - 0.95 per case.

The only difficulty noted with the revolving drug fund at the village level was the management of income from the drug sales. Traditionally the village council has allocated public resources for such community activities as feasts and road repair. This kind of allocation of funds became an issue and it was necessary to reinforce with the VHC that the income generated through PHC financing strategies was to be used only to finance PHC services.

Community Labor

Although it was agreed that a percentage of the revenues from the communal rice farm would be used for PHC, no agreement was reached as to what fraction of those proceeds would be assigned to PHC funds. No further action was taken to implement this scheme during the test phase; however, the understanding

remains that these funds will be available to be called upon as needed. Some community labor has been provided in the fields of the CHW, but this has been limited, ranging from 6 to 12 person days of labor during any three month period in the four successful villages. While these figures are very low it is interesting to note that a new village which implemented this program during the last three months of the test phase provided 39 person days of labor for the support of their CHW. CHWs, for their part, were dissatisfied with this method of compensation and efforts are currently underway to find a way to pay them a small salary.

Production-Based Prepayment

Production-based prepayment has not yet provided any direct resources for primary health care funds. This scheme was rated high on the preference matrix, but no further action has been taken to implement it.

Ad Hoc Assessment

Ad hoc assessments have been highly successful in raising sufficient funds to establish a village revolving drug fund in every village that implemented this scheme except one. In the one village where the scheme was unsuccessful, the VHC was poorly organized and the CHW was ineffective. Ad hoc assessment provided seed money of \$59.00-\$209.60, with household participation in this scheme ranging from 75 to 90 percent in the three villages which were successful in raising funds in this fashion.

Other Income Generating Schemes

One of the three study villages (Taninahun), has found other ways of generating funds for village level PHC services. This village was able to capitalize their revolving drug fund with a \$300 donation from a missionary couple. The village also generated income for their PHC funds through farm contracts totaling \$462. Moreover, continued reinvestment in their drug fund has remained high throughout the test period.

Community Organization

Working through the established village councils and community leaders has proven very effective in this study. Working within the traditional leadership framework facilitated both the creation of a new community organization (the VHC), and the selection of the CHWs. The village council and the VHC functioned with minimal guidance in the establishment and maintenance of their revolving drug funds. The creation of a new community organization responsible for decision making and management of PHC provides an ongoing structure for improving PHC services in the villages.

CONCLUSIONS

Objectives

This operations research study has achieved its objective of identifying and developing effective methods which communities can use to finance all or part of their PHC services. Revolving drug funds have been made operational in

four of the original villages and are sustained through financing schemes developed during this study. Revolving drug funds have been established and are operating successfully in six additional villages which implemented the solutions developed in this study. Additional funds and support have also been raised through community labor, donations, and farm contract work, and applied to the direct support of PHC. The spirit of participation and the percentage of households participating in the different financing techniques have been high. The outcomes for successful communities include locally available drugs, health care providers, and PHC management. The establishment of Village Health Committees has also provided the framework for continued efforts in improving PHC within their own villages.

Methods

This study used a systematic operations research methodology in addressing the problem of community financing of PHC at the village level. Adherence to this approach has enabled the project to move successfully from problem identification, through the development and systematic assessment of alternative solutions, to field implementation.

The selection of a solution combining multiple financing schemes was significant for the project's success in three ways:

- Using different funding strategies allowed people to contribute to primary health care according to their means;
- A combination of schemes used to capitalize and maintain the village drug funds provided a wider base on which to establish and sustain all the drug funds attempted; and
- Testing a variety of schemes increased the potential for success. Concentration on one scheme that failed would not have provided any positive results for villagers nor the encouragement needed to develop other aspects of their own PHC system.

Funding Schemes and PHC Services

Neither production-based prepayment nor communal labor were well implemented or strongly encouraged by community leaders during the test phase. However, village councils have reaffirmed these strategies as desirable and potentially productive in providing support for PHC and CHWs. The assumption that CHWs would be supported by the traditional application of community labor was clearly recognized as an error. Careful planning on the part of village councils and VHCs is now being encouraged to develop the criteria by which these strategies and others can be implemented.

One of the original objectives of the project was to create a health care program that would reach as many women and children as possible. However, early in project planning the villagers indicated that they wanted services for everyone. This conflict between services desired by the community and those given priority by outside health officials may be a stumbling block in the mobilization of adequate support for PHC services. It may be that increased support for CHWs could result from the development of health care

services that address the health issues of all segments of the population rather than the target group alone. This is currently being considered by District Health Officials.

Replicability

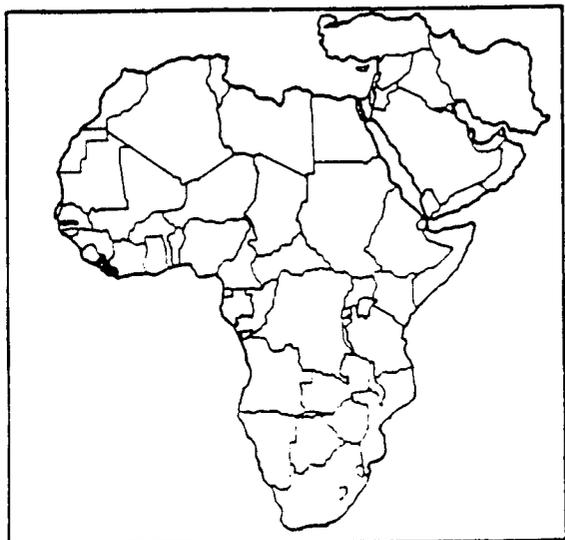
The project's success and replicability has been amply demonstrated by the growing number of villages forming their own VHC and founding their own revolving drug funds. However, the key to success laid in the constant supervision (monitoring) during the field testing of these schemes. Without adequate supervision the traditional use of public funds in this study area would have decapitalized the revolving drug funds before the test phases had been completed. Recognition of this problem resulted in the stipulation that PHC funds be maintained for PHC services.

* * *

This study was conducted from January 1984 through 1985 by the Liberian Ministry of Health and the Christian Health Association of Liberia. This summary is based on a final report of the study prepared by Andrew K. Cole, M.D. Further information is available from the principal investigator, Dr. Andrew K. Cole, Christian Health Association of Liberia, P.O. Box 1046, Monrovia, Liberia, or from Dr. Jeanne Newman, PRICOR study monitor (Chevy Chase).

Study Summary

TRAINING CARETAKERS IN RURAL LIBERIA TO PREPARE AND DELIVER ORT



As one of four primary health care operations research (PRICOR) studies carried out in Liberia, an Oral Rehydration Therapy (ORT) study was conducted by the Department of Public Health and Preventive Medicine at the A. M. Dogliotti College of Medicine, at the University of Liberia. The purpose of the study, which began in September 1984 and ran through March 1986, was to promote the concept and utilization of ORT by ensuring that oral rehydration solution (ORS) was widely available and used appropriately. Specific objectives of the study were to identify an appropriate and acceptable ORS which would be widely

available in the rural areas, and to develop an educational strategy which would ensure that caretakers would be knowledgeable and capable of preparing and administering ORT correctly.

BACKGROUND

The health care delivery system in Liberia is built around static delivery points. The majority of facilities, manpower and funds are concentrated in the urban areas with a few sparse services to the rural areas. Of the two million people in Liberia, 64 percent reside in the rural areas, 48 percent are less than 15 years old and 20 percent are under five. While only 32 percent of the hospital admissions were children, they account for 69 percent of the recorded deaths with 64 percent of these being in children under five. Diarrheal disease is the second leading cause of death in children under five, and malnutrition the first.

The government has adopted the concept of primary health care (PHC) as a means of increasing the provision of basic health care services to the rural areas. Several PHC activities have been initiated by bilateral donors such as USAID, the German and Dutch governments, and the Christian Health Association of Liberia (a coalition of religious and nongovernmental agencies). Activities are currently being carried out in 8 of the 13 counties. The projects focus on such activities as strengthening management capabilities, training health workers, increasing accessibility to PHC services, implementing revolving drug funds, constructing water and sanitation systems, immunizing children, and

providing oral rehydration therapy. At the time of the study, the ORT component was limited to three counties but is expected to cover the rest of the country in the next three to four years.

Since diarrheal disease is a major killer in Liberia, and since ORT is so effective at preventing and correcting dehydration, the government is giving high priority to PHC activities which promote ORT. As a matter of policy, the Liberian government has limited the use of prepackaged UNICEF ORS to hospitals and clinics. Reasons cited for this include: (1) the limited availability of the packets, which would be insufficient to supply the entire country, (2) the high cost for the government (if distributed free), or potential unwillingness of people to pay for packets (which will decrease their use), (3) problems with transportation, distribution and logistic support, and (4) the inaccessibility of many rural villages.

The means chosen to resolve these issues has been to identify and encourage the use of a locally and commonly available home-prepared ORS, which could substitute as an acceptable alternative for the prepackaged ORS. In addition, there was the need to ensure that caretakers would be able to prepare and use the ORS correctly when their children have diarrhea. This, in turn, would require that caretakers have appropriate training in the preparation and administration of home-made ORS. Therefore, the investigators decided on two major objectives for the study:

1. To identify an ORS recipe which would be acceptable to the caretakers; and
2. To identify the most effective strategy to teach caretakers about the correct use and preparation of ORS.

Site Selection and Data Collection Methods

Of the five counties in Liberia without planned or existing primary health care activities, Mar-Gibi county was selected by the research team as the site for the PRICOR ORT study. It is fairly representative of rural areas throughout Liberia, and its proximity to the capital city of Monrovia made it easily accessible to the study team. Within the county, the Gibi Territory was selected primarily because it had not been "contaminated" by other PHC activities.

After several visits to the area, 22 villages were selected and a village profile questionnaire was developed to collect data on 25 socioeconomic characteristics. One of the criteria for the final selection of villages for the study was that there should be no pipe-borne water supply in the village.

To understand the diarrhea problem more fully, researchers gathered information on demographic factors, political/community organization and cultural patterns, economic base, health problems, facilities and services, current KAP of diarrhea and ORT, availability of ingredients and tools used for ORT, and the acceptability of various ORS recipes. This information was obtained through existing data, informal interviews, observation, nominal group process interviews, a village survey, a household survey and a pilot study.

Figure 1. Data collection methods

INFORMATION NEEDED	Methods of Data Collection						
	Existing Data	Informal Interviews	Observation	Nominal Group Interviews	Village, Institutional Survey	Household Survey	Pilot Study
Demographic Characteristics	X					X	X
Political/Community Org.		X			X	X	X
Cultural Practice	X	X	X		X	X	X
Economic Base	X	X	X		X	X	X
(Perceived) Health Problems	X	X	X	X	X	X	X
Facilities, Services, Res.	X	X	X		X	X	X
Current KAP		X	X			X	X
Availability of Ingredients		X	X		X	X	X
Acceptability of Recipes					X	X	X

Four questionnaires were designed to obtain the required information:

- | | |
|-----------|--|
| Form A | The Village Profile allowed the study team to obtain socioeconomic data on each of the villages in the study area. |
| Form BS.1 | Baseline Survey, Part 1 was used to interview the head of the household and to obtain socioeconomic data on the household. |
| Form BS.2 | Baseline Survey, Part 2 was used to obtain information on the socioeconomic characteristics of the caretakers along with data on their KAP of diarrhea, dehydration and ORT. |
| Form M | This was used to obtain information on child mortality, although this was not a focus of the study. |

Forms BS.1, BS.2, and M were pre-tested for fine-tuning in a pilot study.

DEVELOPMENT OF AN ORT PROGRAM

To develop an ORT program for rural Liberia, the researchers sought to (1) identify an appropriate and acceptable ORS which would be widely available in the rural areas, and (2) develop an educational strategy which would ensure that caretakers would be knowledgeable and capable of preparing and administering ORT correctly.

Selection of ORS

A nominal group technique was used to consult with directors of other ORT projects for their judgement of the most acceptable home-made ORS solution among the rural Liberian population. They agreed that most caretakers preferred a salt/sugar/orange solution. However, during informal interviews several caretakers had indicated that rice was widely used to feed children and was prepared as rice water, rice porridge (powder prepared from rice), or strained rice, sometimes with sugar added.

In view of these responses, and because ORS made with rice powder has proven to be equally as effective as sugar/salt/orange in treating and preventing dehydration during diarrheal episodes (and perhaps even better due to its nutritional value), the study team decided to include all four strategies in their pilot study. This would provide them the opportunity to confirm or refute the experts' opinion that sugar/salt/orange is the solution most acceptable to caretakers.

Selection of an Educational Strategy

Based on consultation with experts in the area of education, and in conjunction with a literature review, two educational strategies were decided upon: (1) "Face-to-Face" individualized teaching, and (2) "Group" teaching. It was hypothesized that "Face-to-Face" would be more effective, while "Group" would be easier.

PILOT STUDY

In the original study design, the researchers wanted to investigate two ORS mixtures and two educational strategies through a 2X2 factorial design. Four villages would be used with one ORS-Educational Strategy combination in each.

However, this design was amended to accommodate the need to investigate four ORS mixtures. Since a 4X2 factorial design would give rise to eight combinations, each with a sample size too small to make meaningful comparisons between groups, the decision was made to train all caretakers in the pilot study in all four ORS mixtures. Half would be trained with one educational strategy, the other half with the alternate educational strategy. In this manner, if the one or two most preferred ORS mixtures could be determined in the pilot study they could then be matched with the two Educational Strategies during the field study to determine which ORS-ES combination would be the most effective.

One large village with 73 caretakers was chosen for the pilot study. Ten village-level trainers were selected by the clan chief or commissioner and trained in all four ORS preparations by two trainers of trainers. Six of these village-level trainers taught half of the caretakers using the Face-to-Face strategy, while four trainers taught the remaining caretakers using the Group strategy. In the Group teaching strategy, the caretakers were trained in small groups of nine or less. They received four to six hours of instruction shared between two trainers. The Face-to-Face teaching strategy used six village trainers, each responsible for six or seven caretakers. All caretakers in the Face-to-Face strategy received training in two one-hour sessions with the time divided between two trainers.

The determination of who received Face-to-Face and Group instruction was made on the basis of geography and the situation of the structures. Those grouped closely together received Group instruction so as not to contaminate the results of those receiving individual instruction, who lived on the outskirts of the village.

Pre-test and post-test questionnaire results (Forms BS.1, BS.2, and M) were compared to determine the relative effectiveness of the two educational strategies. Comparisons were made within groups and for all caretakers combined with respect to their preference(s) for ORS mixtures.

Results of Pilot Study

The objective of the pilot study was to ascertain the relative effectiveness of the two educational strategies and the relative acceptability of the four home-made ORS solutions to caretakers. Baseline Survey 2, which measured the KAP of caretakers in each educational-strategy group, was used to evaluate these measures.

Acceptability of ORS. The pretest KAP findings revealed that when caretakers were asked what they do when their child has diarrhea, 70 percent said they send their child to the clinic, while 30 percent said they give country or clinic medicine.

In response to the question "What can be given by the caretaker to the child to make the child feel better when the child has diarrhea", only two of the 73 caretakers reported in the pre-test that salt/sugar solution could be given to the child. Eight caretakers knew that the UNICEF ORS packets could be given and three identified rice water without salt/sugar as a remedy. By and large, most caretakers reported that they could give country or clinic medicines (52.1 percent, n=38), or send the child to the clinic (21.9 percent, n=16), indicating that they believed some form of treatment was needed to make the child feel better.

This conclusion was supported by the responses given to the more specific question asking what type of food the caretakers give to their child when the child has diarrhea. While 23 of the 73 caretakers give rice water, 28 give rice, and 13 continued breastfeeding (either alone or given with a rice supplement), none of these was identified as a treatment which could be given to make a child with diarrhea feel better, indicating that they did not believe that the fluids and food given everyday were a form of treatment for diarrhea.

After training caretakers in the preparation of all four ORS solutions, the post-test survey results revealed an increase to a total of 33 caretakers (53.2 percent of the 62 reporting) who said that salt/sugar solution could be given to their children when they had diarrhea. This was an increase of 50.5 percentage points. No other home-made ORS preparation was as widely identified by caretakers as the salt/sugar solution. In addition, 23 of the 33 caretakers who reported they used salt/sugar solution since the training had chosen orange as an additional ingredient. The post-test results indicated that salt/sugar/orange solution was the most acceptable homemade ORS for the treatment of diarrhea among the caretakers tested in the pilot study.

Selection of an educational strategy. Based on pre- and post-test comparisons of caretakers' KAP, no definitive conclusion could be drawn as to the relative effectiveness of one strategy over the other. Since neither strategy was clearly superior to the other, it was concluded that both would undergo more rigorous testing in the field study phase.

FIELD TESTING THE PRELIMINARY FINDINGS

Study Design

A pre-test/post-test control-group experimental design was used for this study. Both experimental and control villages would be pretested and post-tested to allow the researchers to isolate the effects due to training from other effects.

After computing that a sample size of 190 was needed to detect an appreciable change in the KAP of caretakers, the researchers selected 15 villages, giving a sample size of 502. In the end, despite a high attrition rate, researchers were able to maintain a large sample size.

Socioeconomic data gathered from the village profiles and household surveys were used to rank the 15 villages, in descending order, according to their scores. They were then organized into three categories of five villages each. Within each category, one village was randomly assigned as a control. Of the four experimental villages in each category, the first two were paired and the last two were paired. Lastly, one village in each pair was randomly assigned "Face-to-Face Teaching" and the other village then became the recipient of "Group Teaching". In all, there were six pairs of experimental villages and three control villages. The purpose of the pairing was to allow comparisons between educational strategies while taking socioeconomic characteristics into account (Table 1).

Table 1. Ranking and pairing of study villages

Village Rank	Pair/Control	Educational Strategy	Village Population	No. of Caretakers
<u>CATEGORY I</u>				
Village 1	pair 1	face-to-face	356	46
Village 2	pair 1	group	679	91
Village 3	pair 2	group	371	60
Village 4	pair 2	face-to-face	360	48
Village 5	control	XXXXXXXXXXXX	411	62
<u>CATEGORY II</u>				
Village 6	pair 3	face-to-face	280	41
Village 7	pair 3	group	302	43
Village 8	control	XXXXXXXXXXXX	272	47
Village 9	pair 4	face-to-face	173	30
Village 10	pair 4	group	240	32
<u>Category III</u>				
Village 11	control	XXXXXXXXXXXX	133	14
Village 12	pair 5	group	265	49
Village 13	pair 5	face-to-face	136	20
Village 14	pair 6	face-to-face	202	31
Village 15	pair 6	group	135	19

Pretest Study Findings

Pretest surveys of household socioeconomic characteristics were conducted in the fifteen study villages, with 502 caretakers who cared for 936 children five years old or less. The number of children per household averaged 2.46 while the number of children per caretaker averaged 1.86. The children were divided nearly equally by gender as well as between age groups 0-2 years and 2-5 years.

Inter-category differences reveal the highest literacy rate in socioeconomic Category II, 24.0 percent vs. 18.1 and 12.7 percents for Categories I and III respectively. While 57.0 percent of Category I obtained water from public wells, only 43.8 and 38.1 percents did so from Categories II and III. The latter obtained water primarily from streams, 48.6 and 61.9 percent respectively. The majority of caretakers in all categories were farmers (37.7 percent) and traders (28.3 percent).

In addition to the baseline surveys of the socioeconomic characteristics of the villages and households, the second half of the questionnaire was administered as a pre-test/post-test to gather data on the knowledge, attitudes and practices of caretakers with regard to diarrhea and oral rehydration therapy.

When caretakers were asked what they do when their child has diarrhea, 93.8 percent of caretakers send their child to the clinic and/or give country medicine. Only 1.4 percent responded that they gave an ORS when their child had diarrhea. When caretakers were asked more specifically what could be given during a diarrheal episode to make the child better, 42.6 percent said to send the child to the clinic, while 23.2 percent and 20.7 percent advised giving country and clinic medicines respectively; only 9.3 percent, or 47 caretakers, responded that some form of ORS could be given. Of those 47 who knew that an ORS could be given, 37 had never used any, 7 had given rice water, and only 3 had used a salt/sugar solution.

The 502 caretakers were asked what ORS they had ever used: 397 had never used any, 30 had used a salt/sugar solution and 64 had given rice water without salt/sugar. Six had given rice water with salt/sugar, one had given rice porridge with salt/sugar, and four had given rice porridge without salt/sugar. Nearly half of those reporting that they had ever used ORS reported doing so during the last diarrheal episode (n=46). Equal numbers of these used salt/sugar as rice water without salt/sugar; the use of salt/sugar was greater in Category I, while Categories II and III used the rice water more. Of the 23 caretakers who used a salt/sugar solution, seven added orange

Nearly three-quarters of all caretakers reported feeding rice (45 percent) and rice water (28.3 percent) to their children when they had diarrhea. Of the 69.3 percent who believed diarrhea could be prevented, the three most frequently identified methods of prevention included: send the child to the clinic 34.6 percent, give medicine 14.2 percent, and vaccinate 9.6 percent; 14.5 percent had no idea how to prevent diarrhea. While 484 or 96.6 percent of caretakers believed diarrhea could be treated, only one caretaker knew of ORT as a treatment for diarrhea.

Educational/Training Component

Three levels of training were required by the study: 1) training for the trainers of village volunteer workers; 2) training for the volunteer workers; and 3) training for the caretakers themselves. Each had its own set of learning and behavioral objectives, a knowledge component and practical activities. Training methods at each level included lectures, discussions, demonstrations, role-playing, and visual aids. Descriptions of the training program for each level follow.

1. Trainers of Trainers:

Five trainers with a minimum 12th grade education were selected to train the village level trainers. This group received their training from the study team. After a short pre-test they received 10 hours of instruction in 4 to 6 one and a half hour sessions, and were evaluated at the completion of their training.

2. Village Level Trainers:

Sixty seven village trainers from the 12 experimental villages were selected by their village chiefs and elders. After screening and orientation by the study team, the village trainers were randomly assigned to a trainer of trainers. They received 10 hours of training in 4 sessions, along with a pre-test and a post-test

evaluation. The study team visited the village trainers to ensure that they had been properly trained and to provide re-training when necessary.

Although the study team had hoped for similarity in the educational background of the village trainers, they ranged from school teachers to illiterates. While initially cumbersome, (since the prepared training folders were of no use to the illiterates, the pre- and post-tests had to be conducted orally, and it took a bit longer to train them), in the end this group proved to be very enthusiastic and just as capable of providing training as the literates.

3. Caretakers:

In the 12 experimental villages, the 502 caretakers were randomly assigned to village trainers. They were trained either Face-to-Face or in a Group depending on the educational strategy randomly assigned to their village. All were pre-tested and post-tested for their KAP with respect to diarrhea, dehydration, and ORT.

Having established through the pilot study that the salt/sugar/orange mixture was an acceptable ORS, and that both individual and group teaching strategies would achieve significant positive changes in caretaker knowledge, attitude, and use of ORT, the field study undertook to resolve two questions:

1. Which of the two teaching strategies would be most effective in increasing caretaker KAP?
2. Which of the two teaching strategies would be most effective in reaching caretakers?

RESULTS OF THE FIELD TEST

The Effectiveness of the Educational Strategies on Caretakers' KAP

Statistical analyses of changes in caretakers' KAP revealed that training, whether through individualized or group instruction, significantly increased the knowledge and attitudes of caretakers for all but two of the 14 key variables. (See Table 2 for definition of the KAP variables.) For these two variables (K.6, A.1), the pre-test scores were exceptionally high and there was, therefore, little room for improvement.

The twelve knowledge and attitude questions which showed post-test improvement were analyzed by educational strategy. Three responses (K.3, A.3, and A.5) showed a significant superiority of Face-to-Face over Group training, and seven other responses showed a superiority (although not statistically significant) of the Face-to-Face over the Group training. Only two questions (K.1 and A.4) showed Group results superior to the Face-to-Face results, but in both cases test statistics indicate that the differences may be due to random error. In one case (A.4) the difference was zero.

Owing to a very low incidence of diarrhea between the pre- and post-tests, caretakers from all three categories of villages and both educational strategies were asked to demonstrate the preparation of the salt/sugar/orange solution. No significant difference was found between the educational strategies in the caretaker's ability to prepare the ORS.

Although the data appear to point in the direction of greater effectiveness of the Face-to-Face instruction, as in the pilot test the results are hardly dramatic. Apparently either educational strategy was virtually equally useful under the conditions of this study.

In the control villages pre-test and post-test comparisons of responses revealed no significant changes. Therefore, the differences in responses in the experimental villages can be attributed entirely to the training.

Table 2. Definition of KAP variables

Knowledge:

- K.1 Knowledge of what diarrhea is
- K.2 Knowledge of the causes of diarrhea
- K.3 Knowledge of the effects of diarrhea
- K.4 Knowledge that ORS must be given to child when child has diarrhea
- K.5 Knowledge of the symptoms which indicate that diarrhea has become worse
- K.6 Knowledge that when diarrhea does not stop child should be sent to clinic
- K.7 Knowledge of the correct ways to prevent diarrhea
- K.8 Knowledge that the correct way to treat diarrhea is to give child ORS
- K.9 Knowledge that diarrhea causes dehydration

Attitude:

- A.1 The belief that diarrhea can cause serious illness
- A.2 The belief that diarrhea can kill
- A.3 The belief that diarrhea can be prevented
- A.4 The belief that diarrhea can be treated
- A.5 The belief that diarrhea is one of the most common childhood diseases

Practice:

- P.1 Preparation of salt/sugar solution by caretakers
-

The Role of SES on the Effectiveness of Alternative Training Strategies

When the answers to the KAP questions were ranked and aggregated, Category I ranked highest followed by Category II, and lastly by Category III, which is consistent with the rankings based on the SES obtained from the village profile and socioeconomic household survey.

Because of this apparent relationship between village SES and village KAP, it was important to ascertain whether, in assigning villages within an SES category to an educational strategy, any SES bias had been introduced which might have affected the relative effectiveness of the two strategies in increasing caretakers' KAP.

Accordingly, the experimental villages were grouped by educational strategy received, and the groups examined for differences between them in five SES variables thought to have the greatest probability of influencing KAP. These variables included religion, employment, literacy, marital status, and the availability of a standard ORS container (i.e., a coke bottle). With the

exception of religion, no differences in SES were found between the groups of villages receiving the two educational strategies.

When the SES characteristics of caretakers in each of the pairs of villages were compared, it was observed that employment, marital status and availability of a coke bottle were characteristics possessed at the same level by caretakers in all pairs of villages. In two pairs of villages significant differences were noted in the literacy rates. However, in one pair it was higher for the face-to-face village, while in the other pair it was higher for the group taught village. Thus the possibility existed that one pair offset the other.

Nevertheless, it was important to ascertain whether the literacy rate of caretakers was correlated in any significant way with their learning ability. The data were investigated under two scenerios: (1) for all caretakers within each of the educational strategies, and (2) for all caretakers combined. The findings supported the conclusion that literacy rate was not correlated with the learning ability of caretakers. Therefore, since the literacy level of caretakers was used here as a proxy for SES factors, the researchers concluded that the effect of the educational strategy employed would not have been biased by SES characteristics of the caretakers or villages assigned to the two strategies.

The Advantages of Training Caretakers with the "Group" Strategy

Only 79 percent of the caretakers completed the entire set of sessions with the village trainer. The drop-out rate for Face-to-Face villages was 23.1 percent, while that for the Group villages was 18.9 percent, a statistically significant difference.

Village trainers reported several problems that they felt contributed to the disappointing participation rate and the high drop-out rate observed in the study:

1. The focus of the training was not on topics that caretakers perceived as more important than ORT.
2. The training was undertaken during farming season when most villagers were away at their farms all day, returning tired, late in the evening.
3. The time of day when training was held was often inconvenient.

Those assigned to train groups found that it was difficult to assemble the planned six or more caretakers for training sessions, so smaller groups of two, three, or four were used, requiring them to conduct more training sessions to train all the caretakers. On the other hand, village trainers found it discouraging to try to arrange for individual sessions for each of the caretakers assigned to them, particularly as relatively more of these caretakers were declining to continue their participation.

Since the group strategy was more effective in retaining participants, more efficient for the trainers, and very nearly as effective in improving the KAP of participating caretakers, the researchers concluded that group training offered considerable advantages to a program using village volunteers.

CONCLUSIONS

Based on the pilot study results, the researchers concluded that the salt/sugar/orange solution was the most acceptable homemade ORS for treatment of diarrhea in rural Liberia.

Irrespective of the educational strategy used, significant positive changes were observed in the knowledge and attitudes of caretakers.

The Face-to-Face educational strategy was found to be slightly superior to the Group strategy for its effectiveness in increasing knowledge and attitude scores. However based on the numbers of caretakers receiving training, better coverage may be achieved by training caretakers using the "Group" strategy than the Face-to-Face strategy. Since the difference in knowledge and attitude scores achieved by the two methods was slight, researchers concluded that the Group strategy would yield overall greater effectiveness.

Based on these findings, PRICOR researchers recommended that:

- A nationwide health education project on diarrhea and oral rehydration therapy using the salt/sugar/orange solution should be instituted in Liberia.
- As the educational strategies are of approximately equal effectiveness, the particular strategy should be selected with an eye to achieving maximum coverage.

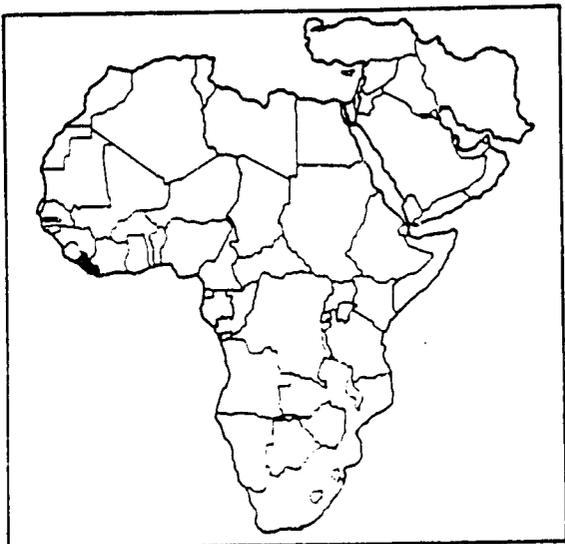
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This study was conducted from September 1984 to March 1985 under the auspices of the Department of Public Health and Preventive Medicine of the A. M. Dogliotti College of Medicine, at the University of Liberia. This summary is based on the final report of the study prepared by Dr. M. K. Galakpai, K. Bentsi-Enchill, and J. K. Atta. Further information is available from the principal investigator, Dr. M. K. Galakpai, or from K. Bentsi-Enchill, or J. K. Atta at the Department of Public Health and Preventive Medicine, A. M. Dogliotti College of Medicine, University of Liberia, Monrovia, Liberia, or from Dr. Jeanne Newman, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

TESTING THE EFFECTIVENESS OF ADOLESCENTS AS HEALTH PROMOTERS IN LIBERIA



Researchers from Cuttington University College (Liberia) and Tuskegee University (Alabama, USA) addressed problems posed by the lack of formal health services and health workers in some areas of Liberia through an operations research study. The researchers recognized that many of the tasks that Liberian adolescents perform in their daily lives are health-related and that adolescents might be trained to serve as health promoters in their communities. The purpose of the PRICOR study was to develop a health education curriculum for adolescents based on their traditional tasks and on the existing community health problems. The study was conducted in four

communities of Bong County, Liberia, from 1984 to 1986.

In 1982, Liberia had an estimated population of over two million with a life expectancy of 52 years. The crude birth rate was 45.4 per 1,000 population and the infant mortality rate was 134 infant deaths per 1,000 live births. The health problems that contributed most significantly to national morbidity and mortality rates included: malaria, diarrhea, respiratory diseases, measles, tetanus, and parasitic diseases. These diseases are easily spread among the population because of poor hygiene, inadequate sanitation, malnutrition, and the unavailability of potable water.

The PHC program of the Liberian government includes community outreach efforts, such as mass vaccination campaigns, malaria control, maternal and child health (MCH) services, and the construction of both drinking water wells and latrine pits in rural areas. The government cannot, however, afford a comprehensive low-cost national primary health care (PHC) system for the rural areas. The PHC facilities and manpower that do exist do not offer adequate coverage of the population. For example in Bong County, there is one doctor for every 15,385 people, one registered professional nurse for every 5,405 people, 1 licensed practical nurse for every 5,263 people, and 1 auxiliary worker for every 1,905 people.

Given the paucity of health care facilities and human resources, community health education becomes an imperative. The Ministry of Health (MOH) and the Ministry of Education (MOE) have revised the elementary school curriculum to

include health, agricultural, and industrial arts topics. This new curriculum has been implemented in schools located in Monrovia, the capital. As it stands, health education curricula have not been introduced in the rural schools, which are attended by 80 percent of Liberian children.

The PRICOR researchers recognized that adolescents in rural communities are a valuable human resource for spreading health education messages to their families and other villagers. Initially, the researchers had envisioned that health workers could teach adolescents how to promote health in their communities. Upon further consideration, however, they decided that the number of health workers was too limited and that those who existed were too busy providing health services and supervising other workers to take on the health education for adolescents as well. Next, the researchers considered having school teachers work with the adolescents. This option had several advantages. Teachers were already in the schools, they had daily contact with adolescents, and they had knowledge of local customs. For these reasons, school teachers and principals were selected to teach the adolescents. Thus the objectives of the operations research study were to (a) identify ways in which adolescents' traditional roles can be extended to include activities which would positively influence community and family knowledge, attitudes, and practices (KAP) related to the prevention of selected health problems, (b) develop a health education curriculum for adolescents based on existing community health concerns and on adolescents' traditional tasks, and (c) test the health education curriculum in selected schools of Bong County.

ANALYZING HEALTH CARE NEEDS AND TRADITIONAL ADOLESCENT TASKS

The researchers were faced with the problem of how to educate adolescents in community health promotion. Their analysis of this problem began with a review of existing health statistics compiled by the Government of Liberia. The study team discovered that they would need additional data in order to determine the health care needs of the community and the traditional health-related tasks of adolescents. Specifically, the researchers needed data on community perceptions of prevailing health problems, community experiences with diseases, environmental sanitation practices, and traditional tasks of adolescents in their homes and communities.

Before gathering this data, the researchers scheduled community meetings in each of the study villages to describe the study, answer questions, and address any hesitations that the communities might have had. The communities stipulated that the survey information not be supplied to the Ministry of Finance and that the secret societies based in the villages not be studied. After four communities had agreed to participate, the research team began preparations for a household survey.

The study team developed an instrument for surveying households in four target communities. Three hundred and twenty families were interviewed. Major health problems cited by the respondents included: malaria, worms, diarrhea/vomiting, insect bites, measles, lice, pneumonia, and eye/ear infections. With respect to environmental sanitation practices, most families said that they procured their water from wells and stored it in a covered container, but that they did not boil or filter the water before drinking it.

Over sixty percent of the households reported having pit latrines. (See Table 1.) The most common adolescent tasks were reported to be cooking, cleaning the home, cleaning yards and surrounding areas, washing clothes, fetching water, and disposing of wastes.

Table 1. Environmental health practices

<u>Variables</u>	<u>Responses</u>		
	Percent Yes	Percent No	N
Do you agree that using clean water can prevent illnesses?	97%	3%	318
Do you store water in covered containers?	93%	7%	320
Does drinking water come from a well?	86%	14%	320
Does family have a household pit latrine?	60%	40%	320
Does family use bush for toilet?	59%	41%	320
Does drinking water come from a pond?	38%	62%	320
Do you use a pit for garbage disposal?	29%	71%	320
Does family use a communal pit latrine?	21%	79%	320
Do you burn your garbage?	16%	84%	320
Do you use compost for garbage disposal?	11%	89%	320
Does family use stream for toilet?	11%	89%	320
Do you bury your garbage?	5%	95%	320
Does drinking water come from river/stream?	4%	96%	320
Do you boil water before drinking?	3%	97%	320
Do you filter water before drinking?	2%	98%	320

DEVELOPING A HEALTH EDUCATION CURRICULUM FOR ADOLESCENTS

The next task for the researchers was to take the information gathered from the community survey and use it to develop an educational program for adolescents which would encourage them to become health promoters in their communities. The study team identified six issues which needed to be resolved: (1) what health education modules (topics) will be taught, (2) who will teach the modules, (3) which adolescents will be taught the modules, (4) how the modules will be taught to trainers and adolescents, (5) where the modules will be taught, and (6) when the modules will be taught. A project advisory committee, composed of officials from Cuttington University College, the Ministry of Health (MOH), the Ministry of Education (MOE), and the local health system, worked with the researchers to answer these questions and to develop the training program.

What Will Be Taught?

Frequently occurring health problems and typical adolescent tasks had been identified through the household survey. The researchers brainstormed in order to identify additional health problems in the communities and other tasks that adolescents could perform to prevent the major health problems. The researchers then reviewed literature on the control and management of communicable and tropical diseases and identified tasks that would help to prevent those diseases. An interaction matrix was constructed which matched adolescents' traditional tasks with the disease prevention tasks which had been identified.

The project advisory committee then met to further discuss the health problems in the communities and possible health-related tasks for adolescents. Members of the committee identified some additional important major health problems which the villagers had not felt were important, such as poor oral hygiene, accidents, and poisonings. The committee was then asked to rank the list of health-related tasks generated by the researchers and the advisory committee in order of importance using the nominal group technique. Table 2 lists some of the health-related tasks in order of descending priority. Opinions were elicited on these tasks and the type of training necessary to get adolescents to perform them.

Based on these discussions between the project advisory committee and the researchers, a modified group decision process was followed to choose the health education modules that would be included in the curriculum for adolescents. The following six modules for adolescents were selected and subsequently designed by the research team:

- (1) oral hygiene,
- (2) nutrition/oral rehydration therapy (ORT),
- (3) skin diseases,
- (4) accidents and poisons,
- (5) intestinal diseases, and
- (6) malaria/germs.

Table 2

<u>Priority Level</u>	<u>Task</u>
1.	Providing first aid and/or referrals for poisoning cases; Promoting proper breastfeeding; Digging and properly using latrines; Practicing good personal hygiene; Procuring, storing, and preparing food properly; and Collecting, storing and using clean water.
2.	Providing referrals in case of illnesses; Providing first aid and/or referrals for accident victims; and, Providing a balanced diet for the family.
3.	Digging and properly using waste disposal pits; Keeping household articles clean; Avoiding contacts that cause infections; and Preparing and administering oral rehydration solution.
4.	Keeping household pets and other animals healthy.
5.	Managing skin infections; and Identifying dangerous areas in the home or community.
6.	Taking precautions with plants, insects, and animals; and Using insecticides.
7.	Identifying poisonous items.
8.	Preparing and administering antidotes for poisons.

Who Will Teach?

In each school, the team decided to select the 6th grade teacher, the principal, and one lower grade teacher. Two PHC workers from a nearby hospital also participated in training the adolescents. It was decided that the teachers would receive a small monetary bonus for participating in the training and spending extra hours teaching the health modules.

Which Adolescents Will Be Taught?

After much discussion and debate, the study team decided to work with students in grade six, which is the highest level of the village schools. The average age of students in grade six is 16-17 years and few students go on to higher education. The researchers felt that adolescents at that level were knowledgeable about local health problems and capable of understanding the health curriculum. Moreover, they were old enough to have reasonable credibility with adults in the village.

How Will the Modules Be Taught to the Trainers and Adolescents?

The research team decided that the school teachers and the two PHC workers would be trained in two workshops which would cover the six health education modules and three special teaching modules. The teaching modules were on understanding adolescents, classroom organization and management, and monitoring the progress of adolescents. The modules would be taught to the trainers using the lecture/discussion approach. Trainers' comprehension of the new material would be gauged by administering and comparing pre- and post-test scores for each module.

The approach developed for teaching the adolescents was basically the same as that developed for the trainers. The researchers determined that each module would take two 45-minute class periods to teach. For each module, the teachers would introduce the new material, administer a pre-test, teach the module using lectures and demonstrations, and administer a post-test. Two researchers would supervise the teachers in these activities during weekly visits to the schools.

Where Will the Modules Be Taught?

The study team developed criteria for selecting the schools where the new curriculum would be tested. Because of budget and time constraints, it was decided that (1) the schools would be located in Bong County within a 25 mile radius of the Cuttington University College campus, (2) the communities should agree to participate in the project, and (3) both public and private schools should be included in the test sample. They also specified that the sample should include both schools near Liberia's main paved highway and schools remote from the highway. Based on these criteria, four schools in Bong County were selected to participate in the field test: (1) G.W. Gibson Elementary and Junior High School in Sinyea, (2) Taylor-Ta Elementary and Junior High School in Taylor-Ta, (3) David Fejue Elementary and Junior High School in Gbatala, and (4) Suacoco Elementary and Junior High School in Suacoco. All of the schools are public except for Taylor Tawn, which is sponsored by the Methodist Church.

When Will the Modules Be Taught?

The research team and MOE personnel agreed that the modules should be taught during the 1985 national academic school year.

Refinement of the Module Content

After developing the general design of the solution to be tested, the researchers decided that they needed more data on health behavior and environmental conditions in the four communities in order to refine the health modules. As a first step, a research assistant lived in each of the four communities for seven days in order to observe health and environmental sanitation practices directly. Following this observation period, the research assistants surveyed 80 families plus such strategic informants as traditional healers, bonesetters, and TBAs.

The results of this survey were similar to those of the larger survey conducted for problem analysis. Families from all four communities saw malaria and diarrhea as major health problems. Accidents and poisoning were generally not seen as health problems. Most families in the study communities went to Phebe Hospital and health clinics when they needed health care services. Few families utilized herbalists, bonesetters, or midwives. Most families procured water from wells, although families in two of the communities also got water from ponds. Families in only one community disposed of their garbage in garbage pits. This community-specific information was also used later to evaluate the effects of the training programs in the different communities.

IMPLEMENTATION AND EVALUATION OF THE HEALTH MODULES

Thirteen school staff members (teachers and principals) from the target schools and two PHC workers attached to the nearby Phebe Hospital had been selected to participate in the teaching of the health modules. They were trained in two workshops, the first of which lasted five days and the second of which lasted two days. Based on the improvements from the pre- to the post-test scores, the researchers felt that the trainers sufficiently understood the content of the modules. During these training workshops, the teachers, principals, and PHC workers also revised the health modules developed for the adolescents.

The modules were taught to 116 adolescents in the target schools between April and November of 1985. The first four modules were taught during the period April through June and the last two were taught between mid-September and November. Each day before a module was taught, the trainer gave the adolescents a module booklet and introduced the topic. Next the teacher administered the pre-test to determine students' baseline knowledge of the module. The trainers then taught the module using lectures, discussions, and demonstrations. The adolescents themselves did not participate in the demonstrations (as had been hoped) because of time constraints. If a module could not be taught within the recommended two class periods, teachers used additional class periods. Members of the research team supervised the teachers and principals in teaching the health education modules.

After each module had been completed, the teacher gave the students a post-test. At the end of the training program, students were also asked to write essays detailing what, if anything, they had done differently since learning the new material. Pre- and post-tests scores and the essays were analyzed by the research staff.

Student Performance in Class

As would be expected, the average student scores on all the health modules increased between the pre-test and the post-test. Upon analysis, the researchers found that the biggest improvements tended to be made by older male students and by students at the Taylor-Ta School. Because there were noticeable age, sex, and school differences on the pre-test scores, it was necessary for the researchers to include pre-test scores as a covariate in an analysis of the main effects of age, sex, and school on pre-test/post-test differences. This analysis showed that all students increased their knowledge

by about the same amount, but older male students were more knowledgeable both before and after they were taught the health modules. Age was not a significant factor in any of the modules, sex differences were only significant for the skin diseases module, and school differences only remained significant for the malaria/germs module.

Changes in Health Practices at Home and in the Community

After the training program had been completed, a small scale survey was conducted in the four target communities by the co-principal investigator, a PRICOR staff member, and an interpreter to determine any actual changes in health practices. This survey was limited in size because school was no longer in session and most families were out working in their fields. The survey team interviewed 12 students who had attended the health classes, 11 parents of these students, and 9 teachers who had taught the curriculum.

Eleven students stated that they were carrying out new health activities, specifying such tasks as: washing clothes frequently, using fresh water for washing dishes, clearing bushes near the home, taking out the garbage, referring people to Phebe hospital, and using latrines. Nine of the eleven parents, interviewed separately from their children, reported that they had received health advice from their children. The most common type of advice reported was on ORT. Eight teachers reported seeing their students applying lessons from the health modules. They had observed the students promoting ORT, treating snake bites, promoting good hygiene, participating in health promotion efforts on market days, and presenting health plays. One of the principals reported having been treated for a snake bite by one of the students. Although many of the accounts are anecdotal, it appears that these children have translated their new health care knowledge into practice.

CONCLUSIONS AND RECOMMENDATIONS

The overall results of the study indicate that the training program had a positive impact on the health knowledge and behavior of the adolescents who participated in the health classes. The students improved their scores on the post-tests and those included in the small survey were carrying out new health activities in their homes and communities.

Based on their experiences in implementing this program, the researchers made the following recommendations:

- Health curricula for adolescents should be designed with their traditional activities and level of comprehension in mind.
- Practical demonstrations should be included in health modules for adolescents.
- Both male and female adolescents should be encouraged to perform health tasks in the home.
- The health curriculum developed in the PRICOR study should be incorporated into the national school curriculum.
- The Ministries of Health and Education should continue efforts to involve adolescents in the promotion of good health.

These recommendations were presented to the Ministries of Health and Education. The MCE has expressed interest in adopting the curriculum used in the PRICOR study for the national curriculum plan. The major constraint to its adoption is the lack of funds for refining and implementing the new health education curriculum.

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This study was conducted from April 1984 to March 1986 by Cuttington University College in Monrovia, Liberia and Tuskegee University, Alabama, U.S.A. This summary is based on the final report by Janet Moore and Paul Wall. Further information is available from principal investigators, Ms. Janet Moore, Cuttington University College, P.O. Box 277, Monrovia, Liberia or Dr. Paul Wall, Carver Research Foundation, Carnegie Hall, Tuskegee University, Tuskegee, Alabama 36088, or from Dr. Jeanne Newman, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

COMMUNITY FINANCING OF HEALTH CARE IN PERIPHERAL AREAS OF MALI



In response to the increasing challenge of maintaining primary health care (PHC) coverage in the rural areas of Mali, the Planning Director in the Ministry of Health and Social Affairs (MOH) conducted an operations research (OR) study which developed financing strategies for the most peripheral levels of the national health system. Research for the project was carried out in the Koro and Kita provinces, with policy guidance from members of the "Comité d'Orientation et de Coordination des Etudes et Programmes Socio-Sanitaires" (COCEPS), which is responsible for health care research in the MOH. The purpose of the study was to

develop a list of priority PHC interventions for implementation at the village level, and to propose financing strategies to cover the recurrent costs of these activities.

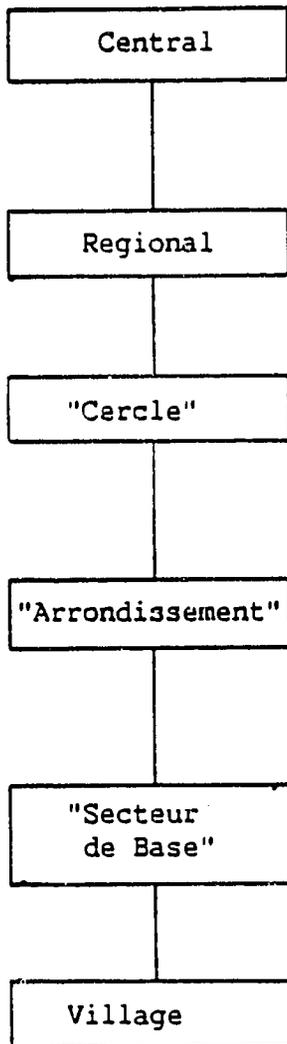
HEALTH CARE IN MALI

A serious challenge to health planning in developing countries is the maintenance of PHC programs once they have been established, since government and foreign donor sources can often only provide start-up costs. Mali is a particularly appropriate country to study; 80 percent of its eight million people live in rural areas with limited access to the most basic PHC programs. As Mali seeks to expand its public health programs to the most peripheral level of its health care 'pyramid' (Figure 1), it is faced with the development of strategies to maintain those services once begun.

Mali's public health system contains six levels of program activity, each with inter-related and complementary functions. Figure 1 shows the components of this pyramid, as envisioned in the future and as are presently in place.

Since the MOH is currently only able to support health care down to the district level, services at the village and village-cluster levels are dependent on outside or local sources of funding. This PRICOR study, which was built upon existing projects in the provinces of Koro and Kita, benefited from the experience of the previous projects, and took the projects the next step toward realizing their financing objectives.

Figure 1. Health coverage pyramid in Mali



The Central level contains a network of national hospitals offering specialized medical care, research facilities, and the central governmental health administration.

The Regional level includes a network of regional hospitals offering general medical services, and contains the regional sanitational administration responsible for most health infrastructure projects.

The "Cercle", or province, should have at least two doctors and should be able to offer general medical services as well as surgery and maternity services. There should be a pharmacy and a capacity for in-patient services.

The "Arrondissement", or district, should have a drug dispensary and a maternity ward. Each district should be directed by a registered government nurse. This is the lowest level of health delivery directly served through the Ministry of Health.

The "Secteur de Base", or village cluster, is a group of 5 to 10 villages which should have access to a local maternity clinic, and have at least one CHW and one TBA supervisor ("matrone"). It is up to the local village federation or school organization to organize and fund any health services at this level.

The village level generally has no formal infrastructure, but should have at least one CHW and one TBA, and a clean source of water. Most villages do not have these basic components.

Koro Province. A USAID-funded rural health delivery project had been testing whether health coverage could be funded at the district level for \$3 per capita. The conclusions from this project were that a program could be set up at this level of funding if recurrent costs, regional staff and technical assistance costs were provided from other sources. What had not been examined in this project, however, was how to generate the per capita costs at the district level. An evaluation of the USAID project mentioned several operational problems to be taken into account for future health delivery efforts:

1. There had been significant attrition from the original group of CHWs trained during the USAID project, indicating a need to increase the incentives for trained CHWs to continue in service.
2. Local dispensaries' stocks were often empty, had not been restocked since program startup, and frequently the money from previous drug sales was no longer available.
3. Remaining CHWs had forgotten some of their training, most significantly about appropriate dosages to prescribe for key illnesses, and no refresher training had been provided for in this project.

Kita Province. Districts in the Kita province were chosen because they had been the sites of a rural sanitation project which was providing villages with clean water sources. A fee-for-service model was also being tested in this area, which sought to recover the costs of medical supplies, heating fuel, gasoline and other service-related consumable items. This project model depends on outside sources for startup and administrative support, and did not include village cluster and village level services.

STUDY PROBLEM AND OBJECTIVES

The framework of the PRICOR study consisted of a five-part research process in two phases: problem analysis and solution development. The third phase of OR, solution testing and validation, was not in the scope of this study.

The Problem Analysis phase involved (1) identification of priority PHC activities for the village and village-cluster levels; (2) determination of the most viable implementation strategies for priority activities; and (3) identification of the recurrent costs of these activities.

The Solution Development phase involved the development of solutions for recurrent cost recovery, and the presentation of solutions to village leaders for evaluation and possible implementation.

PROBLEM ANALYSIS

The research team began the study with a review of PHC services and the related project documentation. They interviewed leading health professionals, along with village and district leaders, to gather data for the problem

analysis. Further information was gathered from two surveys which were implemented in villages in the Provinces of Kita and Koro. The first was a survey of village leaders from 60 randomly chosen villages (30 from each province); the second was a survey of 1800 family and household heads in the 60 villages. Both surveys contained questions about health needs, status of existing PHC services and supplies, current and suggested methods of paying for health care, methods of paying CHWs and TBAs, household economic data and attitudes towards PHC programs. The results of this data collection enabled the team to gain a better understanding of the health and economic profiles of the communities for which financing strategies were to be developed.

Findings of Survey Questionnaires

Community financing of health care in a Malian village is complicated by the economic structure of the family unit, and by the fact that many farming families are only able to farm at subsistence levels, leaving little or no disposable income for other necessities. The priority expenditures of a typical family unit are food, health and taxes in order of magnitude.

Eighty percent of the respondents in Koro said that they consume more than what they grow, largely a result of the continuing drought conditions in that part of the country. As such they are severely limited in their ability to contribute to health care. Farmers in Kita are more fortunate because they are able to grow peanuts as a cash crop, and showed only four percent of their farms at subsistence levels. Most families consist of several households (75 percent in Koro and 68 percent in Kita contain two or more households), with the younger brothers or sons acting as head of the family. Most often the family members collectively work the family farm (80-88 percent), with the majority of economic decisions controlled by the family head. Individual health-related expenditures are usually paid for by the family head (70-71 percent), or by the household head (7-10 percent). Most of the respondents complained of this system, and expressed interest in a more flexible method which would leave the individuals free to seek their own health care.

There were large differences in response to questions about knowledge of health services in the two districts, largely because Kita had not had health teams working in the villages prior to the survey.

Table 1. Knowledge and understanding of services

	<u>Koro</u>	<u>Kita</u>
Vaccinations	93%	59%
CHW Services	72%	27%
Maternal/Child Care	89%	56%

There is apparently no formal method for the payment of CHWs and TBAs at the village levels. Most CHWs responded that they do not receive anything from the villagers for their services, while the TBAs may receive some in-kind remuneration for helping with childbirth. Koro leaders reported that roughly 80 percent of the costs of drugs and supplies from the district dispensary are "theoretically recovered", while only 50 percent are recovered in Kita. The researchers are quick to point out that these funds are often not recovered, so that the district level dispensaries are frequently forced to rely on favorable administrative or political actions in order to resupply their stocks. Since these stocks are distributed at the district level, the distribution of drugs and supplies to village cluster and village level health workers is likely to be even less reliable.

Identification of Priority Activities

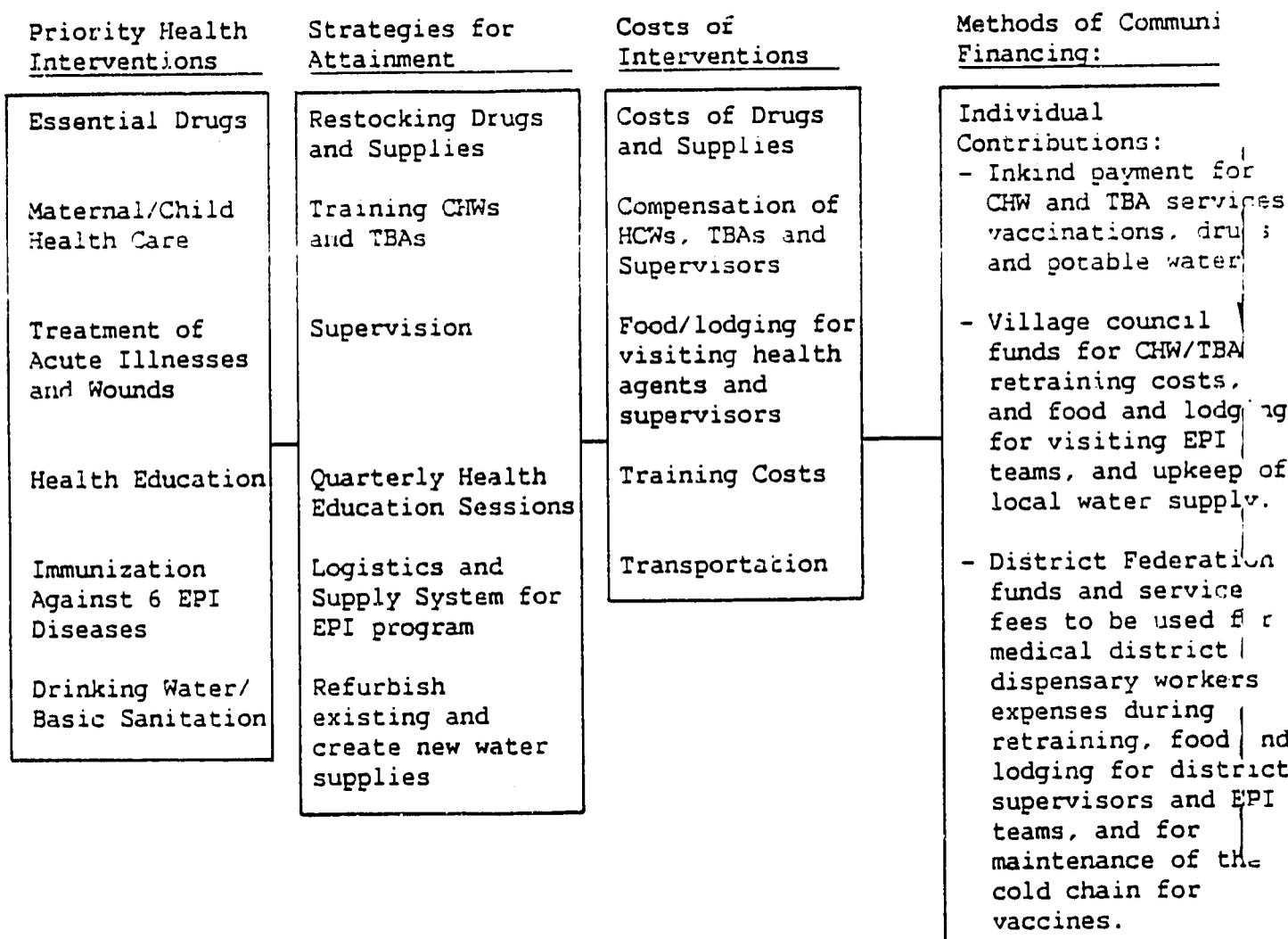
Based on the responses from the surveys and from consultation with the COCEPS advisors, the research team developed a list of six priority PHC interventions and ways to implement them:

1. Basic drug supplies for village pharmacies.
Village pharmacies are to be restocked and replacements of their stocks are to be provided for from local sources.
2. Maternal and Child Care.
At least one TBA is to be trained for each village and one TBA supervisor installed for each village cluster. The TBAs are to be retrained once a year by the supervisor.
3. Treatment of acute illnesses and wounds.
At least one CHW is to be trained per village, and one nurse/supervisor to be provided for per village cluster. CHWs are to be retrained once a year.
4. Health education.
The chief nurse of the district dispensary is to hold quarterly health education sessions in each village.
5. Immunization against the six EPI diseases.
A refrigerator and a stock of vaccines and supplies is to be provided in each district, including a motor bike for the vaccinator. A regular and well publicized routine of vaccination sessions is to be established in all villages.
6. Access to drinking water and basic sanitation.
Existing water sources are to be maintained or new ones provided for in each village.

The interventions are listed in order of chronologic priority for implementation, rather than in order of programmatic importance. Extra weight was given to interventions which would provide immediate health relief, and to maternal and child care, with the rationale that preventive programs such as health education and vaccination campaigns are more likely to be successful

once they are understood in relation to immediate curative health care. The researchers acknowledged that the long-term impact may be greater from the preventive programs, but felt that implementation and acceptance of PHC services would be easier if the more immediate health needs of the villagers were met first. Figure 2 summarizes the priority health interventions along with strategies for attainment, their associated costs, and proposed methods of community financing.

Figure 2. Community financing strategies for peripheral health coverage in Mali



PROBLEM ANALYSIS

SOLUTIONS

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SOLUTION DEVELOPMENT

Community financing solutions were developed for each of the priority interventions after program objectives were defined and recurrent costs were identified. The researchers cited a study of village health expenses by Jonathan Meyer which suggests that local use of modern medicine is price dependent, while use of traditional medicine is not. While the use of modern medicine is a function of income, it does not seem to be affected by length or cost of travel to obtain modern health care. These findings indicated a need to develop financing methods which would decrease the immediate burden of health expenses on the individual.

The research team, with the help of the COCEPS advisors, used nominal group technique to evaluate the survey findings and determine how each of the identifiable recurrent costs might be met at the local levels. Survey questions which dealt with attitudes about who should pay for which health-service-related costs revealed that the majority of respondents (particularly in drought-ridden Koro) felt that the government should pay for most health services. There was, nonetheless, significant support for the financing of drugs, food and lodging, vaccines and retraining costs by communities. Sources for local funds were split into three categories:

1. Individual contributions, which would generally be for direct services and unit costs of medicines or treatments;
2. Community (village) funds, which would be used for costs that were community wide in nature, such as the costs of retraining CHWs and TBAs, food and lodging for visiting health teams, and maintenance of the village water source; and
3. Funds collected by district level health workers as fees for services, which would be used to cover expenses related to the maintenance of the cold chain for vaccines, and food, lodging, and transportation for district supervisors and vaccinators.

Strategies for Cost Recovery

The research team developed alternative methods for generating each category of recurrent cost, and used a group scoring method to choose the best solutions. Each alternative was evaluated and scored according to its viability, acceptability, and the degree to which it encouraged the use of each related health service.

Restocking village pharmacy. Two alternatives were considered; alternative A involved individuals paying a replacement cost price which would include the costs of transportation and unit costs of supplies used in treatment such as cotton swabs, alcohol and mercurochrome. Alternative B involved payment of all replacement costs through a "community chest" maintained by the village council, and was rejected because it was likely to be a cumbersome management and accountability task.

Payment of TBAs and CHWs. Several alternatives were considered including a fee-for-service scheme and payment of a salary out of the community chest. The third alternative involved mandatory in-kind remuneration of the worker's services which could take any form, including barter or reciprocal services. This idea was favored because it did not involve an exchange of money, to which few villagers have ready access.

Retraining costs of CHWs and TBAs. These involved the costs for food, lodging and transportation, and were to be paid for out of the community chest. They would be managed by the village council, since it is only a once a year event, and represents a collective need rather than an individual one.

Payment of village cluster health agents. Fees for services were rejected since these agents perform a wide variety of functions which are not easily isolated for payment. It was decided that salaries would be paid out of a district level fund to be generated either by an annual health fee or from village councils.

Retraining of village cluster health agents. These costs, similar to those of the village CHWs, would be paid for out of a district level fund similar to the scheme for retraining CHWs and TBAs.

Cost of vaccination sessions. These costs include food, lodging and transportation for vaccinators, maintenance of the cold chain, and the unit cost of vaccines. Food and lodging are to be taken care of by each village visited, and the other costs are to be paid for out of a district level fund managed by the District Council.

Maintenance of water supply and sanitation facilities. Consideration was given to payment of a unit price for water by each consumer, or to a monthly or quarterly fee collected by the village council from each household. This latter option was selected because it represents less of a management problem, and would guarantee free access to clean water by everyone in the village.

RESULTS

While the researchers were not able to test each of these alternatives during the course of the study, their recommendations were presented to leaders in both Kita and Koro with some promising results. The Development Council of the Province of Koro adopted many of the suggestions into its 1986 budget and is currently testing them. The measures adopted in Koro include (1) retraining 45 CHWs and 30 TBAs for the Central District; (2) funding for two district level nurse/supervisors; and (3) restocking of all village pharmacies

Villagers in the Kita Province have set aside collectively owned and worked fields which will be used to generate funding for a community pump-equipped well. Villagers will be encouraged to develop other creative ways of generating resources for their own health needs now that a dialogue has been opened between the provincial, district and local leaders regarding the division of responsibilities in Primary Health Care.

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This study was conducted from June 1984 through March 1986 by the Malian Ministry of Health and Social Affairs and the Comité d'Orientation et de Coordination des Etudes et Programmes Socio-Sanitaires. This summary is based on the final report of the study prepared by Dr. Mamadou Namory Traore, Dr. Adama Kone, Dr. Bagoureissy Tall, Ms. Rita B and Mahamadou Diarra. Further information is available from the principal investigator, Dr. Mamadou Namory Traore, Ministère de la Santé Publique et des Affaires Sociales, Mali, or from Dr. David Nicholas, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

A MARKET RESEARCH STUDY OF THE QUANTITATIVE AND QUALITATIVE ASPECTS OF THE MARKETING AND DISTRIBUTION OF ORAL REHYDRATION SALTS IN MEXICO



In July 1983, Promotora de Planificación Familiar (PROFAM), a Mexican nonprofit organization, conducted a market research study on the distribution and use of oral rehydration salts (ORS) in Mexico City and surrounding areas. PROFAM has been in operation since 1979 and has concentrated its activities on family planning and maternal and child health. A major activity has been the production, marketing, and distribution, under the trade name PROFAM, of inexpensive contraceptive supplies (pills, condoms, suppositories, foam, and cream) through private drugstores. Training in family planning and contraceptive methods has also been provided to drugstore personnel and other private sector drug retailers as a part of PROFAM's activities. In the context of its maternal and child health

program, PROFAM hoped to produce and distribute an inexpensive easy-to-use ORS tablet. The purpose of the marketing study was thus to determine how the public would receive such a product.

BACKGROUND

The 1980 census indicated that the population of Mexico was over 67 million. Life expectancy at birth for the period 1980-85 was estimated at 65.7 years. As in many other developing countries, diarrheal diseases are a major cause of infant and child morbidity and mortality. In 1981, the infant mortality rate was estimated at 34.5 per 1,000 live births. In 1982, the death rate from diarrheal diseases for children under one year of age was approximately 743 per 100,000 persons. Although major improvements have been made in the last 20 years, health care coverage is still unequally distributed and many people live in conditions marked by poor nutrition, unhygienic housing, and unemployment.

The use of oral rehydration therapy is being widely encouraged in Mexico to combat high infant and child morbidity and mortality from diarrheal diseases. ORS products in granule or tablet form are less expensive to produce than the traditional premixed liquid solutions. PROFAM was interested in producing and marketing an ORS tablet according to the World Health Organization formula and wanted to know if the public would find this product acceptable. Since drugstores are a popular source of ORS products, it was decided that a survey

of pharmacists would provide a relatively good measure of supply and demand for such products. The objectives of this survey were to: (1) determine the market distribution of ORS products, such as solutions, tablets, and granules; (2) determine the price, demand, and use of oral rehydration products sold in drugstores; and (3) elicit pharmacists' opinions on the acceptability of ORS tablets.

ANALYZING THE PRIVATE ORS MARKET

The researchers first reviewed an International Marketing Services (IMS) study of the private ORS market. This survey showed that the size of the private ORS market was about 350 million pesos, or approximately US\$ 2,333,333. Liquid oral rehydration products were the most prevalent. Pedialyte (liquid) manufactured by Abbot had the largest share of the market (61.0 percent) and Electrolite (liquid) manufactured by Pisa had the second largest share (26.4 percent). Other brands with much smaller shares of the market (1.6 to 3.6 percent) included Pedioral (liquid), Miel Karo (syrup), Solural (liquid), Glucolyn (powder), and Electrolite-C (liquid).

PROFAM contracted with a professional market research firm, Buró de Investigaciones de Mercado (BIMSA), to carry out the actual drugstore survey for the PRICOR study. BIMSA conducted a thorough market research study concentrating on drugstores in three regions of Mexico. A total of 116 drugstores were surveyed: 55 in Mexico City, 30 in the hot region, and 31 in the temperate region. At each site, the researchers interviewed the pharmacists on the subject of ORS. The questionnaire used in the BIMSA survey was pretested in Mexico City and in the temperate region by BIMSA and PROFAM's marketing department before approval for use in the PRICOR study.

Distribution and Sales

The BIMSA survey showed that ORS products were widely distributed in the drugstores studied. Ninety-nine percent of the pharmacists reported that they carried ORS in some form. ORS products are sold both with and without a doctor's prescription. Prices range from 110 to 141 pesos (US\$.73-.94) for 500 ml. (see Table 1). These products represent good sales volume and a fast rate of turnover for the drugstore owner.

Table 1. Average prices of ORS products

Brand	Volume	Price	
		Pesos	Dollars
Pedialyte	1000 ml	215.00	1.43
	500 ml	110.00	.73
Electrolite	1000 ml	244.00	1.63
	500 ml	141.00	.94
Solural	500 ml	121.50	.81

* at the July 1983 exchange rate 150 Mexican pesos = 1 U.S. dollar

Knowledge of Purpose and Correct Use

The majority of the pharmacists surveyed (67 percent) indicated that ORS are over-the-counter products and do not require a doctor's prescription. Most respondents (90 percent) said that they knew what oral rehydration salts were used for. When asked specifically, most pharmacists mentioned use for dehydration (47.3 percent), for diarrhea (16.2 percent), and as drinking water (16.2 percent). According to the respondents, the ORS products are mainly to be used to treat babies and children. As to the directions for use, there was considerable confusion in the minds of the pharmacists. Abbott was identified as the only manufacturer that occasionally provided the pharmacists with information on the purpose and the correct use of their ORS product.

Demand

The products with the highest demand in the study drugstores were identified as Pedialyte (75.4 percent), Solural (21.0 percent), and Electrolite (2.6 percent). The pharmacists reported that ORS products were usually bought by women to be used to treat babies and children. The demand for ORS was found to be seasonal. The times of highest demand were the spring (57 percent of answers) and the summer (42.1 percent of answers). The drugstore personnel felt that, in considering the needs of the population, the prices of the ORS products were generally too high.

Presentation, Packaging, and Form

When asked about what presentation and packaging of ORS products they preferred, 55 percent of the pharmacists preferred a glass bottle and 14 percent preferred a plastic bottle. Those preferences coincide with the current presentation of the products. A small percentage of the respondents felt that it would be desirable to add flavor to ORS products. Opinions about the utility of ORS tablets were mixed. On the one hand, many pharmacists felt that tablets would be easy for the customer to use and more economical than other ORS products. On the other hand, many pharmacists feared that use of contaminated water to dissolve the tablets would be a problem and that the tablets might be difficult to dissolve (see Table 2).

Table 2. Pharmacists' opinions of form of ORS products

Would the products sell in this form?	<u>Yes</u>	<u>No</u>
Tablets	57.9%	42.1%
Granules	64.8%	35.2%

Which presentation would be more suitable?	<u>% of pharmacists</u>
Tablets	33
Granules	48
No Opinion	19

BASING DECISIONS ON RESEARCH

Given the results of the survey, PROFAM decided not to manufacture ORS in tablet form for the Mexican market. This decision was made because (1) the survey showed no particular advantage to the consumer of the ORS tablets and (2) the cost of manufacturing tablets was higher than that of manufacturing packets of granules.

This PRICOR study determined that ORS solution is the biggest seller in the Mexican drugstores surveyed, even though it is relatively expensive. The pharmacists included in the study were of the opinion that oral rehydration granules would be preferable to tablets.

Therefore, instead of manufacturing tablets, PROFAM decided that, upon government approval, they would produce packets of ORS granules that can be dissolved in an eight ounce glass of water. The eight ounce glass was seen as a more convenient container for consumers than the one liter vessel required to dissolve the existing granule products. According to the market survey, granule packets are as well suited to consumer need as tablets, if not better. Since the granule packets are less expensive to produce than tablets, it made sense to choose the granule packets.

DISCUSSION

The PRICOR researchers were well aware that pharmacists' opinions are not the only factors that influence the acceptance and use of ORS products in the community. "We do not know for a fact that the consumer will accept a change in presentation. We are dealing with a product bought by young mothers to be given to their delicate babies. We do not know to what extent persuasion (degree of advertising commitment) is going to be necessary to have the consumer accept the change." Nevertheless, the pharmacists' opinions were seen as valuable, and they aided significantly in the decisionmaking process.

* * *

The study was conducted during July 1983 by Promotora de Planificación Familiar (PROFAM), a private, nonprofit Mexican association. This summary is based on a final report prepared by Ing. Luis de la Macorra. Further information is available from Ing. Luis de la Macorra, President, PROFAM, Apartado Postal 34, El Pueblito, 76900 Villa Corregidora, Queretaro, Mexico, or from Dr. David Nicholas, PRICOR study monitor (Chevy Chase).

Study Summary

PLANNED HEALTH SERVICES AND COMMUNITY NEEDS:
A MODEL FROM MEXICO FOR CLOSING THE GAP



In primary health care programs in many developing countries, discrepancies exist between the activities of community health workers as programmed and executed, and the specific needs and demands of the communities they are intended to serve. An operations research (OR) study seeking to improve the congruence of health workers' activities with local needs was conducted from May 1984 to March 1986 by researchers at the Coordinated Public Health Services of the State of Mexico (SCSPEM). This summary discusses the main findings of the study and its development of a solution to improve the setting of priorities and effectiveness of community health worker activities.

The State of Mexico, located in central Mexico and one of 31 states in the country, has characteristics representative of the entire country as well as other developing countries. Many of its nearly 10 million inhabitants are poor, living in urban marginal settlements or rural areas. They lack adequate sanitary conditions, public services and housing, and school and employment opportunities. Consequently, the health-disease profile still shows a high infant mortality rate, many preventable diseases, and a high incidence of morbidity and mortality due to respiratory and gastrointestinal infections and malnutrition. At the same time, degenerative diseases are on the increase.

The Coordinated Public Health Services of the State of Mexico is responsible for carrying out the national Health and Welfare Ministry's policies and activities in the state of Mexico. SCSPEM provides health care to about 60 percent of the state's population which is not covered by Social Security Institutions and cannot afford private doctors. In recent years special attention has been given to primary health care as the main strategy for addressing the health problems of the people being served.

As part of the overall primary health care plan, and in an attempt to extend health service coverage to previously unserved or under-served areas, the SCSPEM began to recruit, select and train community health auxiliaries (CHAs) in 1978. Currently there are approximately 1830 CHAs in the state carrying out basic preventive and curative health activities. Each worker is responsible for providing primary health care to approximately 3000 to 5000

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people in a health microregion, which is the smallest unit in the SCSPEM's decentralized structure. Services being provided by the CHAs include immunizations, family planning, health education, growth monitoring, prenatal care and treatment of acute respiratory infections and diarrhea.

In addition to the CHAs, the SCSPEM's human resources at the primary health care level include medical students, public health and clinical physicians, nurses and nurse auxiliaries. Of these various resources, the community health auxiliary is the member of the health system who makes the first contact with the community, and serves as the front-line primary health care worker within the community.

Although the work of the CHAs has been an important component in the State of Mexico's primary health care strategy, SCSPEM officials recognized that the activities of the health auxiliaries could be more closely linked with local problems, needs and priorities. Considerable geographical and cultural variation exists among the microregions which encompass rural, agrarian, indigenous, industrialized and urban marginal communities. Despite such variation in the socioeconomic characteristics of the communities, the CHAs were carrying out uniform tasks which were established at the central level. Moreover, the number of tasks which the CHAs are expected to carry out include some 146 separate activities, without clear designation of priorities among them. Overburdened with too many tasks and with no systematic way of organizing her time between them, the CHA does not meet her programmed targets and often does not adequately respond to the specific needs of her community.

The objective of this study, then, was to analyze the practices of the health auxiliary vis-a-vis the characteristics of the community where they work, and to develop and test a strategy for improving the congruence between health care services and communities' health needs.

ANALYSIS OF CURRENT CHA ACTIVITIES

The first phase of the research consisted of a problem analysis of the CHA's current practice to determine the nature and degree of incompatibility between auxiliaries' activities and the communities' needs and demands. Several techniques were employed for this phase. First, because the State of Mexico is very heterogeneous, a typology of the different communities was constructed to allow the investigators to group localities with similar socio-economic characteristics. Five community prototypes were developed: rural, indigenous, urban industrial, urban non-industrial and traditional industrial. All subsequent data collection activities were carried out using a sample of microregions stratified by prototype community.

A survey of 381 CHAs was carried out to better understand the actual practice of the auxiliaries. Descriptive information about the CHAs, their activities, perceived problems, and their contacts with other levels of the health system and with the community was gathered. To corroborate the self-reported activities, a "shadow study" of 38 CHAs was undertaken to observe over a three-day period the activities of CHAs in each of the prototype microregions. Finally, interviews with formal and informal leaders and public meetings were carried out in ten communities to discuss the findings of the survey and shadow study. In the public meetings, the nominal group technique was used to identify and rank the main problems threatening the health of the community.

The findings of these data collection activities confirmed the basic problem definition and provided a clearer picture of the aspects of the existing CHA program which can be improved. The shadow study indicated that of the 146 activities programmed at the central level for health auxiliaries, only 43 (29 percent) were actually carried out. However, some 47 other non-programmed activities were also observed, such as clerical and administrative tasks among CHAs that work out of health centers. The PHC activities that auxiliaries do carry out are essentially limited to maternal and child health and family planning, with little or no emphasis on control of communicable diseases, nutrition or community development.

The field observations of the CHAs also indicated that they can carry out, at most, only 8-10 activities per day. In rural and indigenous communities, their activities are further limited by the dispersion of houses and by the lack of transportation to reach some localities. Although coverage statistics are not available to show how many families in a microregion are actually reached by the CHA, observations of and discussions with the CHAs indicate that extending coverage is a major problem, given the large population of a microregion.

Another important objective of the problem analysis was to better understand the actual participation of the CHA in planning their work. According to the CHA's job description, they are supposed to prepare a map of their community and carry out a census to determine basic demographic and socioeconomic characteristics of the community. They are then to use this information in planning their activities. In reality, most auxiliaries do map their communities and collect data for some or most households. However, the value of this work for the CHAs' own planning is limited because they have not been trained to analyze or interpret this information; they simply collect the data and pass it on to higher levels.

When auxiliaries were asked how they currently planned their daily activities, two main factors were cited: established programming (i.e., from the central level) and time required (for travel to target population, to carry out the activity). Established programming was interpreted as those activities which were given priority by the Municipal Coordinator, a physician who is responsible for overseeing the activities of approximately two PHC units which may include 8-10 CHAs. In most cases, the priority activity areas were maternal and child health (particularly immunizations) and family planning. One result observed from focusing on these two activities was that CHAs would limit the purpose of their home visits to just one or two activities. Given the large number of homes that a CHA is supposed to cover, single purpose visits are not efficient and do not promote the delivery of comprehensive primary care. Also with regard to the time factor, it was noted in the survey of CHAs that 53 percent of the CHAs spend more than three hours a day in a health post or clinic, leaving little time for outreach activities.

Related to the lack of active participation on the part of the CHAs in the planning of their work was the problem of lack of regular supervision. There was no plan of sustained supervision for the CHAs. They received sporadic and indirect supervision from the medical students who were performing their obligatory social service in a PHC clinic, or an occasional visits from the Municipal Coordinator in their region. A small survey of these physicians and

medical students showed that they had little appreciation for the problems faced by the CHA in trying to carry out the excessive number of activities that have been programmed for them by higher levels in the health system. Neither worked with the CHAs to program their work in response to specific local problems.

The problem analysis concluded that CHAs were overburdened with too many tasks and that this prevented them from meeting PHC goals. Centralized planning and lack of training impeded them from responding to specific problems and concerns of their community. The existing mechanism for supervision and evaluation did not facilitate improvement of the CHAs' performance or effectiveness in carrying out activities. These findings pointed to the need for improvements in the planning of CHA activities to ensure that the health auxiliary's efforts would be more efficiently and effectively channelled towards problems of concern to both the health care delivery system and the community.

SOLUTION DEVELOPMENT

The solution strategy was to design and develop a model that addressed the problems detected in the problem analysis. The objectives for the model were to (1) decrease the number of tasks programmed at the central level to be carried out by the CHA; (2) involve the CHA in the planning of their activities; and (3) improve the compatibility between the CHA's activities and the needs and demands of the community. The process developed by the researchers for achieving this integrated approach to health service delivery was the microplanning process.

Microplanning is a process whereby the health auxiliaries assume an active role in programming their routine activities, with participation from the community and their supervisors, to identify, plan and implement actions to resolve local health problems. This process begins with the analysis by the auxiliary and the supervisor of community census information that the CHA has collected. This includes data on the number and size of the families, age distribution, educational level, access to water and sanitation and employment in the microregion. Understanding the relationship of this data and health problems in the community is the first step in directing the CHA's activities to meet community needs.

The next step in the microplanning process is to consult directly with members of the community to present information from the census and identify community members' perceptions of key health problems and their causes. This consultation may take various forms, such as public meetings (using techniques such as nominal group to list and rank problems), small group discussions, and conversations with formal and informal leaders. Through this direct exchange of information and views, the CHA and members of the community delineate a plan of action as to how they can jointly respond to the problems identified. The problems and actions identified then serve as the guidelines for the programming of weekly and monthly activities for the CHA, which will be done jointly by the health auxiliary and the supervisor.

FIELD TESTING THE MICROPLANNING PROCESS

The feasibility of the microplanning model was tested with a group of 10 CHAs representing four different prototype communities in the State of Mexico: three rural, two indigeneous, three industrial and two urban non-industrial. The study team had originally proposed that the researchers themselves carry out the training of the CHAs and their supervisors. However, the Director of SCSPM decided that the replicability of the microplanning training strategy would best be ensured if the researchers trained the supervisors (the Municipal Coordinators) and then the supervisors repeated the presentations for the CHAs whom they supervised. The latter approach was consistent with SCSPM's policy that all in-service training activities be carried out by supervisors.

The training approach which the research team implemented involved training a group of Municipal Coordinators in a shortened version of the training which had been designed for the CHAs. On the day following each lecture, the Municipal Coordinators repeated the same training for the CHAs who are under their supervision and who had been selected for the experimental group. The researchers assisted the Municipal Coordinators in the training and in monitoring the practice activities.

A comparison group of nine CHAs in the same municipalities as the experimental group of CHAs was identified for purposes of evaluating the microplanning intervention.

The training of the experimental group of CHAs consisted of approximately 25 hours of lecture and some 76 hours of practice, distributed in five modules:

1. Health Diagnosis - what a community diagnosis is, how to conduct a community meeting to identify and set priorities among health problems (4 hours lecture, 25 hours practice).
2. Data Analysis - sources of data, analysis and interpretation of health information (5 hours lecture).
3. Planning and Programming - setting targets, general planning, specifying activities (4 hours lecture, 20 hours practice).
4. Community Organization and Development - communication, group dynamics, identification and selection of leaders, techniques for promotion and community development, evaluation techniques (10 hours lecture, 30 hours practice).
5. Training Leaders - immunizations, family planning, sanitation, referral, information system (12 hours lecture, 38 hours practice).

The CHAs were taught specific techniques for collecting and interpreting population data from the household census and family records; interviewing community members; conducting community meetings to identify and rank problems; and identifying informal "leaders" who could assist the CHAs in carrying out their tasks.

The emphasis on identifying and training community leaders to assist the CHAs in carrying out their tasks was part of the solution strategy developed by the researchers. They concluded that even if priorities were set among the CHAs' activities through microplanning, the CHAs would still have problems with

being overburdened with activities because the large population assigned to each CHA (3000-4000 persons) could not be reduced at present. Based on experience in other PHC programs in Mexico, it was hoped that informal leaders could be identified in each block or sector for which the CHA was responsible to assist them in mobilizing community members for specific activities such as immunizations, recruiting family planning users, and communicating health education messages.

The researchers designed a series of forms for use by the Municipal Coordinators and the CHAs in the microplanning process. The first form was an annual planning instrument which showed how a CHA's time would be allocated among the major activity areas over a year's period. For certain activities which were expected to be carried out by all CHAs, such as updating the community census and map, immunization campaigns, in-service training and even planning, the researchers calculated the minimum number of hours that the CHA would presumably dedicate. These fixed tasks were expected to require 42 percent of the available work time of the CHA. With respect to direct services, such as maternal and child health interventions, and sanitation and health education activities, the researchers also estimated the minimum number of hours that all CHAs would need to dedicate to these tasks, and designated the remainder of the CHAs available work hours for activities that would be defined by the supervisor, the CHA and/or the community as local priorities. Thus, while the basic activity areas remained the same for all CHAs, the relative importance of specific tasks within those categories would be established based on local needs.

Other forms used in the microplanning process included a weekly plan of activities to be filled out by the CHA and the supervisor, a daily activities register for the CHAs, and a form for evaluation of the activities carried out.

RESULTS OF THE FIELD TEST

Two months after the training was completed, the research team evaluated the effects of microplanning on the way CHAs planned or carried out their tasks. The reported activities of the experimental and comparison groups were analyzed to determine whether one of the groups was better able to develop an appropriate plan and carry out activities based on local problems. The two groups were compared based on the extent to which CHAs in each carried out tasks related to information analysis, planning, evaluation, consideration of local problems in programming, and identification and training of volunteer leaders.

The test group programmed and carried out activities related to local problems to a significantly greater extent than did the comparison group. All of the CHAs in the experimental group had incorporated consultation with the community and consideration of local problems into their work planning. Areas where there was minimal difference between the two groups of CHAs were in the formation and training of community groups, and in self-evaluation of their work. While CHAs in both the experimental and comparison groups identified and trained community volunteers, few of the CHAs carried out evaluation activities.

The research team demonstrated that the microplanning process was a feasible approach that enabled CHAs and supervisors to plan tasks more rationally and take into account specific local problems and community priorities. An added benefit of the microplanning process was that it increased the Municipal Coordinators' awareness of CHA activities and strengthened the supervisor-CHA link.

To support the microplanning process at the local level, researchers recommended that some changes to be carried out at the central level. Planning and programming of CHA activities at the central level requires coordination between the different departments. The researchers recommended that one person be responsible for this coordination to establish a specific operational program with objectives and functions to be carried out by the CHAs. This is important to enable the CHAs activities to continue to meet current priorities within the maternal and child health/immunization programs as well as those programs that meet the specific needs of the community, such as sanitation, health education, latrines, and garbage disposal.

The researchers recommended that guidelines be established for supervisors emphasizing those activities carried out by the CHAs. Through such guidelines, the activities of the CHAs could be objectively evaluated, permitting the identification of weaknesses which can then be improved. Evaluation should also take into consideration the time it takes to do the activities, which should not exceed eight hours per day. The training program for CHAs and their supervisors should be coordinated with with the department of training and include the following modules: health diagnosis; planning and programming at the local level; community development and organization; and supervision and evaluation. The training program was designed by the researchers to enable the CHAs to meet the needs of their communities. The investigators also suggested that a simple information system for the reporting and monitoring of CHA activities be defined. Since the field test, components of the microplanning process training program have been incorporated into the primary health care training of 150 physicians throughout the state and presented to heads of the 19 health jurisdictions.

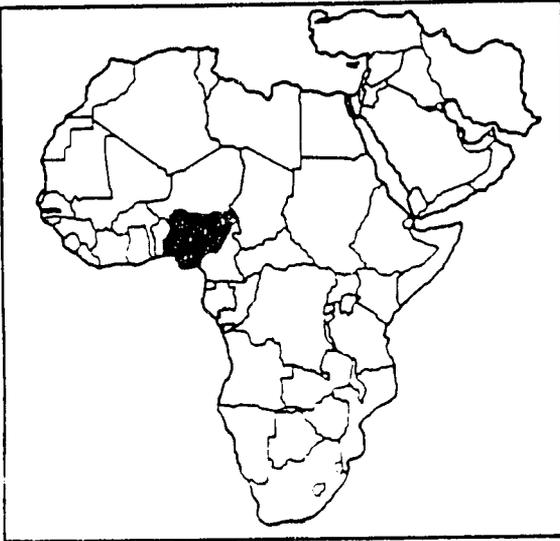
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This study was conducted out from May 1948 through March 1986 by the Coordinated Public Health Services of the State of Mexico. Further information is available from the principal investigator, Dra. Ana Ramos, Porto Alegre 12256, Col. San Andres Tetepilco, C.P. 09440, Zona 13, Mexico, D.F., or from Ms. Lani Rice Marquez, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

ATTRITION AMONG VILLAGE HEALTH WORKERS IN NIGERIA



[The following summary is taken in large part from an article prepared by PRICOR researchers and staff for a 1987 issue of the international journal, Socio-Economic Planning Sciences and appears here with permission of the journal's editors.]

From 1968 to 1983, the Rural Health Program of the Christian Reformed Church of Nigeria (CRCN) trained 70 village health workers (VHWs) in southern Gongola State, Nigeria. These VHWs were trained to work in remote villages, treating common diseases with basic drugs and providing health education. By 1983, however, it was apparent to the health program managers that VHWs had been leaving their jobs after

serving a period of only one to three years. The result was that CRCN was having to train new workers continually.

Recognizing this as an operational problem, the investigators undertook an operations research (OR) study to identify program variables that contributed to the high VHW attrition rate, and to use this information as a basis for developing solutions to the problem. The two-year study, begun in March 1984, sought to systematically identify and analyze the problems and sub-problems of VHW attrition and to develop alternative solutions which would later be field tested and validated.

BACKGROUND

The CRCN Rural Health Program is located in the southern third of Gongola State, Nigeria. The population in this area numbers about 1 million, including speakers of 20 different languages. The majority of the people in the area live in villages and work small farms, growing such crops as maize, guinea corn, rice, African yams, and cassava; groups of nomadic cattle herders also roam the area. The two major towns are Wukari and Takum, each with a population of about 20,000.

Although CRCN-sponsored rural health work began as long ago as 1937 with the establishment of a health clinic and maternity center near Takum, as of 1968 many of the rural areas were still without primary health care services. In

response to this situation, CRCN began to train village-based health care providers, initially called "first aiders" and later renamed "village health workers" (VHWs). Communities selected young men to receive three months of training in the diagnosis and treatment of common diseases and the delivery of health education messages. They then provided these services in simple health care facilities called "village health posts". Village health committees were formed (composed of volunteers from the community), charged with motivating the VHWs and paying them a small salary out of patient fees collected at the village health post. From 1968 to 1977, about 30 VHWs were trained. In 1978, the VHW training course underwent substantial revisions, and between 1979 and 1984, when the study was undertaken, an additional 48 VHWs were trained.

At the time of the study the Rural Health Program included health clinics staffed by community health assistants (CHAs); village health posts staffed by VHWs; maternity centers staffed by registered midwives; and several maternity posts staffed by traditional birth attendants (TBAs).

It is important to note that there are significant differences between the work situation of the CHAs and that of the VHWs. The CHAs work full-time and are paid 150 to 200 naira (approximately 200 to 270 US dollars in 1984) per month; they also have opportunities for advancement. VHWs work 1 to 2 hours per day and receive a small salary of 10 to 20 naira (approximately 13 to 27 US dollars in 1984) per month; they have no opportunity for advancement.

PROBLEM ANALYSIS

Problem analysis began with initial meetings of the members of the research team, to draw up a preliminary list of possible causes of VHW attrition. The team included the Health Officer and Director of the CRCN Rural Health Program, a consultant to the program, a medical student, and an agriculture student. In these meetings, the following possible causes of the high VHW attrition rate were identified.

1. Low salaries
2. Villagers' dissatisfaction with VHWs' limited curative role (i.e., VHWs are not trained or licensed to give injections)
3. Small number of patients treated
4. Lack of community support and respect
5. Infrequent supervisory visits
6. Lack of opportunities to upgrade skills or enter professional health training
7. Competition from more prestigious health facilities nearby

To analyze the problem from a broader perspective, the research team then visited five other church-sponsored rural health programs in Nigeria and two small programs in Sierra Leone. At these sites, they spoke with the program directors, community residents, and village health committees in order to get a general idea of how the different VHW programs worked. The team also conducted structured interviews in three of the programs--Mambilla Baptist, Church of the Brethren, and Tiv Church--interviewing 19 VHWs and 12 village health committees in all. Questionnaires were used to elicit such information on VHWs as educational background, sex, age, length of service, salaries, jobs

taken after leaving village health work, and number of patients seen daily in a village health post. The village health committees were asked to give their opinions on why VHWs left their jobs. In addition to providing a wider perspective on problems in village health work, these initial interviews served as pretests for the interviews to be conducted later in the CRCN program area.

Interviews Within the CRCN Program Areas

Following the initial interviews in other areas, the study team conducted two rounds of interviews in the CRCN program area. Altogether, they visited 32 villages, talking with people most directly affected by the VHW program. Initially, they interviewed 5 active and 37 former VHWs in the program area, 32 men and 10 women. Data were collected and analyzed on VHW length of service, income, and occupational mobility, as well as distance to the nearest health clinic.

In order to get more information on why VHWs left their jobs, the study team conducted a second round of interviews with 12 active and 29 former VHWs. At that time, they also interviewed 32 village health committees and 32 leaders of village women's groups. In this round of interviews, the following information was gathered about the VHWs: length of service, income, activities, and patient load (the latter determined by checking the record books of 4 VHWs, selection, supervision, interaction with the village health committee, inservice training, occupational mobility, and reasons for attrition. In addition, distance to the nearest health clinic was again determined and 10 TBAs were interviewed so that their work experience could be compared with that of the VHWs. Community leaders were also asked how they thought VHWs could be kept on the job.

Length of service. The researchers found that, among the active and former VHWs interviewed, the average length of service was 3 years for men and 1.5 years for women. No significant differences in length of service were found for the educated vs. uneducated, or for those under and over 30 years of age.

VHW income. The monthly income of those VHWs interviewed was low, ranging in the first round from under US \$10 to just over US \$20. Those with higher monthly incomes tended to stay on the job longer, as illustrated in Table 1.

Table 1. Average VHW monthly income and length of service

Income/Month	No. of Men	Avg. Length of Work	No. of Women	Avg. Length of Work
Under \$ 10	7	2 yrs.	7	1 yr.
\$ 10-19	12	3.5 yrs.	2	1.5 yrs.
\$ 20 plus	13	3 yrs.	1	1.5 yrs.

The salaries of the 41 VHWs interviewed in the second round ranged from US\$ 0 to \$80 per month. The median monthly salary of the 29 former VHWs was

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approximately \$20, while that of the 12 active VHWs was approximately \$30. These amounts do not represent a living wage in Nigeria; for example, in 1984 a government laborer received US \$168 a month. As a result, many of the VHWs worked only part-time and depended mainly on farming to support their families.

VHW activities. Researchers found little emphasis given to health education, one of the major tasks for which the VHWs had been trained. The major health care activity cited by the 41 VHWs in the second-round interview was "treating patients"; health education was mentioned by only 4 VHWs. When asked what they felt VHWs should be doing, the leaders of women's groups in the villages mentioned treating the sick, giving injections, giving blood transfusions, providing referrals, and receiving further training. Since VHWs were not trained to give injections, this represents a conflict between what the community wanted and what the VHW could provide. Health education was not mentioned by the village women as a task for VHWs.

VHW selection. The village health committees and leaders of women's groups were asked what type of person they would like to have serve as their VHW. Most respondents preferred a mature male from 20 to 37 years old. Moreover, community leaders seemed to want a VHW with higher education who would in fact be more suitable for CHA than VHW training.

VHW supervision. Supervision in the study areas was found to be sporadic and generally inadequate. Supervision of VHWs was supposed to occur monthly, to provide support and encouragement. However, 23 of the 41 VHWs interviewed in the second round had been visited by their supervisors twice a year or less; only 5 reported receiving received monthly visits.

Interactions with the village health committee. In the interviews, support and encouragement by the village health committee emerged as an important factor in VHW job satisfaction. Among the 13 former VHWs who had met monthly with their local committee, the average length of service was 3 years; for the 14 others, who met only occasionally or never with the local committee, the average was only 1.3 years. This difference demonstrates the importance of support and encouragement by the village health committee in VHW job satisfaction.

Inservice training. Another important factor in job satisfaction among VHWs was further health care training, which would allow them to advance into professional health care work and receive higher pay. When the VHWs interviewed in the second round were asked what sort of training they would like to receive to improve their performance as health workers, 16 said they would like any training that might be offered, 11 said they wanted to be trained as CHAs, and 4 said they wanted to be trained as lab attendants.

VHW occupational mobility. Of the 37 former VHWs interviewed in the first round, 17 had received more advanced training and had gone on to become higher-level health workers, while 20 had returned to full-time farming. The trends were similar in the second round: of 29 former VHWs interviewed, 7 became higher-level nonprofessional health workers, 2 became TBAs, 5 became professional health workers, 1 became a religious evangelist, and 14 returned to farming or housework. It may be noted that 14 of the 29 former VHWs were still active in health care, working in positions with higher pay than that of VHWs.

TBAs. Interviews with 10 TBAs revealed that their work is more nearly full-time than is that of VHWs, their salaries much higher, and their job satisfaction generally greater. The researchers noted that TBAs were well accepted by the women in the rural communities. Although TBAs were more satisfied with their work than the VHWs, the TBA program was as yet too new to know whether they would stay on the job longer than VHWs.

Patient loads. The VHW record books (which covered a period of three months), supported the researchers' hypothesis that VHWs' patient loads were very low: they indicated that these VHWs saw an average of 45 patients per month, or 2 per working day. In comparison, an average of 15 patients per day were seen at health clinics in the CRCN area, staffed by professional CHAs.

Distance to the nearest health clinic. A correlation was found between the distance to a health clinic and the length of VHW service. If a health clinic was nearby (less than six km away), the researchers found that the VHWs interviewed in the first round stayed on the job an average of only 2 years; if the health facility was further away, the VHWs stayed on for an average of 3 years. Of the VHWs interviewed in the second round, the researchers found that those who were far away from a clinic served longer than those who were close to a clinic by almost a full year on average.

Reasons for attrition: VHW perspective. When the VHWs were asked to give reasons why they found their work difficult, small salaries were mentioned most often. Next in importance was the fact that VHWs are not allowed to give injections; injections are highly valued by many Nigerian villagers, and the inability of VHWs to give them reduces the villagers' confidence in the VHW. This situation is reflected in the VHWs' dissatisfaction with the number of patients they saw.

Table 2 shows the reasons given by the 29 former VHWs for leaving their jobs which, not surprisingly, correspond closely to the reasons given by current VHWs for job dissatisfaction.

Table 2. Reasons given by former VHWs for leaving their jobs

Found better-paying work	4
Salary insufficient	9
Few patients seen because VHWs can't give injections	4
Local committee dismissed VHW because of mishandling of funds	5
Entered higher-level training program	7

Reasons for VHW attrition: community perspective. Members of village health committees and leaders of women's groups in communities that had lost their VHW cited the following reasons: (1) the VHW's desire for higher training, (2) insufficient salary, (3) dismissal by the village health committee for stealing community money, (4) laziness, and (5) departure to join the civil service. Community leaders suggested the following ways to keep VHWs working in the villages: (1) paying the VHW a higher salary, (2) providing CHA

training to the VHW, and (3) upgrading the health post to a health clinic. In 7 of the 32 villages included in the study, such upgrading is already underway

Conclusions from the Problem Analysis

Based on the survey results summarized above, the study team concluded that the VHW attrition problem was complex, involving a number of interrelated factors:

1. VHW salaries were low.
2. Villagers did not value health education, but rather curative care.
3. Villagers did not have confidence in the VHWs' ability to treat diseases, and few came to the village health post for treatment and advice.
4. VHW supervision did not occur frequently enough.
5. VHWs did not receive enough encouragement from village health committees.
6. VHWs did not have opportunities for professional training and advancement leading to greater skills and higher pay.
7. VHWs experienced competition from more prestigious health facilities near their health posts.

SOLUTION DEVELOPMENT

Having clarified the problem of attrition, in December 1985 the research team held a meeting with six VHW trainers to begin to develop feasible and effective solutions to the problem. All six trainers were experienced CHAs who had worked with the CRCN Rural Health Program for five years or more, and had trained from 2 to 10 VHWs each, using the program's standard training course. The researchers and trainers employed nominal group techniques (NGT) to develop solutions to the VHW attrition problem. The researchers began by clearly stating the problem - VHWs did not stay on the job for more than 3 years, so that CRCN had to continually train new workers - to which the trainers then independently wrote down their impressions of the reasons for this problem. They cited eleven reasons, virtually all of which correspond well with the results of the community surveys.

The eleven reasons were then listed and ranked by the trainers. The following were ranked as the top five reasons:

1. Low salaries
2. Lack of opportunities for advancement
3. Villagers' mistrust of the VHWs
4. Poor VHW supervision
5. Relatively high educational levels of VHWS

The six trainers were then asked to write down their recommendations on how the CRCN Rural Health Program could encourage VHWS to stay on the job. These recommendations addressed five program components: (1) VHW selection, (2) VHW training, (3) VHW supervision, (4) health post locations, and (5) village health committee support.

The researchers had deliberately used NGT at the beginning of the session so that the more forceful group members would not influence the others. By the end of the sessions, however, the six trainers interacted well as a group, and the researchers therefore opened up the discussion and facilitated the development of consensus among the group.

Based on the findings of the problem analysis, the group members concluded that villagers see a village health post as a step towards a more comprehensive health facility; most look forward to seeing their post upgraded to a health clinic with professional staff. Even more important to villagers than having an imposing health facility is having a permanent health worker who is more skilled than the VHW. Thus there is generally low satisfaction with the more limited services provided by the VHWs. At the same time, the VHWs were dissatisfied with the low number of patients they saw (because of the limited services they provided) and the subsequently low pay they received, all of which caused them to feel unappreciated.

During this exercise the group made the following recommendations:

1. VHW selection--VHWs who work part-time in health care while continuing with their full-time, higher-paying jobs are generally more stable than those without other employment. Also to ensure stability VHW trainees should be mature people, 25 to 40 years old, and married. Moreover, primary school graduates are more appropriate VHW trainees than secondary school graduates, who are often dissatisfied with the simple level of health care offered by the village health posts and desire higher training after a short period.
2. VHW training--VHW tasks should include the treatment of simple illnesses, referrals to the nearest health clinic, and health education. Annual refresher course of two to three days should be held to keep VHWs up-to-date in these skills.
3. VHW supervision--VHWs should be supervised every two months by the CHA from the nearest health clinic. In addition, supervisors should order basic drugs for the village health posts under their jurisdiction along with those ordered for the clinics, and arrange for these drugs to be supplied to the VHWs.
4. Village health committee support--The supervisors' tasks should include educating the village health committees about the value of health education and encouraging them to support the VHWs. The committee should meet monthly, and the VHW and TBA should attend.
5. Health post locations-- To promote fuller utilization, village health posts should not be opened any closer than 15 km from an existing health clinic. The VHWs should continue to work in the village health posts to serve small, remote villages, while the CHAs would staff the health clinics in each of the larger villages, and treat those patients from the remote areas who are referred by the VHWs.

MEASURING THE IMPACT ON VHW ATTRITION

The study team and VHW trainers used the above conclusions and recommendations to formulate solutions for field application; these have since been adopted by the CRCN. Over the next five years, CRCN will apply the following solutions:

- Emphasize stricter selection of trainees - over 25, married, and with primary school education.
- Provide refresher courses for VHWs.
- Stipulate that supervisory visits be made every two months.
- Develop and work with the village health committees as described above.
- Train CHAs instead of VHWs for large villages.

Furthermore, upon later reflection, the researchers added and the CRCN adopted the following two measures:

- Offer VHWs the opportunity to be trained as CHAs after they have served for two to three years.
- Develop health education programs for church members, to be led by CHAs during special church-sponsored meetings.

The researchers will gauge the effectiveness of the above solutions in reducing VHW attrition by using three measures: (1) length of service, to be recorded for all VHWs; (2) patient attendance at health posts staffed by VHWs, compared with that at clinics staffed by CHAs; and (3) mortality, particularly of children under 6 years, from VHW and CHA comprehensive mortality records. For child deaths, the cause of death will also be listed. In this way it is expected that operational problems can be identified as they arise and program adjustments made accordingly.

This OR study of the attrition of village health workers has given program managers of the CRCN Rural Health Program a greater understanding of health work at the grassroots level, and facility in the use of a simple OR approach for resolving operational issues. The OR approach to problem-solving and the results of this research will be used to improve the CRCN VHW program; the study results may be useful as well to the work of other church-funded primary health care projects and to the Nigerian Ministry of Health.

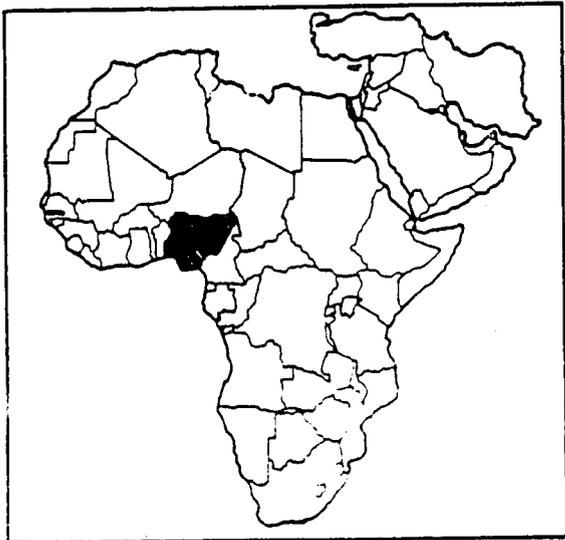
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This study was conducted from January 1984 through March 1986 by the Christian Reformed Church of Nigeria (CRCN) Rural Health Program. This summary is based on the final report of the study prepared by Herman H. Gray, M.D., and James Ciroma, Community Health Officer. Further information is available from the principal investigator, Dr. Herman Gray, CRCN Rural Health Program, P.O. Box 30, Wukari, Gongola State, Nigeria, or from Dr. Jeanne Newman, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

INCREASING THE PRODUCTIVITY OF COMMUNITY HEALTH WORKERS THROUGH SUPERVISION IN THE RURAL AREAS OF NIGERIA'S IFE-IJESHA ZONE



[The following summary is taken in large part from an article prepared by PRICOR researchers and staff for a 1987 issue of the international journal, Socio-Economic Planning Sciences and appears here with permission of the journal's editors.]

The Department of Community Health and Nutrition at the University of Ife carried out a PRICOR operations research study with the cooperation of the Nigerian Federal Ministry of Health beginning in February of 1984. The project was located in 19 villages of the Ife-Ijesha area of Oyo State, Nigeria. In order to focus on the delivery of PHC services to rural areas,

the two major townships in the area, Ife and Ijesha, were not included in the study.

The Nigerian Government has in recent years made a major commitment to providing accessible basic health services to all citizens through the National Primary Health Care Programme. Within a span of five years (1979-83), a new cadre of over eleven thousand CHWs have been trained and deployed to health units in rural areas, and many other categories of health workers have been reoriented to the PHC approach. Despite the development of new PHC manpower, the targets for reductions in infant mortality, maternal mortality, and morbidity had not been met by 1984.

In Oyo State, childhood malnutrition and infectious diseases are major health problems contributing to high infant mortality and morbidity. The infant mortality rate (IMR) in the Ife-Ijesha rural area is over 175 per 1000 live births, which is higher than the national figure of 120 per 1000 live births. The low health service coverage of the population is considered to be a major factor in the poor health status of the area.

While CHWs are charged with providing basic health service coverage in the rural areas, it is the quality and quantity of supervision that are considered key factors in CHW effectiveness. Therefore, the PRICOR researchers decided that the focus of this operations research study would be to find ways to improve the supervision of CHWs in the Ife-Ijesha area and thereby their effectiveness. This was to be accomplished through a) identifying operational problems and current practices of supervision of CHWs and b) proposing, testing, and validating better patterns of supervision.

ANALYZING THE CHW SUPERVISION SYSTEM

The researchers first set out to identify the existing patterns of CHW supervision and the problems inherent in the current supervisory practices. Three separate data collection instruments were designed: a self-administered questionnaire for supervisors of CHWs, an interviewer-administered questionnaire and observation schedule for CHWs, and a household interview for households in the CHWs service areas. The questionnaires were pretested and modified before their final administration.

Eighteen supervisors of CHWs were identified by the local principal health officers as being active in the Ife-Ijesha area. Questionnaires were sent out to all 18 supervisors, of which 11 were returned. The CHWs under supervision by the eleven supervisors were then identified and interviewed. Of 82 CHWs, 74 participated in the study. For the community survey, households in the catchment areas of the health units where the CHWs were based were selected by cluster and random sampling methods from the nineteen villages in the Ife-Ijesha area. Every third household was selected in villages having less than 100 households and every fourth household was selected in villages having more than 100 households; data were weighted appropriately in the analysis. In each household, the respondent was a woman in her child-bearing years with a child under five years old. Information was obtained from a total of 875 households.

Data were collected from the supervisors to determine their knowledge of supervisory tasks, characteristics of the supervisory process, and personal and professional characteristics. To ascertain their knowledge of supervision, the supervisors were asked to list at least five important supervisory tasks. The process of supervision was characterized by questions on frequency of visits to CHWs, use of supervisory guidelines, actions usually taken for unresolved problems, availability of support for transportation to CHW posts, distance traveled per month, and number of CHWs supervised. The supervisors also supplied information on their present position, level of education and training, length of experience as a health worker, age, sex, marital status, and number of children in the personal section of the questionnaire.

The CHWs were asked questions on personal/professional characteristics and on the performance of their supervisors. Personal/professional questions included present position, length of health-related experience, age, sex, marital status, and place of residence. Supervisor performance was examined through questions about the frequency of supervisory visits, the average duration of supervisory visits, supervisory tasks performed during the visits, and the total annual CHW/supervisor contact time.

Women of child-bearing age with at least one child under five supplied information on personal characteristics (sex, age, education, marital status, and occupation), household's utilization of Primary Health Centers, and the home visiting activities of the CHWs.

The PRICOR team chose home-visiting coverage by CHWs as the indicator for measuring the influence of supervision on CHW effectiveness. The rationale for using CHW home-visiting as an indicator of good supervision is that in order to implement primary health care effectively, CHWs must go into the community instead of waiting in health units for people to come to them.

Experience suggested that the majority of CHWs were not doing much home-visiting, despite the fact that the new cadres of CHWs were expected to spend at least 60 percent of their time on community outreach activities. Thus, if a CHW did carry out a substantial amount of home visiting, it could be assumed that he or she probably was being prodded to do so through good supervision (see Table 1 and Figure 1).

Table 1. Home visiting coverage by CHWs during the six-month period before the study began (as reported by households)

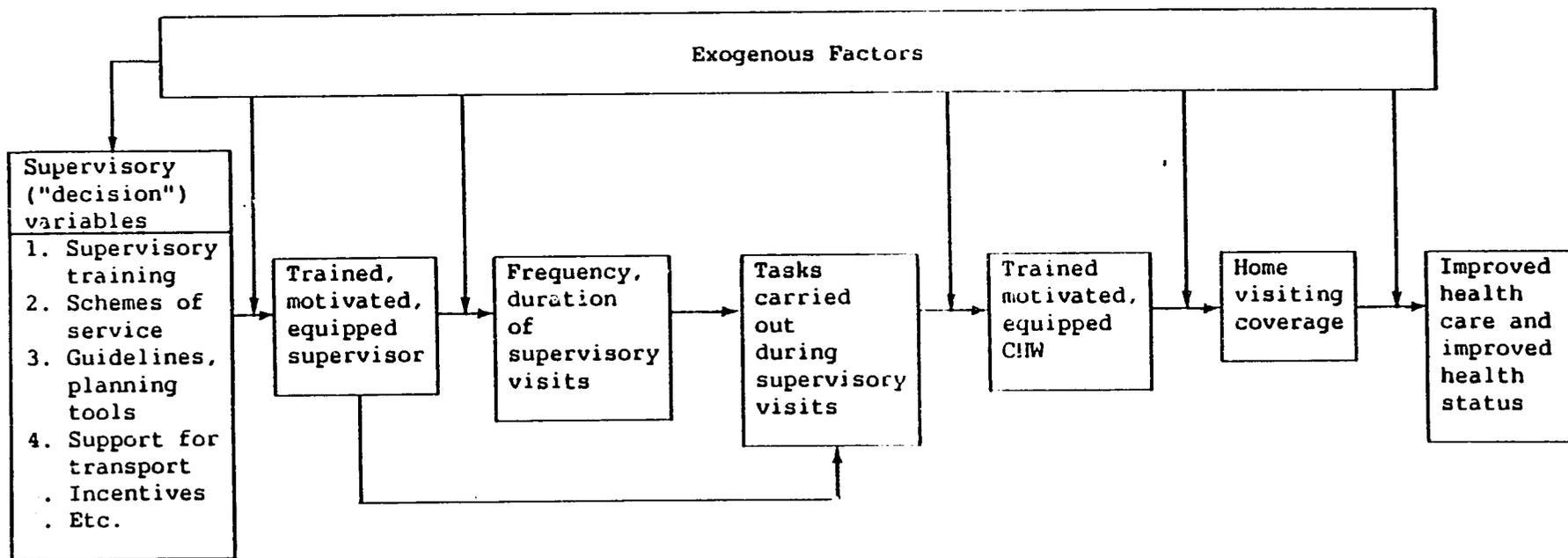
VILLAGE	NUMBER OF HOUSEHOLDS	NUMBER OF HOUSEHOLDS REPORTING A VISIT	COVERAGE (%)
Ipetumodu	100	1	1.0
Ifetedo	87	4	4.6
Edunabon	51	5	9.8
Osu	38	17	19.3
Iwara	15	3	20.0
Ilashe	25	17	60.7

The home-visiting coverages reported from the household data were cross tabulated with three measures of the supervisory process: (1) the frequency of supervisory visits, (2) the duration of supervisory visits, and (3) the tasks performed during supervisory visits. Taking each of the variables in turn, comparisons were conducted to determine the relationships. Analysis and interpretation of the data revealed several significant findings about the supervisory process and its effects on CHW performance. The researchers discovered that the supervisors were not using specific guidelines or protocols for their supervisory visits to CHWs, and that they gave little priority on these visits to reinforcing CHW community outreach activities or home-visiting. The frequency of supervisory visits to CHWs was less than one visit per month, and the duration of each visit was only one hour per visit. The majority of the PHC units in the area were not visited by the supervisors more than once a year. Follow-up was inadequate when problems were discovered during the supervisory visits.

The supervisors also lacked adequate knowledge of the tasks to be performed during supervision of CHWs; nearly half failed to list any tasks at all, and only one supervisor could list more than two tasks. Inservice training, checking equipment and supplies, and monitoring clinic operations were listed by the largest number of supervisors (Table 2).

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Figure 1. Schematic diagram of relationship between supervisory decision variables and CHW home visiting coverage



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Table 2. Comparison of number and ranking of supervisory tasks reported by CHWs and supervisors

TASKS	NUMBER CHWs REPORTING TASK*	RANK	NUMBER SUPERVISORS MENTIONING TASK**	RANK
Technical Assistance/ problem solving/ inservice training	32	1	5	1
Monitoring clinic operations	26	2	2	2
Checking equipment, supplies, drugs	18	3	2	2
Collecting statistics	17	4	1	3
Checking clinic sanitation	15	5	1	3
Planning/coordinating staff meetings	9	6	1	3
Health Education	5	7	0	4
Community Involvement	1	8	0	4
Staff Appraisal	0	9	1	3

* 73 CHWs responded to this part of the questionnaire

** 11 supervisors responded to this part of the questionnaire

Lack of support from the government health system for transportation and supplies for supervisory visits was a major problem for the supervisors. Most of the supervisors used their personal cars when they went out to visit CHWs. Official cars and transportation allowances were not made available to them. This proved to be a serious constraint in making an adequate number of supervisory visits, since some supervisors had to travel nearly 300 km a month to visit all the health units under their supervision. Many of the supervisors described the irregular and inadequate supplies of essential drugs, PHC manpower, and medical equipment as major constraints to good supervision. In addition to their supervisory duties the supervisors also carried major clinic responsibilities.

Using home-visiting coverage as an indicator of CHW effectiveness, the following relationships were observed:

1. Longer and more frequent supervisory visits had a positive effect on the home-visiting activities of the CHWs. Duration of the supervisory visits was slightly more important than the frequency (see Tables 3 and 4).
2. Certain supervisory tasks were associated with the frequency and duration of supervisory visits. For example, a high frequency of visits and longer visits were associated with the tasks of planning, coordinating, and holding staff meetings, as well as with monitoring clinic operations. However the collection of statistics was associated only with the high frequency or visits, and not their duration. Conversely, and not surprisingly, inservice training and technical assistance were related to the duration of the supervisory visit; it takes time to provide inservice training.
3. High levels of home visiting coverage were also positively associated with the supervisory tasks that are themselves associated with visit frequency and duration.

Table 3. Relationship between CHW Home Visiting Coverage and Frequency of Supervising Visits

Frequency of Supervisory Visits to CHWs	Home Visiting Coverage ¹ (% of Households Reporting Home Visits)
Low (av. 5.9/yr) (n = 28)	10.3% (n = 291)
High (av. 39.3/yr) (n = 30)	21.5% (n = 79)
Total (av. 23.2/yr) (n = 58)	12.7% (n = 370)

¹ Differences significant at 0.01 level

Table 4. Relationship between CHW home visiting coverage and duration of supervisory visits

Duration of Supervisory Visits to CHWs	Home Visiting Coverage ¹ (% of Households Reporting Home Visits)
Low (av. 40.6 min.) (n = 34)	8.0% (n = 276)
High (av. 68.2 min.) (n = 31)	26.6% (n = 94)
Total (av. 53.8 min.) (n = 65)	12.7% (n = 370)

¹ Differences significant at 0.01 level.

DEVELOPING SOLUTIONS TO SUPERVISORY PROBLEMS

Solutions to these problems were developed through a series of seminars and workshops with Nigerian policymakers and opinion-leaders. The PRICOR team organized these meetings to get input from health planners on the local, regional, and national levels.

Supervisors from the Ife-Ijesha area attended the first solution development workshop on May 2nd, 1985. After the findings from the field were presented by the PRICOR researchers, participants discussed supervision problems and suggested solutions for improving supervision of CHWs in their areas. Obstacles to effective supervision, such as the shortage of health manpower, unequal distribution of health workers, lack of supervisory protocols, lack of transportation and mileage claims, lack of supervisory training, lack of coordination between government PHC agencies, and the lack of incentives for CHWs to work in rural areas, were identified. Suggestions for improvement of the situation included the development of supervisory protocols, supervision training programs, transportation and mileage claims, and coordination mechanisms for local and state government PHC agencies.

In response to the suggestions made at the workshop, the PRICOR team developed a set of simple supervisory protocols. The protocols focused on supervisory tasks that would improve the work of CHWs. Each protocol contained a preparation page to be filled by the supervisor before the visit as a planning tool, a page where supervisors rate the CHWs' performance of a list of activities on a scale from one to four, and a post-visit sheet for supervisors to list steps they will take to follow up on CHW problems.

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A month after the meeting with the supervisors, the PRICOR team held a meeting with the coordinator of the National Primary Health Care Programme of the Federal Ministry of Health, the UNICEF Representative for Nigeria, and the Principal Health Officers of Oyo State. The findings of the problem analysis phase were again presented and these officials were asked to make comments and suggest solutions. They generally agreed that the problems identified at the earlier workshop were significant, and made a few additional suggestions for improving supervision of CHWs in Nigeria. In addition to general supervisory guidelines, these officials felt that specific guidelines for supervising special programs, such as ORT, family planning, immunization, and growth monitoring, should be developed. One of the key policy makers suggested a planning workshop to further develop solutions.

Prior to holding the suggested planning workshop, specialized protocols were developed for ORT, family planning, growth monitoring/nutrition, and immunizations. It was expected that, in addition to the general supervisory protocol, one of the specialized protocols (in rotation) would be completed during each supervisory visit.

The Solution Development Workshop was attended by 108 health planners, health workers, and students from Oyo, Ogun, Ondo, and Bendel States of Nigeria. Representatives from the MOH, UNICEF, WHO, PRICOR (Chevy Chase), and the state and local governments of Oyo State were also in attendance. This was one of the largest groups to participate in a PRICOR solution development workshop.

The attendees arrived the night before the workshop and were given background papers to read describing the OR study conducted in the Ife-Ijesha area. The next morning at the workshop, research findings and drafts of supervisory protocols were presented to the assembled group by the PRICOR team. A lively discussion of supervision issues followed. The participants later broke up into three working groups, each with a member of the PRICOR team, in order to deliberate on the problems of supervision in their areas, suggest possible solutions, and develop program recommendations.

The working groups used the technique of multiple criteria utility assessment (MCUA) to develop solutions with the best mix of effectiveness, acceptability, and feasibility.

Supervisory practices were listed and weighted according to their importance for improving CHW performance. Strategies for improving supervision were given weights for their effectiveness in improving specific supervisory practices and for their feasibility. By multiplying the three scores together, ranks were calculated for the alternative strategies to improve supervision. Sixty-six MCUA forms were turned in by the three working groups. Even though this technique was new to the majority of the participants, the groups caught on quickly and worked enthusiastically.

The solutions that received the highest ranking in the MCUA were (1) inservice training for supervisors, (2) modification or addition to professional supervisory curricula, and (3) development of management tools, such as protocols for supervisory visits. The MCUA effectively removed from consideration those solutions that the participants felt were not feasible because of the government's lack of additional resources, such as the provision of increased monetary incentives and transport for supervisors and reduction of the supervisors' workloads.

Following the solution development process, the workshop participants developed a set of recommendations to be forwarded to the Federal Ministry of Health. The MOH was urged to:

1. Establish inservice training programs in supervisory methods and management techniques for the current cadre of supervisors.
2. Include similar training in the curricula of the educational programs for new supervisory personnel, and see that at least one member of the faculty of each training center be trained in supervision and management.
3. Revise the schemes of service for new cadres of CHWs to stress prevention and community outreach.
4. Develop planning tools, guidelines, and protocols for supervisors, and train the supervisors in their use.
5. Carry out a field trial of the solutions suggested, especially the supervisory protocols developed by the PRICOR team.

PLANNED STRATEGY FOR TESTING SOLUTIONS

The PRICOR team plans a third phase of research to test the solutions developed at the workshop. Two geographical areas in the Ife-Ijesha Zone, each with populations around 15,000 and other similar characteristics, will be chosen. The solutions will be implemented in one area with the other area as a control. The researchers realize that it may not be possible to implement all the solutions at once and, in that case, only two or three will be introduced at one time. Data on supervision will be collected monthly and at the end of the field test. Using this new data and the data collected during the problem analysis phase, time series analysis and pre- and post-intervention evaluation of supervisory practices and their effects on CHW performance will be carried out. The PRICOR team is still waiting for Federal Ministry of Health approval to go ahead with this phase of the research.

DISCUSSION AND CONCLUSIONS

This PRICOR study is exemplary of how operations research can be used effectively to identify problems in a primary health care subsystem and to develop reasonable solutions that have the potential to make a positive impact on the subsystem. Among the major problems identified in the supervision of CHWs of the Ife-Ijesha area were the lack of guidelines for use in supervision and the supervisors' poor knowledge of supervisory tasks. These problems were specifically addressed in the solutions developed at the workshop.

The study showed that CHW outreach is positively influenced by the frequency and duration of supervisory visits. The effect may be indirect; higher frequencies and longer durations of supervisory visits appear to facilitate the accomplishment of those supervisory tasks during the visit that tend to result in improved CHW outreach to the community.

This study also demonstrates that large numbers of people can participate in the solution development process and learn how to use relatively sophisticated group decisionmaking techniques. The 108 health planners, health workers, and policymakers who participated in the workshop used the technique of multiple criteria utility assessment with skill and enthusiasm to reach their solutions to the supervision problems in Nigeria.

The effectiveness, feasibility, and acceptability of the strategies to improve supervision developed through the PRICOR study have yet to be tested in the field. It is unknown if the Federal Ministry of Health will find the project results persuasive enough to implement the recommendations submitted to them or to fund the solution testing and validation phase. Since the training for supervisors of CHWs is carried out at the University of Ife by the Department of Community Health and Nutrition (the institution that conducted the PRICOR study), there is a high likelihood that their curricula will now include more supervisory topics and that they will be encouraged to use the protocols developed by the PRICOR team.

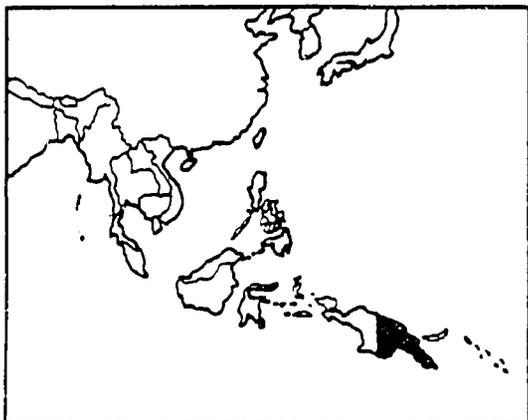
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This study was conducted from March 1984 through December 1985 by the Department of Community Health and Nutrition of the University of Ife. This summary is based on the final report of the study prepared by E.O. Ojofeitimi, M.K. Jinadu, and I. Elegbe. Further information is available from the principal investigator, Dr. Ebenezer Ojofeitimi, Faculty of Health Sciences, University of Ife, Ife-Ife, Nigeria, or from Dr. Jeanne Newman, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

TRAINING HEALTH WORKERS IN PAPUA NEW GUINEA



[The following summary is taken in large part from an article prepared by PRICOR researchers and staff for a 1987 issue of the international journal, Socio-Economic Planning Sciences and appears here with permission of the journal's editors.]

Early in 1984, the Church Health Secretary of East New Britain Province (ENB) of Papua New Guinea contacted planners at the University of Tennessee Division of Public Health requesting help in developing and implementing research aimed at improving

the delivery of primary health care (PHC) in the province. The request included a proposal focusing on health extension workers in rural areas. The request and accompanying proposal were significant because they (1) showed commitment by key decisionmakers to re-orient the service delivery system toward PHC, (2) accepted community involvement as an integral part of PHC, and (3) recognized the importance of extension workers in the effective delivery of PHC services.

In developing the focus of the research project, decisionmakers at various levels of the system determined that a key problem was the strong curative orientation of health workers who staff the health centers and their aide post satellites. Moreover, this orientation was seen as the result of a training program that emphasized curative care and neglected prevention and promotion. Thus, the operational problems of the PRICOR-supported project were the development and testing of effective training programs, both for nurses who staff the health centers, and the Aide Post Orderlies (APOs) who staff the aide posts. However, as the project progressed, the researchers became convinced that one of the most effective means for training the health service delivery cadre was their interaction with the community in determining community needs and appropriate strategies for satisfying those needs. Promotion of this interaction became an additional objective of the project. This also helped with yet another concern of the Provincial Health Secretary: broadening the involvement of all levels in the re-orientation of the system.

METHODOLOGY EMPLOYED

In considering the methods to be used to solve the operational problem, the project investigators took a number of factors into account: (1) the quality

of available data, (2) the decision-makers experience with and knowledge of the rural health worker and the rural health center, (3) the sophistication of the decisionmakers in planning, and (4) the selection of techniques that could be understood and used by all of the members of the planning group. The almost complete lack of relevant and reliable data, the difficulties of gathering data in the remote areas, the wide range of knowledge and experience of the members of the planning group, and the eagerness of the decisionmakers to implement a training program suggested the use of planning tools that utilized "expert opinion."

Initially, an expert group was formed comprising high-level decisionmakers, mid-level managers, and peripheral-level service deliverers. To harness this expert opinion, the research team used group process consisting of brainstorming, nominal group technique, and multiple criteria utility assessment. Using these techniques, the group identified health problems in rural villages that could be susceptible to amelioration with the resources available. They defined the knowledge and skills that PHC workers at each level needed to possess, identified decision variables in developing training strategies, identified constraints for the range of training strategy options, generated alternative strategy solutions, and, using multiple criteria utility assessment, evaluated those alternatives.

PROBLEM ANALYSIS AND SOLUTION DEVELOPMENT

In the problem analysis phase of the study, the expert group developed weighted objectives for the training program based on problems to be addressed by the nurses and APOs, and the related knowledge and skills these require. These were:

1. Developing personal and community relations skills;
2. Developing skills in identifying problems and assessing needs in rural villages;
3. Developing knowledge of available resources and skill in utilizing them;
4. Developing knowledge and skills required to implement PHC projects.

In addition, the group decided that social stability would be an important factor in selecting health workers.

In developing a training strategy, decision variables were taken to be where to do the training, who should do it, duration and frequency, and content and emphasis. A number of constraints to attaining these objectives were discussed and weighted. Various alternative strategies were discussed; these were narrowed to the three shown in Table 1.

Table 1. Decision variables and the alternatives

Variables	Alternative 1	Alternative 2	Alternative 3
Where	Vunapope	Individual Health Center	Central village
Who	Senior Health Workers	Health Center Staff	At first with all the health workers and later with key villagers
Approach	Classroom lecture	A combination of on the job and workshop	Workshop and then group discussions
Content	All PHC skills and knowledge previously identified	All PHC skills and knowledge previously identified	All PHC skills and knowledge previously identified
Time	Training sessions occurring twice a year, each one lasting one week	One week in duration occurring three to four times a year	Two days a week for four weeks, several times a year
Trainers	Project Team and Resource Personnel	Project Team and Resource Personnel	Project Team and Resource Personnel

The group decided to use a multiple criteria utility assessment (MCUA) decision model to estimate the relative utility of each of the alternative strategies. Using group process, utility curves were developed for each objective and the utility of each strategy was estimated for each objective. These values were inserted in the MCUA matrix to see which of the three strategies under consideration had the highest weighted utility (Table 2). To bring the different costs of each of the three strategies into the analysis as a factor in the selection process, the researchers helped the group consider cost in two different ways. The first was the conventional cost-utility model, in which each strategy was costed out and the cost divided by the weighted utility for that strategy. The second was to treat cost as an inverse utility function in itself, weigh it, and insert it in the MCUA decision model along with the other utilities. These two approaches yielded very different outcomes in terms of preferred strategy, presenting the decision makers with a dilemma. Following a lengthy discussion, they opted for the second course. While it is not clear why this was done, the investigators speculated that the village-based training component of the preferred strategy, though relatively expensive, had high value and thus overrode direct comparisons of cost. It is also possible that the group was reflecting the general human trait of ascribing a curvilinear utility to money (or any resource) rather than linear.

Table 2. Objectives: summary of weighted utilities

Objectives	Weight	Alternative 1 (weight x utility)	Alternative 2 (weight x utility)	Alternative 3 (weight x utility)
Community Relations	10	(10 x 40) = 400	(10 x 77) = 770	(10 x 97) = 970
Stability	10	(10 x 52) = 520	(10 x 52) = 520	(10 x 52) = 520
Problem Identification	9	(9 x 31) = 279	(9 x 78) = 720	(9 x 96) = 864
Resource Knowledge	9	(9 x 91) = 812	(9 x 60) = 540	(9 x 41) = 369
PHC Skills	9	(9 x 40) = 360	(9 x 64) = 576	(9 x 88) = 792
Total utility	Σ 47	Σ 2378	Σ 3108	Σ 3515
Mean utility		(2378/47) = $\overline{50.6}$	(3108/47) = $\overline{66.2}$	(3515/47) = $\overline{74.8}$

SOLUTION VALIDATION

The strategy chosen was number three (Table 1), which featured a very strong community-based approach. The decision makers and the researchers developed a workshop approach to address the objectives, then tested and refined it initially in a small group of villages. One of the more interesting aspects of this method was the use of a formal model to help incorporate the villagers' own perceptions of their health problems with what the health care system could do to deal with them. The model asked the villagers to (1) determine their needs, (2) determine required local material resources, required external material resources, and external technical assistance needed, (3) set priorities, and (4) propose a plan of action. An unexpected lesson of these workshops that had been designed to help train trainers was that the villagers, as a result of this planning exercise, came to see themselves as being in control of the activity, with the outsiders as their resource.

RESULTS

Following the guidelines set in the original planning sessions, the training team developed a three phase generic approach that was then adapted to the needs of each site. The program began by focusing on community relations and problem identification skills. Then, while continuing the use of these skills, emphasis shifted to acquiring a knowledge of and skills in accessing resources, and in developing skills in implementing PHC projects. The final phase emphasized assessment of the PHC project implementation, and reinforced the other skills targeted by the program objectives.

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Following the implementation of the problem analysis and solution development phase at the ENB sites, key decisionmakers began to realize that both short term and long term success of the project would require finding a way: (1) to sustain the commitment of the health system to PHC, and (2) to integrate the program into a multi-sectoral approach to community development. Building on this realization, the PRICOR investigator worked with decisionmakers to pilot test this strategy at Vatnabara on the Duke of York Islands.

The Vatnabara workshop was as strategic to protect implementation as the original planning sessions were to problem analysis and solution development. Vatnabara expanded the project target to the entire delivery system. It provided a means of addressing the emerging operational problem of sustaining system support, and it pilot tested the use of district level workshops as a context for multi-level planning. In addition, it tested the use of community diagnosis mapping, the linking game, and a solution development matrix as techniques to be used within that context. And, it led to the emergence of the solution development phase as the central component of the training program.

The training program was implemented at Nutuve and Muela in ENB and at Unea and Kandrian in WNB. The results of the case studies reflect the unique characteristics of each site. There are, however, some results that were common to all or a number of the sites. In Nutuve, Muela and Unea the health workers established development committees and scheduled visits to the villages to improve community relations and work with the villagers to identify and solve problems. At Kandrian, the health center was a great distance from the targeted villages, and there was little system support for changes in health worker activities. The lack of interest and support led to redefinition of the target to focus on district development workers. Once targeted workers were identified at each site, the villagers, workers and decisionmakers used brainstorming, community diagnosis mapping, the linking game and the solution development matrix to identify problems and propose solutions. At Nutuve, Unea and Kandrian district level workshops were held. These workshops brought together the worker, the village big men and decisionmakers from many provincial and district level departments. The extreme isolation of Muela prohibited such a workshop. The Muela workers did, however, participate in the Nutuve district level workshop. At each site a significant number of PHC projects were implemented. These included such projects as training village health workers, building water tanks, and planting experimental gardens. The projects addressed the health, education, social and spiritual needs of the people. Thus, problem identification and the PHC projects reflected the broad understanding of PHC enunciated at Alma Ata.

CONCLUSIONS

Examination of the results of the case study supports three general conclusions.

1. The OR effort created a solution that effectively reached the goal and objectives of the training program.
2. The flexibility of the OR approach increased the probability of successful project implementation.
3. The OR approach made possible the transfer of self-reliant development skills.

RECOMMENDATIONS

Based on the implementation results and conclusions, the investigators made the following recommendations to the Church and the Provincial Health Services:

- The training program should continue to be reinforced at the four original sites and expanded to other sites in each province.
- The Church Health Service should train additional staff to work with the health extension team.
- The Archdiocese of Rabaul should use the OR approach and techniques in training its church staff to do community development work in the rural areas.
- The Provincial Health Service should continue implementing and expanding the performance appraisal system that emphasizes the PHC component of health worker's responsibilities.
- The Provincial Health Service should reinforce and expand the community development network with other provincial departments, especially, Education, Primary Industry and Communications.
- The Church Health Service and the Provincial Health Service should continue their joint effort to plan and implement the health worker training and other projects directed toward reorienting the health delivery systems toward primary health care. 10

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This study was conducted from November 1984 through March 1986 by the Division of Public Health of the University of Tennessee in collaboration with the Church Health Service of Papua New Guinea. Further information is available from Ms. Ellen Von der Bruegge, Dr. Sherilynn Spear, and Dr. Charles Hamilton at the Division of Public Health, University of Tennessee, Knoxville, Tennessee 37996-2700, or from Dr. Stewart Blumenfeld, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

AN IMPROVED SYSTEM FOR THE DELIVERY OF BASIC HEALTH SERVICES IN A HIGH JUNGLE AREA OF PERU



In order for the Peruvian primary health care model to work at peak efficiency, each of its administrative levels - from the periphery to Area Hospitals - must have appropriate, accessible, and accurate information. The current information system did not provide isolated community health workers with the information needed to carry out their activities or to link them with other administrative levels, namely the health centers and the Area Hospitals. Two groups in Peru are working together to develop ways to use portable computers to solve some of the health information problems associated with the delivery of primary health care services. International Health Technologies, Inc., a U.S.-based firm interested in the development of appropriate technologies in health care, is collaborating with the

Institute of Tropical Medicine at the Universidad Peruana Cayetano Heredia on this study. In August 1985, PRICOR funded the field test of this system in a remote high jungle area of Peru. Through the field test, the researchers hope to determine how health workers respond to using microcomputers, and how microcomputer use can affect data collection, worker motivation, and utilization of resources. The ultimate goal is to develop a completely integrated computer-based information system that can be easily tailored to the needs of community health posts. Although PRICOR funding has ended, the field test is continuing until December 1986 under the auspices of the Peruvian government. The preliminary findings are presented herein.

BACKGROUND

The field test is taking place in the remote high jungle area of Peru, administratively referred to as Area Hospitalaria No. 36. It is located in the Huancayo Health Region, and encompasses more than 4000 square kilometers, serving approximately 270,000 persons.

One of the health related problems encountered in this area is the difficult terrain which makes movement from one post to another very time consuming and treacherous. This, coupled with the lack of training and supervision of auxiliaries and promoters, has a detrimental effect on the supply of health

posts, communications, and the status of the health worker program. This also has the effect of inhibiting the achievement of the Ministry of Health's target goals. For example, immunization campaigns which project 80 percent coverage often do not attain the goal because of confused health worker priorities and lack of supervision. An evaluation of health worker activities showed that most of the health worker's time is taken up with first aid activities and bookkeeping in order to meet MOH requirements for data. Only 20-30 percent of their time, at most, appears to be spent in ensuring a high level of vaccination coverage and other support services for mothers and children.

In addition to these problems, medical doctors in the Area have identified the following obstacles, based on their knowledge and experience in the area:

1. Shortage of qualified supervisory personnel and high cost of travel to isolated areas;
2. Inability of the system to provide adequate positive reinforcement to workers;
3. Inadequate disbursement of critical supplies from the general hospitals to the health posts; and
4. Poor planning, administration and evaluation of current vaccination and nutrition interventions.

ANALYSIS OF THE HEALTH MANAGEMENT INFORMATION SYSTEM

These observations were substantiated by an eight-month problem analysis in which the researchers reviewed and analyzed existing health post records and activities. This process provided base-line data on health post worker activities, and on the extent and completeness of the reports they file. Analysis showed a high level of curative activities and low level of well-child/home visits. It also showed a very high level of reporting errors. Despite the fact that the MOH has strict health information requirements, data collection and report preparation is particularly difficult for many health posts and community promoters because of their cultural upbringing, which strongly favors the oral transmission of information.

In order to address these problems and allow for Area Hospitalaria No. 36 to operate at peak efficiency, the administrative levels (i.e., community health post, health center, general hospitals, and area centers) must be linked with appropriate, accessible and accurate information. This necessitates a dynamic health and management information system in which the information pool at each level is continuously updated with new data from other levels in a manner which minimizes lag time and allows relatively few errors to enter and remain permanently in the information pool. The researchers feel that improving the operations of this area's health system through accessible and accurate information is one way to addressing many of the above-mentioned problems.

Because community health promoters and auxiliaries are the critical link to the regional information system, the researchers decided to initiate the field

trial of microcomputer-based training modules at the periphery. For the purposes of the trial the researchers are focusing on health interventions which address the problems of pediatric diarrheal disease and its interaction with nutrition and growth.

These activities are:

1. Monitor and evaluate growth and development of children five years and under, and educate families on hygiene, nutrition, and accident prevention;
2. Identify child/mother pairs to receive supplementary food aid; and
3. Recognize, treat, and refer children with diarrhea and dehydration, and promote the use of oral rehydration.

The selection of this service package also parallels the UNICEF GOBI-FFF program, which is an integral part of Peru's primary health care system.

The decision to use a microcomputer-based system at the peripheral level has historically been viewed as 'inappropriate technology' with high recurrent costs and a high level of instability. The researchers tested the premise that "microcomputers could be the most important factor in improving management and thus bring health for all within reach" (El Kholy and Mandil, 1983) by selecting high school educated Peruvians with no computer experience and in ten minutes giving them enough basic instruction to complete a data entry and editing task on their own. The students were all successful at this, and continued to develop many sophisticated skills on their own time. This test overrode the bias prevalent in the development field that mid- and low-level workers in developing countries could not use microcomputers. Furthermore, in response to the belief that the introduction of computers will contribute to the displacement of labor in a country with already high unemployment, the researchers stated that computers will make field-based health workers more effective and give them more incentives to stay where they are. The researchers found that the ability to use computers enhances the status of users, which, as discussed by David Werner, is a particularly important factor in the motivation and community acceptance of health worker.

HARDWARE AND SOFTWARE

In addition to trying to improve the status and functioning of the health promoters and auxiliaries, the researchers are interested in demonstrating the feasibility of using microcomputers in difficult conditions with an appropriate solar battery source. A significant amount of time was spent before the field test identifying and modifying appropriate hardware, and designing the software. Much of the research and development expense for this component of the study was underwritten by Hewlett-Packard. The researchers selected Hewlett-Packard's portable microcomputer HP110, which has several desirable characteristics considering the users and the environment. They are physically robust, extremely portable, free from all moving parts, capable of recharging from ambient light while being operated, and sufficiently powerful to perform complex tasks quickly and store large amounts of data in RAM. Hewlett-Packard donated \$100,000 worth of equipment to the project.

The team also worked extensively on developing and debugging a solar recharging system to the computer battery charging system. The model they developed underwent a major revision during the field test. The team developed and manufactured 12 small solar power units for use with the HP 110's, the Think-jet printers, and portable disk drives. A series of problems with the batteries was resolved by the replacement of internal batteries and development of new and more reliable solar power systems. The final solution entailed using 12 volt auto batteries with simple charging units and more robust solar panels.

The question of hardware failure was addressed by the implementation of a maintenance system. If a computer fails, the entire machine is withdrawn from the field and replaced with a spare. Repairs are made in the field by replacing the malfunctioning circuit board with a spare board kept locally in an inventory of computer parts and supplies. The circuit boards are then taken to Lima for repair.

The software package used was written by the research team in BASIC and FORTH, and included modules for a main directory, a census, emergency first aid, visit registration, routine well-child care (based on UNICEF's road to health chart), and diagnostic assistance on diarrhea and acute respiratory infections. The software package includes the following elements:

1. The major database in each computer, which consists of longitudinal records containing birth, family and geographic, anthropometric, vaccination, and morbidity data for all children 0-4 years within the catchment area.
2. The second database terms of size is a file of information screens which may be called from the main program at the user's request. This file explains, using both language and graphics, everything from how to take anthropometric measurements to how to educate someone to use ORT.

The intervention modules were introduced to the trainees in the course of the field test, and underwent revisions as the trainees responded to and evaluated them. Suggestions from the trainees on changes in wording and program flow have been incorporated in a later version.

The field test was of a non-experimental design. The evaluation criteria were based on (1) the acceptability of the computer-based system by the health workers and their communities, (2) the ability of the health workers to use the modules to improve their data recording and delivery of health services, and (3) the functioning of the computer and its solar recharging system during the period of study.

FIELD TRIAL

The field trial involved both volunteer community health workers and paid health auxiliaries. Five were health promoters who had been brought into the MOH system as full time, paid health auxiliaries. The other five were volunteer promoters. The majority of the promoters in the rest of the country are volunteers. Originally the ten trainees were designated to be part of the

pilot study. However, due to battery failures on four machines, only six were given the initial training. Later, the other four joined them. This field test was supervised by a physician working out of the health center responsible for the catchment areas serviced by these health workers.

The health workers who participated in the field test were introduced to the microcomputers in a two-hour session. Although none of the participants had ever seen a computer, and only two had ever used a typewriter, they were very enthusiastic and quickly overcame any initial hesitations. The initial activity was an interactive typing-tutor game built into the management information system software which encouraged familiarization with the keyboard.

The first days of the five day training consisted of instructions on the use, care, and maintenance of the computer and familiarization with the computer keyboard. Also included in this first session was a census exercise, demanding that names be entered and accessed for corrections at random. This module is being used successfully by the health post workers participating in the study to register all members of their communities.

After the health workers became fairly comfortable with the machines, the software was introduced in increments of two to three weeks, so as to enable the workers to gain familiarity with each module. The supervisor visited the health worker in the field and introduced each the modules in two to three hours. The modules were introduced in 3 phases:

Phase I: Executive, Directory, Emergency, Visit Registration
Phase II: Well-child, Scheduling, Prescription
Phase III: Diagnostic Assistance.

RESULTS

Overall, the field trial has been successful in demonstrating the applicability and utility of computer technology in even remote communities, albeit with a significant amount of support from the research team. Because the field trial was not completed under PRICOR funding, and is continuing under the auspices of the Ministry of Health in Peru, these findings are considered interim and will be further expanded upon at the completion of the project in December 1986.

The researchers feel reasonably certain that they can make the following conclusions from their observations and descriptive data from their field test.

1. The acceptance of the computer and computer-assistance by the health worker and by the community being served has been extremely high. This was concluded based on observations after a two to three month intervention period. Interviews conducted prior to the trial showed that both health workers and members of their communities felt that the status of community health workers was lower than it should be, given the importance the communities place on health care. The reasons identified were inadequate support of the community health worker in the form of training, facilities, and medical supplies, and the fact that most of the positions were only voluntary.

After the two to three month intervention during which the training modules on child health were introduced, the perceptions of the community and the health workers involved changed markedly.

The researchers observed the interviews between the health workers and mothers with children using the diagnostic module in the computer. They noted that the user has begun to assimilate the routines, paraphrasing what appears on the screen, as well as using it to reinforce an opinion he may have regarding a diagnosis. The mothers perceive that it is not just the health workers opinion the mother is getting, but rather an authoritative statement from something which she accepts as a valid source of medical expertise. Based on observations of the CHWs using the system, the researchers feel that parents have been more willing to accept advice and treatment recommendations when it has come from the computer than previously when it was just the word of the health worker.

The microcomputers were also viewed as a community resource, giving the communities increased status amongst their peers, and making them more accepting of a CHW-based local system rather than an MD-based regional system.

The researchers have not, however, been able to demonstrate increased utilization of CHW services since the introduction of the new system.

2. Training of the health workers to use the computer was not difficult or time-consuming. Since the average educational level of the trainees was sixth grade, and only one of the ten had used a typewriter before, it was remarkable that all ten were able to use two-handed typing within a period of eight hours or less. They became more confident that they could handle the machines as their typing abilities improved.

Even with the limited software available for training, the trainers were able to get the health workers back to their communities with a functioning executive system and the census module within four to seven days of the training. Nine out of ten of the health workers were able to learn easily and use the later modules as they were introduced by the supervisor during her community visits.

3. The HP110 computer has been reliable and appropriate for the environment. Since it has no moving parts, it has had a low occurrence of breakdown. The only real hardware problems encountered were in matching a solar-recharging system to the computer battery-charging system. The system is currently backed up by an auto battery reserve which can provide 45 days of recharging in the complete absence of solar energy inputs. The system also allows solar energy to be collected during the day and the computer to be recharged overnight.
4. The use of the computer-based system already appears to be improving the quality of service delivery and record-keeping for those activities targeted. The on-going census and the routine monitoring of childhood growth and development have been in operation long enough to permit data gathering on how their use affects health worker productivity and performance.

The interactive census module permits each health worker to maintain an accurate, up-to-date census of the families in his/her community. The date is maintained in a computer file and is available on-screen whenever desired. In addition, the supervisor is able to print out the current list on any of her bimonthly visits to the community. According to interviews done in the past two months, the ability to "see" that the system has permanently incorporated information about a child when he or she is registered at birth and automatically sorts its record into the correct family order has been reinforcing for both the health worker and for the parents, who begin developing a sense that the system is "paying attention" to their child.

The health workers have indicated that both they and the community leaders are impressed with the extreme power of the computer to enumerate community information at a touch of a key. This seems to provide enough incentive to the CHWs to maintain the census. Random spot checking of census accuracy, done by the supervisor during her bimonthly visits, indicate that they contain very few errors.

The growth monitoring module allows the CHW to take each child through a thorough, professional, well-child examination and obtain an expert evaluation of that child's risk status each month. The system also keeps track automatically of the child's history concerning vaccinations, nutrition, weight for age, ability to meet development standards, and serious illnesses, and is able not only to review these for the health worker and mother, but also incorporate selected historical data into the current evaluation of risk. The system also provides an automatic safe-keeping of the data which could be used to recreate a health chart if the existing one (kept by the mother) is lost or destroyed.

With respect to the growth monitoring component, the health workers are learning how to take correct weights, plot them, interpret them, and focus on the problems of targetting and following the children really at risk. This is because of the interactive nature of the software, and the constant reinforcement it provides of the routine. The health workers are, therefore, considered to be more thorough than previously.

The short term result of this process is that each of the computer-aided health workers is already capable of carrying out a definitive childhood growth and development monitoring program in his community with few errors and outside assistance. It also provides a supervisory function in that the automatic data-logging facility makes it easy for the supervisor to obtain an instant summary of the monthly performance of each health worker in meeting his or her community "Road to Health" visit goals. This function has revealed, however, that there is still an unacceptably low frequency of home visits for well-child monitoring.

The researchers feel that these results merit a continuation of the field test, in which they hope to further substantiate their findings and introduce a supervisory function, as well as a networking component which will link the periphery of the system to the Area Health Center.

FOLLOW-UP

Although not covered during the life of the PRICOR-funded field test because of lack of time, the researchers are currently establishing a link between the field computers and one which would reside in the health center. The information, stored in "bubble memory", will be dumped into the computer at the health center at the beginning of each month when the health workers go to resupply and collect their paychecks. Health center computer operators will carry out the following tasks:

1. Consolidate the raw data taken from the local computers, as well as maintain replica key data bases for each local computer;
2. Manage the inventory of relevant supplies for the Area with sophisticated optimization routines;
3. Plan vaccination campaigns with the objective of minimizing losses through cold chain gaps, and maximizing coverage while minimizing cost and effort; and
4. Analyze data drawn from the area using a package designed to enable analysts based at the health center office to modify the information screens and conduct complex statistical analyses rapidly.

This project has received wide-spread attention in Peru. In addition to its official recognition and support by the Government of Peru, the computer-based system and the field trial, which has been named PROMETHEUS-PHC, have been written up in several Peruvian national magazines and newspapers. It was also the subject of a 15-minute spot on one of the national television channel's news magazines. There has been a great deal of interest in making this project a private sector intervention in rural health care in Peru. If it is found to be functional and cost-effective, it could grow into a comprehensive development-oriented information system which would link many sectors. The Ministry of Informatics and the Ministry of Health may help to generate the capital needed to finish the development of the current project and work on a large demonstration level. USAID may also be a source of funding for the future.

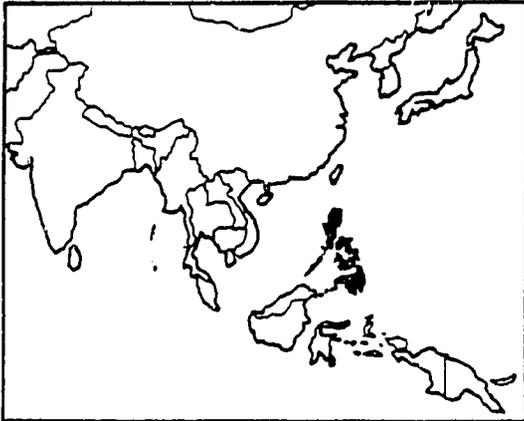
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This study was conducted from August 1985 through March 1986 by International Health Technologies, Inc., in cooperation with the Universidad Peruana Cayetano Heredia. This summary is based on the final report of the study prepared by Dr. William H. Spira and Dr. Paul Skillicorn. Further information is available from the principal investigators, Dr. William H. Spira or Dr. Paul Skillicorn, International Health Technologies, Inc., P.O. Box 30178, Bethesda, Maryland 20814, or from Lani Rice Marquez, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

ALTERNATIVE STRATEGIES FOR FINANCING PRIMARY HEALTH CARE IN THE PHILIPPINES



Health planners in many developing countries have determined that public resources are insufficient to meet the primary health care needs of the entire nation. In response, a requirement for community financing of primary health care is gaining acceptance. The basis for community financing is the fact that many people in developing countries are already making substantial out-of-pocket payments for curative health care and, therefore, are capable of paying for some government-

provided health services. There is a need to convert capability to willingness.

In January of 1983, a research team from the University of the Philippines in the Visayas began a two-year operations research study on community financing in Iloilo Province with the support of PRICOR. Six barangays (villages) were selected to participate in the study. The barangays were chosen to represent various economic sectors of the province. Two of the barangays were primarily involved in rice farming, two were involved in sugarcane production, and two others dependent on fishing for their livelihood. The control barangays were chosen to have similar demographic and economic characteristics to the study barangays.

These PRICOR barangays were all part of the Panay Unified Services for Health (PUSH) Project. This project was directed by the regional office of the National Economic Development Authority (NEDA) and financed by USAID. The purpose of the PUSH Project was to increase the accessibility of basic health services to the more rural barangays, largely through the use of barangay health workers (BHWs). The PRICOR Project was incorporated into the larger PUSH Project to study and resolve operational problems in the establishment of community financing of PHC. PUSH had already proposed to establish botikas sa barangay (community drugstores) as part of its overall approach, but the PUSH staff also hoped that other services might be financed by the communities. PRICOR staff hoped that, because of the barangays' participation in the PUSH Project, they would already possess a degree of community organization.

This operations research project had three major objectives. One was to help villagers in the project communities decide what PHC services they would support financially and how they would raise the necessary funds. Another

important objective was to help them organize stable, long-term management and accounting systems for the community financing projects that they selected. Lastly, the project staff hoped to encourage the villagers to use part of their financial resources for preventive and promotive health activities.

PROBLEM ANALYSIS

In the problem analysis phase of the study, the operational problem focused on identifying factors necessary for the development of a sustainable community financing scheme to support health-related activities. The researchers initially developed a model for analyzing the determinants of health-seeking behavior. The interactions between demand for health services and various determinants, such as provider characteristics, accessibility, income, socioeconomic characteristics, demographic characteristics, and need for health services were summarized in the model. Knowledge of the determinants of health behavior was used to develop a variety of appropriate alternative schemes for community financing of health services.

Project staff also carried out a baseline community survey of each study barangay as a part of the problem analysis. This survey was conducted to determine the perceived health problems in the community, the financial resources available for health care, attitudes toward and current utilization of health care providers, and willingness to participate in community financing schemes.

Synthesis of the results from all six surveys showed that the barangays had much in common in their attitudes and behavior regarding health care. The major health problems were perceived to be respiratory and gastro-intestinal illnesses. Outside management for these problems was generally sought from physicians, nurses, midwives, and traditional healers. Annual medical expenditures per household were estimated to be in the range from P200 to P300 (US\$ 30-40). The unavailability of drugs and poor water-supply facilities were perceived as major health-related service problems. The majority of households expressed a willingness to participate in the community financing of health activities, but preferred to participate in the form of service donations, contributions of materials, and flat rate contributions of money. In the six barangays, the purchase of drugs and the operation of a drug depot (botika) were projects that community members were most willing to finance.

SOLUTION DEVELOPMENT

Solution development consisted of several steps that involved the barangay residents in community financing projects. First, the research team charted the results of the baseline survey pictorially and presented them to the barangay residents at community assemblies. The assemblies were attended by local health workers, political leaders, teachers, government officials, and other barangay residents. After learning the results of the baseline survey and discussing them, the communities selected health activities that they would fund through a community financing project, and the types of financing mechanism that they would use.

Five barangays chose to finance and run community drugstores, or botikas sa barangay; one barangay decided on an emergency hospitalization fund. The botikas are revolving funds in which user payments for drugs (or repayment of loans) are used to replenish stocks (or replenish the loan fund). Although the research team had hoped that the barangays would come up with a variety of financing approaches, they felt that it was essential that the communities choose their own priorities. Most barangays selected a flat rate contribution from households for the initial capitalization of the project, but supplementary fund raising activities, such as taxes on sales of produce and livestock, raffles, and parties, were also included in some of the plans. Communities also set fund raising targets. (Table 1 shows the capitalization schemes selected by the barangays.) Barangay representatives subsequently presented the projects during a meeting held at the NEDA regional office.

Table 1. Capitalization schemes

<u>Barangay</u>	<u>Pop.</u>	<u>Scheme</u>	<u>Targeted</u>	<u>Actual</u>
Milleza	635	P3/Qtr/HH	P732	P419
Bucaya	935	1-time pledge of P5-50	P500	P368
Maribuyong	533	1-time pledge + taxes on sale of produce and livestock	P820	P1086
Badiang	986	P1/Mo/HH	P830	P306
Tastasan	758	P1/Mo/HH + P200 gift	P1640	P434
Bololocao	902	P3 membership fee + P1/Mo/HH + raffle, mah jongg party	P2700	P717

One month after the community financing schemes were initiated, the project staff held a workshop in each barangay for members of a core group of residents who had agreed to take responsibility for the project. These core groups were generally made up of community leaders and local health providers. For example, in Barangay Milleza, this group was composed of the Barangay Captain, six councilmen, the Barangay treasurer, the Barangay Health Worker (BHW), two school teachers, and the Rural Health Midwife. These workshops were used to plan the community financing project in more detail, to strengthen the management capabilities of the core group, and to teach concepts of primary health care. During this workshop, community women were selected for the jobs of "lead mother". These unpaid volunteers were to assist the barangay residents in implementing preventive and promotive health activities, such as environmental sanitation, nutritious food production, and basic hygiene. At that time, the core group also chose the specific tasks that lead mothers would be performing in their communities.

The Botikas

All of the barangay residents were expected to contribute to the initial capitalization of the botikas. Core group members, lead mothers, and BHWs generally did the collection of funds. Cumulatively, the barangays were able to collect an average of 46.1 percent of the targets they had set for fund raising through flat-rate contributions. When barangay residents were asked

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later why they did not contribute (or contributed less than the specified amount), they cited either inability to pay or lack of follow-through on collection efforts. The majority of these villagers said either that they had not been asked to contribute or that they had been asked only once. Upon later reflection, the research team felt that, in general, it is best to collect money for community financing schemes quickly and in one lump sum. Collection over a long period of time and in small installments was not a very effective capitalization method. After the initial capitalization (which took a considerable amount of time in many cases), only users were asked for payments to replace drugs.

The botikas sa barangay were managed and run by volunteers from the communities. One person was generally in charge of dispensing drugs, collecting money, and maintaining stocks. Sometimes this role was taken by the BHW, sometimes by the lead mother, or another barangay resident. A community member also was appointed to "audit" financial records and stocks.

Each botika made its own arrangements to buy its initial stock and replenishments. The choice of specific drugs to be stocked was determined by community demand. The botikas generally carried popular brand name drugs instead of generics. In buying drugs, the barangay residents were generally able to negotiate small discounts from commercial establishments in the nearest town. Pricing policy was set by each barangay. In two cases, mark-ups were taken as flat amounts (i.e., 10 centavos per pill, P2 for a large bottle of cough syrup); in another, as a percentage of actual costs (roughly 10-20%) based on cost and the manager's estimate of what was reasonable; and in two cases, on prevailing prices in commercial drugstores or roadside stands. Table 2 shows initial capitalization for each botika, months of operation, total sales in that period, and net profit for the period.

Table 2. Financial data for five botikas

<u>Barangay</u>	<u>Capital</u>	<u>Months</u>	<u>Sales</u>	<u>Profit</u>
Milleza	P419	12	P555	P121
Bucaya	P368	13	P3640	P567
Badiang	P306	9	P1132	P211
Tastasan	P434	12	P936	P177
Bololocao	P717	10	P1321	P220

It may be seen that stock turned over at annualized rates ranging from 132 to 913 percent and that profit on sales ranged from 16 to 22 percent; this despite claims of very small mark-ups. The level of increase in costs of stocks is not known. These figures should not be taken as perfectly accurate because record keeping performance varied from botika to botika. Two of the botikas (Milleza and Badiang) were observed by the study team to have been somewhat sluggish at stock replenishment; the other three quite timely. None of the five botikas appeared to be in the process of decapitalization. Auditing was often done poorly or not at all, and in many cases the PRICOR researchers served as auditors.

The Emergency Hospitalization Fund

Resources for the emergency hospitalization fund in Maribuyong were generated from flat rate contributions and taxes on the sale of pigs, goats, carabaos, firewood, fruit, and coffee. The lead mothers were in charge of both collection of contributions and monitoring the taxation scheme. Collection of funds was quite slow and the barangay residents discussed the problem of non-payment at a community assembly. It was decided to undertake a raffle for those residents who had made their contributions as an incentive for payment. This was a good motivator and most of the residents made their contributions in time for the raffle. A total of P1,086 was collected: P96 from taxation and P990 from donations. The researchers reported that this amount was not enough to cover the needs of the residents.

Any resident of Maribuyong was eligible to utilize the fund for medical emergencies as long as he or she could present a co-maker to be responsible in case of default, would attempt to pay the money back within a month's time, and had repaid any previous loans from the fund. Although money was available as early as November 1983, by the time the research team withdrew in August 1984, only four barangay residents had utilized the fund. The researchers reported that the villagers used the loan fund only as a last resort, after they had exhausted all other personal sources of funds, such as relatives, friends, or neighbors. Barangay residents who fell ill were apparently embarrassed to have to borrow money from a public resource.

The Lead Mothers Program

The Lead Mothers program was implemented in all six study barangays with varying degrees of success. The core groups selected the lead mothers at the PRICOR workshop on the basis of criteria such as willingness to serve, perceived capability, and rapport with the local residents. The range of tasks specified for the lead mothers in all the barangays included: environmental sanitation; health education; immunization referral; maternal/child care; nutrition education, rehabilitation, and surveillance; food production; family planning education and referral; first aid; herbal gardening; record keeping; drug depot management; and prevention and control of endemic diseases. The lead mothers in any one barangay were assigned from six to ten of these tasks.

A one-day pre-service training workshop was held in each barangay for the lead mothers. The trainers were local basic health providers, such as rural health physicians, midwives, sanitary inspectors, and BHWs. Generally one of these health workers was also put in charge of supervision of the lead mothers. Quite a few of the lead mothers were unable to attend the pre-service training because they were busy with other tasks (unrelated to their roles as lead mothers).

The performance and effectiveness of lead mothers varied in the study barangays. In a few cases, many of the lead mothers remained inactive or resigned their posts. (See Table 3 for numbers of lead mothers that were active, inactive, or resigned at the time of evaluation.) The lead mothers who were active ended up serving as motivators for environmental sanitation

and vegetable/herbal gardening. In a few barangays, the lead mothers were quite effective in encouraging people to start vegetable and herbal gardens, build compost pits, and construct toilets.

Table 3. Activity of lead mothers
(measured by attendance at meetings)

No. of Lead Mothers	Milleza	Bucaya	Badiang	Tastasan	Bololacao	Maribuyong
Active	3	12	8	4	9	8
Inactive	5	1	2	5	0	1
Resigned	2	0	0	2	0	0

The PRICOR researchers observed several factors that affected the lead mother's performance and effectiveness. Factors that were identified as having a positive impact on lead mother performance included: (1) adequate supervision, (2) motivation and enthusiasm for the project displayed by local basic health providers, (3) recruitment of appropriate and respected lead mothers from among the barangay residents, (4) an arrangement of barangay houses which facilitates ease of communication and coordination, (5) existence of active development organization in the barangay, (6) active support and leadership from local political leaders, (7) cohesiveness within the group of lead mothers, (8) participation of the lead mothers in tangible activities such as drug depot management, and (9) availability of valued supplies (i.e., PUSH-supplied pumps and toilets) for distribution by the lead mothers. The more successful lead mother programs enjoyed at least a few of these facilitating factors. The most important facilitating factors seem to have been good supervision and support from the community (health workers and political leaders).

Factors that were identified as having a negative impact on lead mother performance included: (1) lack of adequate supervision, (2) little support and enthusiasm from local basic health providers, (3) the attitude of certain health providers that lead mothers infringe on their activities, (4) lack of willingness to serve on the part of the lead mothers, (5) lack of time available for the project on the part of the lead mothers (usually because of their extensive involvement in income-generating tasks and household chores), (6) lack of simple apparatus and drugs, (7) scattered barangay houses with little interaction, and (8) general apathy of the community. The researchers saw the most important constraining factor as the lack of time that the unpaid lead mothers had to devote to their duties because they had to spend time earning money and doing household work.

SOLUTION TESTING AND VALIDATION

Solution testing and validation took place after the community financing schemes and lead mothers programs had been functioning for some time. The PRICOR researchers performed a time series analysis using data on the study

and control barangays from a post project survey (carried out soon after the PRICOR project was completed) and the PUSH Record Keeping System (RKS). This was an attempt to determine if the project activities had caused any changes in the health status and behavior of the study barangays. A year after the completion of PRICOR project support, the botikas and the emergency hospitalization fund were revisited by the researchers to see if the community financing schemes were still operating, and if so, how well.

The botikas and the emergency fund were found to be functioning well a year after the PRICOR Project ended. Between 83 and 92 percent of barangay residents had contributed to the capitalization of the botikas (99 percent to the loan fund). Utilization of the botikas ranged between 54 and 77 percent of households. However, the analysis of post-project surveys was not able to show attributable impact of the project on the health status and health behavior of the barangay communities.

DISCUSSION AND CONCLUSIONS

This PRICOR study has several important lessons for community financing of primary health care activities. From the success of the botikas sa barangay, it can be concluded that Filipino villagers value having a local sources of desired drugs sufficiently enough to pay for this service. With some outside assistance, they can learn how to capitalize, organize, and manage such an enterprise. This is particularly important to note because the government also has a program to help barangays establish botikas, but recent evaluations of this program are not encouraging; a large proportion of these botikas decapitalize in less than one year. A major difference between the PRICOR team's approach and government practice is that the government provides the initial stock but does not provide much guidance in management.

Extensive community participation in designing, financing and managing the botikas seemed to be a key factor in their performance and sustainability. Because the drug revolving funds were the creation of the community, and the barangay residents chose the drugs that would be sold there, the botikas were more responsive to local demand than other drug sources. It may also be that when communities capitalize a venture themselves they feel a greater sense of responsibility for maintaining that capital.

Barangay residents were not, however, willing to pay for preventive and promotive health services, as had been initially hoped by the researchers. In all of the barangays, curative health care financing schemes were selected over preventive schemes. Similar results have come from community financing projects all over the world. Most health service utilization is geared to crisis illness management. Generally, people do not value preventive and promotive care enough to spend their hard earned cash on it.

The research team feels that the impetus toward creating a botika must come from an outside catalyzing source, and that, on their own, Filipino villagers are not very likely to move in this direction. Outside input from the research staff, in the form of information gathering, training, and community organization, was critical to the success of the botika projects. However, successful operation of a botika in one barangay did not seem to motivate people in nearby barangays to approach either the managers of the botika or the outside group for help in getting one started in their own barangay.

The results of the lead mothers program are mixed. Those barangays where lead mothers were active and effective did make clear that potential beneficiaries of health services can take on roles as preventive and promotive health care motivators if they are given adequate support.

The botikas sa barangay were clearly a successful demonstration of community financing of primary health care. A basic question about the long-term viability of these community ventures still exists, however. It remains to be seen if, without the interest of the research team, the people will continue to see the botika as a worthwhile addition to barangay life, and if, particularly as the first wave of PRICOR-trained botika staff leave their jobs, the management technology can be transferred to subsequent workers without some form of outside help.

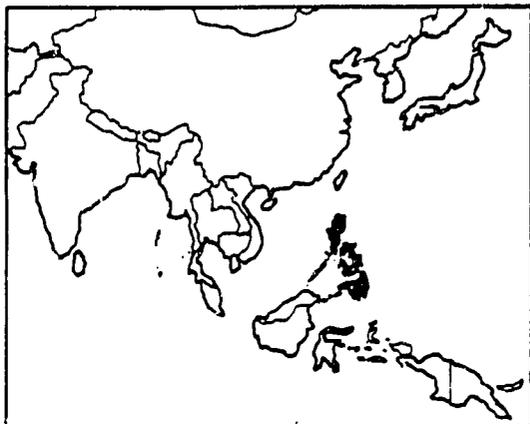
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This study was conducted from January 1983 to May 1985 by the University of the Philippines in the Visayas Foundation. Further information is available from the co-principal investigators, Dr. Trinidad S. Osteria, Institute of Southeast Asian Studies, Heng Mui Keng Terrace, Pasir Panjang, Singapore, and Professor Ida M. Mason, University of the Philippines in the Visayas, Iloilo City, Philippines, or from Dr. Stewart Blumenfeld, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

INCREASING THE EFFECTIVENESS OF THE BARANGAY HEALTH WORKER IN THE PHILIPPINES FOR PROVIDING NUTRITION SERVICES WITHIN THE PHC FRAMEWORK



A recent decline in food production in the Philippines has increased problems of childhood malnutrition and resultant mortality. The development of a nutrition intervention program within the primary health care (PHC) structure has therefore been identified as a top priority. In April 1984, an operations research study aimed at improving the delivery of nutrition services by barangay (village) health workers (BHWs) was initiated in Rizal Province by the Institute of Public

Health (IPH) of the University of the Philippines in cooperation with the Nutrition Service of the Ministry of Health (MOH).

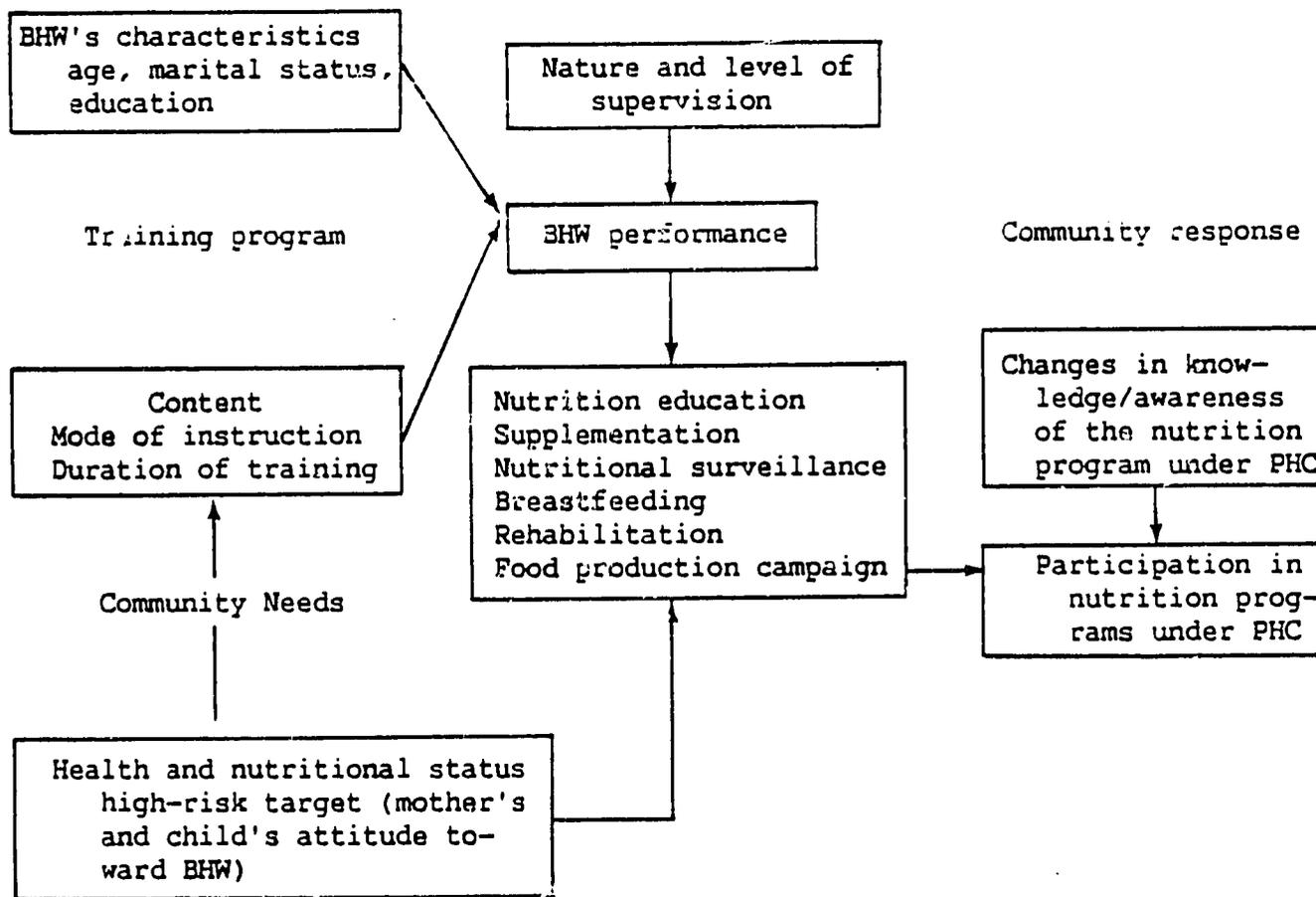
As do many developing countries, the Philippines confronts several health problems that are amenable to intervention. Major health problems targeted by the National Health Plan of 1982 include communicable diseases, malnutrition, rapid population growth, endemic diseases, poor environmental sanitation, and drug abuse. The problem of malnutrition has been particularly persistent. According to recent studies, four out of every five Filipino children are undernourished. In Rizal Province (the study area), the proportion of preschoolers identified as malnourished (using Filipino standards of weight for age) ranged from 60 to 77 percent. A number of factors account for their poor nutritional status, including the inadequate delivery of nutrition services. Health problems are compounded by low standards of living, poverty, fluctuating costs of fuel, increasing costs of food and other basic commodities, crowded and inadequate housing, increasing costs of medical care, and an inequitable distribution of health manpower and facilities. The Philippine Ministry of Health (MOH) has launched a national PHC program to combat these and other health problems. A central component of this program is the training and deployment of barangay community health workers. These barangay health workers (BHWs) are primarily an extension of the health team and their principal task is to provide basic preventive, promotive, and curative services, including nutrition services. Midwives (the lowest level professionals in the health care delivery system) train and supervise the BHWs.

ANALYZING BHW NUTRITION SERVICE DELIVERY

Existing surveys revealed that BHWs were not delivering nutrition services effectively. To help analyze the problem, the investigators designed a model

of the interacting factors that influence the performance of nutrition service delivery by the BHW (See Figure 1). This analytic framework helped to pinpoint key program elements. As indicated in the model, BHW characteristics, as well as the content, mode, and duration of nutrition training are important elements in the effective delivery of nutrition services within the PHC system. The nature and level of supervision also affect BHW performance. Community nutrition problems and attitudes of the recipients should be taken into consideration for the program to be effective. Ultimately, BHW performance should influence the community members' knowledge of nutrition and utilization of nutrition services.

Figure 1. Factors influencing the role of the BHW in providing nutrition services



After considering the various parts of the model, the researchers concluded that BHW training in nutrition was inadequate. Thus, improvement of BHW training, specifically the nutrition training modules, was chosen as the focus for this PRICOR-supported operations research study. The goal of the study was to increase BHWs' effectiveness in providing nutrition services to their communities. Specific objectives of the study included: (1) procurement of information on current BHW nutrition training and activities, (2) modification of the current nutrition training modules for BHWs, (3) testing of the modified nutrition training modules in the field, and (4) documentation of the field test and any changes in community knowledge and utilization of nutrition services.

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ANALYZING BHW TRAINING IN NUTRITION

Three approaches were used for in-depth analysis of BHW nutrition training: (1) a review of the existing nutrition training modules; (2) interviews of the BHWs and the midwives who supervise them; and (3) a survey of community members in four barangays (villages) in Rizal Province.

Training Modules

By 1983, two training modules in nutrition had been developed by the MOH Nutrition Service, one for midwives and another for BHWs. Analysis of the BHW nutrition training module indicated that although some topics were covered adequately, there was not enough emphasis on how BHWs should deliver nutrition services to communities. Despite exposure to these training modules, both the midwives and the BHWs still relied heavily on the 1983 PHC Household Teaching Manual (a general manual for both midwives and BHWs) as their guide for routine training activities and service delivery. The PHC Household Teaching Manual was found to be deficient in such basic information as: (1) the signs and symptoms, prevention, and rehabilitation of protein-energy malnutrition; (2) the use of growth charts; and (3) the promotion of proper nutritional practices. Additionally, there was no mention in the PHC Household Teaching Manual of programs carried out by Mothercraft Nutrition Centers or Nutrition Rehabilitation Wards/Units run by the MOH Nutrition Service.

Interviews

Interview schedules were designed for the nutrition service providers (midwives and BHWs) and the recipients of those services in the barangays. Baseline information was gathered by using open-ended questionnaires specific to each group and a standardized nutrition knowledge and practice questionnaire. The surveys were based on the major nutritional concepts believed to be important for effectively averting or treating malnutrition, including: (1) maternal nutrition, (2) infant and child nutrition, (3) food production, (4) nutrition surveillance, (5) nutrition education, and (6) nutrition rehabilitation. The respondents to these surveys included four midwives (one from each of the four barangays), 21 BHWs (four to six from each barangay), 1763 households, and 349 mothers.

In their responses, many of the BHWs stated that insufficient time had been spent on nutrition during training sessions. They also reported that village mothers' lack of interest in nutrition topics was a significant problem when they tried to introduce the subject. Midwives felt that the training had equipped the BHWs with the most of the knowledge and skills necessary for their role in nutrition service delivery, but that problems existed with BHW nutrition training, including: lack of time to cover the topics adequately, lack of transportation allowances for trainers, and lack of standardized training procedures.

The majority of the 349 mothers interviewed had more than three children. Most of them knew the value of breastfeeding and of participation in the national child weighing program "Operation Timbang" (OPT), but few were aware of the availability of nutrition clinics, nutrition rehabilitation wards, or other nutrition services. They felt that the emphasis placed on food production when the BHWs discussed nutrition was inappropriate given the lack of land, space, and capital in their communities. Perceived problems affecting nutrition included lack of nutrition information and inappropriate

selective provision of food supplements by clinic workers. The major nutrition activity reported by the mothers was referral of malnourished children to the local midwife.

The results of the three surveys verified the investigators' preliminary hypothesis that the BHW nutrition training program was a major factor in BHWs' weak performance in nutrition service delivery. The researchers then proceeded to develop ways to improve BHW training in nutrition.

DEVELOPING AN IMPROVED STRATEGY FOR BHW TRAINING IN NUTRITION

The researchers began the solution development process by brainstorming on the components needed for an effective training program. This process was aided by the information gained from the examination of the existing training modules and the surveys. They came up with the following components: (1) a location accessible to the most participants, (2) training facilities that are conducive to effective learning, (3) adequate time for comprehensive discussions and demonstrations, (4) knowledgeable and approachable trainers, (5) training materials that are appropriate and easy to understand, and (6) monitoring and close supervision of the training program.

To develop the new training strategy, a working group of Ministry of Health (MOH) personnel and Institute of Public Health (IPH) staff was organized. The group decided that BHW skills should be built up in three broad areas: determination of the nutritional status of household members, implementation of selected nutrition activities, and monitoring the nutritional status of households.

Multiple Criteria Utility Assessment (MCUA), a group decisionmaking tool, was used by the working group to make major decisions related to the training. Four decision variables were assessed: (1) the topics of nutrition training, (2) the teaching method(s), (3) the type of trainers, and (4) the duration of training. Using MCUA, the emphasis on different nutrition topics was prioritized as follows:

1. Importance of nutrition
2. Food handling
3. The national child weighing program ("Operation Timbang")
4. Nutrition of pregnant and lactating women, infants, and children
5. Common nutritional disorders and illnesses
6. How to organize and conduct household teaching
7. Family productivity

Possible instruction methods included various combinations of didactic and participatory techniques. A choice was given between (1) lecture with teaching aids, (2) demonstration, (3) lecture and demonstration combined, (4) lecture and demonstration with discussion or (5) lecture, demonstration, discussion, group dynamics, and role playing combined. The alternative chosen as best through the use of MCUA was a combination of all teaching methods: lectures, discussions, demonstration, role playing, and group dynamics.

The options for trainers included public health nurses, midwives, and a nutritionist. The working group determined that all three; the midwives and public health nurses of the study area, and the Regional Nutritionist, should

be involved in training. Due to the illness of the Regional Nutritionist the group agreed to obtain a substitute nutritionist from the Nutrition Service of the MOH.

Although a staggered training program of four hours per day every other day was selected as the best alternative for length of training by the MOH/IPH working group, consultation with the service providers led to adoption of a different alternative. They felt a straight five-day training course would be more effective in maintaining the interest of the participants.

The researchers spent twelve weeks writing the modules on the seven nutrition subject areas. Information on the needs of community residents, the problems facing the service providers, the previous BHW training manual (1983), and the five major thrusts of the MOH were considered during module development. Each module included the following:

1. Learning objectives
2. Content of the teaching/learning program
3. Learning activities
4. Teaching-learning materials
5. Evaluation activities

The collaborative assistance of many agencies increased the availability of technical resources. Reference materials were collected from agencies such as the MOH, the Nutrition Center of the Philippines, the Technology Resource Center, the Food and Nutrition Research Institute, the Bureau of Plant Industry, and the Bureau of Animal Industry. These materials were used in module development. The results, entitled "Modules for Training Barangay Health Workers in Nutrition", were translated to Tagalog for use in the field.

IMPLEMENTING THE IMPROVED TRAINING STRATEGY IN THE FIELD

Training of Trainers

The MOH and IPH continued to collaborate in the training of trainers. Five faculty members from the IPH Department of Nutrition demonstrated methods for teaching the modules to the PRICOR research assistants. These research assistants then trained the midwives, public health nurses, and the nutritionist who would later train the BHWs. MOH personnel attended these classes and acted as advisors to the research assistants. These training sessions for the trainers elicited many valuable suggestions, and a module on nutrition in adolescents and the elderly was added to the training course. A two-week gap between the training of the trainers and that of the BHWs allowed the research assistants sufficient time to incorporate of the suggestions and comments made by the MOH and the participants into the modules.

Before actually training the BHWs, the trainers (midwives, public health nurses, and the nutritionist) conducted a two-day practice training course attended by the MOH personnel and the research assistants. This enabled the nurses, midwives, and nutritionist to build self-confidence and familiarize themselves with the modules and the teaching-learning techniques.

Training of BHWs

The training of 22 BHWs (from three of the four barangays studied earlier) was conducted in Cardona in Rizal Province in June of 1985. As had been planned, the training sessions included lectures, nutrition games, demonstrations, practical exercises, and role-playing. Both IPH research staff and the MOH staff were present during the entire training period to provide back-up support. On the last day of training the midwives assisted the BHWs to develop action plans for nutrition service delivery specific to the problems encountered in their barangay. These action plans are outlined in Table 1 below.

Table 1. Summary of barangays' nutrition problems and proposed plans of action in three study barangays of Rizal, 1985

Barangay	Problem	Plan of action
Limbon-Limbon	Lack of knowledge in nutrition Poor environmental sanitation High prevalence of under-weight children Lack of income-generating activities	To perform nutrition education To lead environmental clean-up To conduct OPT
Kuhala	Lack of knowledge in nutrition High prevalence of under-weight children High birth rate due to lack of knowledge in family planning	To perform teaching on nutrition and family planning To conduct OPT
Real	Lack of knowledge in nutrition and medicinal plants Poor environmental sanitation High prevalence of under-weight children	To perform teaching on nutrition and medicinal plants To lead environmental clean-up To conduct OPT

Evaluation of BHW Training

Identical tests were administered to the training participants before and after training. A substantial improvement in the participants' scores was measured. Sixty percent of the trainees improved their knowledge in nutrition. Findings of a post-training evaluation indicated that the course had been adequate in the time allotted to the various topics, the quality of the trainers, the methods of instruction, and the training materials.

DELIVERING NUTRITION SERVICES TO THE BARANGAYS

In the first month after their training, BHWs began to implement their action plans in the three study barangays: Limbon-Limbon, Kuhala, and Real. A fourth barangay, Concepcion, was selected as a control. BHWs in Concepcion did not receive the new nutrition training and continued to deliver services in the usual manner. The barangays had been selected according to three basic criteria: (1) no barangay nutrition scholar (the specially-trained community nutrition worker of the National Nutrition Council), (2) a population of approximately 100 families, (3) an operational PHC program, and (4) midwives and BHWs trained through the regular MOH/PHC training program. The general characteristics of the study and control sites were similar. Populations ranged from 685 to 729 inhabitants. All were accessible by at least three wheeled motorcycles, and some were also accessible by jeeps and motorboats. Limbon-Limbon and Kuhala are rural coastal barangays and most inhabitants are either farmers or fishermen. Real is a semi-urban commercial barangay inhabited by skilled laborers. Concepcion is located in a rural mountainous area which is separated from the other three barangays by a town. Most job-holders in Concepcion are skilled laborers.

Results of the improved training strategy were validated using several techniques. The nutrition-related activities of the BHWs were documented through participant observation and monitoring forms. Information gathered through these methods was used to develop narrative case studies of BHW nutrition activities in each of the barangays. To relate these activities to actual behavioral change in community members, a post-intervention survey of mothers was carried out to detect changes in knowledge and practices towards nutrition.

Post-intervention Survey

The post-intervention survey showed that mothers' knowledge and practices towards nutrition were positively influenced over the study period. The mothers' scores on a standardized test were significantly higher in all three study barangays after they had attended household nutrition classes led by the BHWs. These data suggest that the training program instituted by the researchers was associated with an improvement in mothers' nutrition knowledge and practices. Scores of the mothers in the comparison barangay also improved slightly, but not significantly.

Case Studies

The case studies compiled information from various sources in order to present a complete picture of nutrition service delivery in each barangay. Specifically, the case studies included information on:

1. The socioeconomic and cultural environment in the study communities in relation to nutrition service delivery,
2. Activities undertaken by BHWS that led to the implementation of nutrition projects,
3. Implementation, management, and supervision of nutrition projects, including problems experienced and solutions developed,
4. The extent of community participation in and utilization of nutrition services,
5. Factors affecting community participation in and utilization of nutrition services, and
6. Accomplishments of any nutrition projects carried out.

Following is a brief summary of each of the four case studies.

Barangay Limbon-Limbon. BHWS were selected in Limbon-Limbon by members of a Women's Club in 1983. Four mothers were chosen because of their involvement in community work. Previous to the project's training course in 1985 only one of the four BHWS was active in service delivery. After the training course, the BHWS agreed to conduct house-to-house nutrition education visits, child weighing, and a clean-up campaign.

The strategy for provision of nutrition services was slightly modified upon implementation. House-to-house visits were found to interfere with the BHWS' household work. Thus, a household teaching class was adopted which allowed the mothers in the catchment area to gather in one house for classes. Initially these household classes were well received. Weighing of children and the beautification campaign, "Operation Linus," were conducted within the first two months after training, as well. However, when visits from the midwife declined after the first two months, the barangay health workers resorted to their everyday activities.

Barangay Kuhala. In 1983, five BHWS of Kuhala were selected by the Parish midwife and a former Municipal Health Officer on the basis of their leadership qualities, literacy, and willingness to undergo training. Six additional BHWS were recruited by the original BHWS. Prior to training only four BHWS were active and only one of these was thought to be effective in health service delivery. In the June 1985 training session, the BHWS planned to conduct household teaching on nutrition and to weigh children as part of "Operation Timbang."

As in Barangay Limbon-Limbon, most of the household teaching classes occurred in the first two months after the training course. However, lack of interest on the part of the mothers led to a decline in teaching by the BHWS. Children

were weighed and immunized with the help of the midwife. Two free clinics were conducted in the second month after training - one led by the Municipal Health Officer was poorly attended; the other led by the Parish Team was well attended.

Barangay Real. In Barangay Real, the Barangay Captain, the Barangay Secretary and two Councilmen selected BHWs according to their maturity in terms of age, educational background, responsibility and conscientiousness, willingness to render voluntary service, and availability. Initially five individuals, all married, consented to be BHWs. In June of 1985, two additional BHWs were recruited. Five of the seven BHWs were considered to be active and effective prior to attending the new training program. At the end of the training session the group planned to organize household teaching, conduct home visits, and conduct "Operation Timbang" to monitor malnourished children. Together with the Barangay Captain they decided to lead an environmental sanitation campaign called "Operation Linus."

Household classes were conducted once a week in each area by the BHWs and their midwife. For two of the areas, the BHWs performed house calls since mothers residing in these areas were working. Within a month and a half, seven modules were taught to mothers in the six areas. By the end of two months the BHWs had completed nine household teachings per area. Child weighing was conducted on a monthly basis and "Operation Linus" was successfully completed. Community participation in nutrition activities steadily increased over the study period. By the end of the fourth month, nearly two-thirds of the mothers had participated in nutrition activities.

Barangay Concepcion (control). When the need for BHWs was recognized in 1983, two mothers volunteered their services. Additional BHWs were appointed by the midwife if they met the criteria of being at least a high school graduate, willing to work without pay, responsible, and industrious. Only one or two BHWs adequately performed their duties. The most active worker resigned in August of 1985. BHWs assisted the midwife in free clinics or during immunizations. They seldom conducted home visits and only gave out health information when the need arose.

Since Concepcion was selected as the comparison site, the BHWs did not participate in the revised training program. July is considered Nutrition Month nationwide in the Philippines. In line with this, free clinics and "Operation Timbang" were carried out in the barangay. The BHWs undertook home visits, but this was short lived and no major activities were conducted thereafter. Most of the population received health care services directly through the provincial hospital located in the next town. Thus, participation was minimal except in one area served by two BHWs.

DISCUSSION AND CONCLUSIONS

An important variable in the success or failure of the nutrition activities in the experimental barangays was the support of the local midwife and the community. In the most successful barangay, community input and strong support from the midwife led to continued improvement in the BHWs' nutrition activities. In the two communities where BHW interest decreased, neither the midwife nor the communities gave strong support to the BHWs in their nutrition

service delivery. The researchers concluded that, in order for BHWs to carry out successful nutrition service delivery, training would probably need to be supplemented by strong supervision by the midwife and substantial community support.

This study found that a relevant training program could increase the effectiveness of BHW nutrition service delivery. The revised training module and more participatory training style led to improved trainee knowledge. When the support of the community and the midwife was present, this improvement translated into an increase in nutrition activities by the BHWs and better participation by the community. Thus, it comes as no surprise that with more effective delivery by the BHWs, the nutrition knowledge and practices of the community members improved.

Utilization and dissemination of the study results was one of the key features of this project. The use of MCUA as a decisionmaking tool was enthusiastically adopted by the Nutrition Director of the MOH, who preferred MCUA to less formal methods. The MOH endorsed the training manuals developed in the PRICOR study and has ordered the printing of 30,000 copies for the MOH training program. The nutrition modules have also been adopted by many other organizations within the Philippines.

* * *

This study was conducted from May 1984 through March 1986 by the Institute of Public Health of the University of the Philippines, in cooperation with the Ministry of Health. This summary is based on the final report submitted by Carmencita Salvosa-Loyola, Trinidad S. Osteria, Adelisa C. Ramos, and Lourdes M. Sumabat. Further information is available from the principal investigator, Dr. Carmencita Salvosa-Loyola, University of the Philippines, Institute of Public Health, P.O. Box EA 460, Manila, Philippines, or from Dr. Stewart Blumenfeld, PRICOR study monitor (Chevy Chase).

practical strategies to overcome these constraints and to rank the strategies in order of their importance and feasibility in light of country-specific factors.

ANALYZING THE DRUG DISTRIBUTION PROBLEM

The PRICOR researchers initially discussed the problems associated with drug delivery in the rural areas of Somalia with officials from the MOH and several international health agencies. Factors identified as possibly contributing to breakdowns in drug delivery included: lack of sufficient quantities of basic drugs at the central level, unreliability of the drug distribution system, ignorance of the use of specific drugs for specific conditions, inadequate capability to forecast drug requirements for order placement, and insufficient funds to purchase required drugs in large enough quantities to achieve the best possible cost per unit.

The researchers noted that many people working to extend PHC in Somalia had long assumed that the villagers' lack of disposable income was one of the major factors limiting drug use at the village level. However, on several occasions expatriates working in Somali PHC programs were requested to purchase drugs in behalf of village committees. This suggested that villagers might, in fact, be willing and able to pay for drugs and also brought into question preconceived notions about village-level demand for modern drugs.

Using the information gained through these discussions and observations, the PRICOR team developed three questionnaires for surveying samples of rural populations and their drug sources. Separate questionnaires were created to gather information on household drug use, drug dispensers' perceptions of drug needs and use, and the supply of PHC drugs in rural outlets.

The Household Survey

The study team selected 30 rural villages for the household survey using a multistage cluster sample design. From the 16 regions of Somalia, six regions were chosen on the basis of geographical representation, presence or absence of PHC activities, and feasibility of travel. For the sake of convenience, only villages that were within two and a half hours driving time from the regional base of operations were considered. From that set of villages, five villages in each of the six regions were selected at random. In each village, 24 households were randomly chosen for the survey; four interviewers each surveyed six households.

From the 716 households surveyed, the interviewers obtained information on demographic characteristics, sanitation practices, and drug utilization. The average number of persons per household surveyed was 5.8. Women were reported to be the "head" of the household in 24.0 percent of all households surveyed. Forty-six percent of all households reported that they had radios. Approximately 17 percent of the population of targeted households were reported to be literate in at least one language.

A few of the statistics on sanitation practices were of particular interest. The majority of households interviewed (64.5 percent) used wells as their source of water. Forty-six percent of households reported that garbage was

PRICOR Primary Health Care Operations Research

Study Summary

A SURVEY OF DRUG UTILIZATION AT THE VILLAGE LEVEL
IN SIX REGIONS OF SOMALIA AND ITS IMPLICATIONS FOR
THE PRIMARY HEALTH CARE AND ESSENTIAL DRUGS PROGRAMS



An operations research study focusing on the utilization of modern drugs in rural areas of Somalia was carried out by researchers from the Somali National Academy of Arts and Sciences and Medical Service Consultants, Inc. (USA), with the support of PRICOR and UNICEF, and with the cooperation of the Somali Ministry of Health (MOH) and USAID/Somalia. The study was conducted in villages in six geographically diverse regions of Somalia during 1985.

BACKGROUND

The majority of Somalia's 4.5 million inhabitants do not have access to modern health services. This is particularly true of the rural and nomadic people who constitute an estimated 85 percent of the country's population. Recognizing that primary health care (PHC) provided the best chance for bringing health services to unserved populations, the Government of Somalia instituted a comprehensive PHC program in 1977.

The Somali PHC program includes the provision of essential drugs. All pharmaceuticals imported from outside Somalia or manufactured within Somalia are supposed to be under the control of the independent, state-owned enterprise, ASPIMA. After procuring the drugs, this agency is responsible for distributing the pharmaceuticals from a central warehouse to commercial pharmacies and to government PHC stations in the rural areas. In some cases, however, the drugs that are available to villagers through the private sector have not passed through ASPIMA, but rather have come across the border through unofficial channels.

According to policy, medicines are provided free of charge at government PHC facilities. At present, however, few basic PHC drugs are available in the rural areas and many PHC stations are closed because they have no drugs to distribute. Decisionmakers in the MOH feel that the shortage of drugs in rural areas is a major constraint to implementation of this PHC program in Somalia.

The purpose of the PRICOR study was to examine the operational problems in drug delivery in Somalia. One major objective was to identify and quantify, to the extent possible, the most important constraints to furnishing PHC drugs to Somalia's rural population. The other main objective was to develop

The 716 households interviewed reported average drug expenditures of 68.64 Somali shillings (approximately US\$.83, at the 1985 exchange rate) in the previous six months. For the 32.4 percent who purchased drugs, this average was 211.85 shillings (US\$ 2.55). Average expenditures (based on the total sample) ranged from 190.43 shillings (US\$ 2.29) in Lower Juba to 28.40 shillings (US\$.34) in Sanaag. Average expenditures for drug users ranged from 312.18 shillings (US\$ 3.76) in Lower Juba to 115.54 shillings (US\$ 1.39) in Lower Shabelle. These drug expenditures can be compared with average six-month expenditures for the 716 households of US\$ 20 on tobacco, US\$ 16 on tea, US\$ 18 on celebrations, and US\$ 335 on food. The average cost of treatment for 343 cases of illness was 135.01 shillings (US\$ 1.63) counting both drugs and consultation fees.

The Dispenser and PHC Drug Surveys

Thirty clinics, health posts, and drug shops in the target villages were chosen, based on indications by households surveyed that these were sources of drugs. Some drug shops at district and regional levels were surveyed when villagers indicated that they were the prime source of drugs. The dispensers interviewed included community health workers (CHWs), MOH public health workers, drug shop owners and attendants, MOH nurses, and MOH medical officers. Each dispenser was asked to name the four most often diagnosed diseases/injuries and to discuss the recommended treatment for each. The supplies of 21 essential PHC drugs were also assessed at 28 of the drug dispensing facilities.

Of 31 different diseases named by the dispensers, the three most often cited were malaria, diarrhea/dysentery, and bronchitis (see Table 2). This seems to correspond approximately with the most common illnesses reported by the households: cough, diarrhea, fever, headache, influenza, malaria, and stomach distress.

The most frequently mentioned drugs for the "most common diseases" were penicillin, chloroquine, and aspirin. Drugs reported by households to have been received from PHC or other MOH facilities included chloroquine, aspirin, oral rehydration salts (ORS), ferrous sulfate, cough medicine, ampicillin, and ciltotrim. Seventy-eight percent of all facilities surveyed had chloroquine tablets and some oral dosage form of aspirin in stock. Sixty percent had ferrous sulfate and tetracycline ophthalmic ointment. Forty-three percent had some form of penicillin in stock. ORS packets were stocked by 40 percent of practitioners.

The PRICOR researchers made an attempt to assess the acceptability and appropriateness of the advice dispensers reported giving to patients. All advice reported given for use of chloroquine tablets, cotrimoxazole tablets, mebendazole tablets, oral penicillin, streptomycin, and tetracycline ophthalmic ointment was acceptable and appropriate. Directions for use of aspirin, penicillin injections, and oral tetracyclines were found to be unacceptable 10.7 percent of the time.

Conclusions of Problem Analysis

The results of the surveys showed that village-level demand for drugs is greater than the public sector has yet been able to supply. The drugs that

disposed of by "throwing away." A question concerning latrines and bathrooms was eliminated after it was discovered that very few households had these facilities.

Thirty-nine percent of households surveyed (average size 5.8) reported that someone in the household had been sick in the past six months. This figure seems low and it is possible that the wording of the question may have emphasized illnesses treated with drugs.

Thirty-two percent of households had spent money on drugs in the past six months. Money for drug purchases was reported to come "from the farm" (42.3 percent of responses), "from selling livestock" (12.6 percent), and "from business" (22.9 percent).

Some drug users (approximately 7.0 percent of the total sample or 16.7 percent of apparent drug users) reported purchasing drugs from a government clinic (where drugs are supposed to be free). Government health care facilities may be charging for drugs to help meet costs. Forty-nine percent of respondents indicated that PHC or other MOH facilities were their first choice when seeking modern medicines (see Table 1).

Table 1. Reported preferred source for obtaining drugs

Region	P e r c e n t R e p o r t i n g					
	Village Drug Shop	Village Clinic	Outside Drug Shop	Outside Clinic	District Source	Regional Source
Lower Juba	36.8	7.7	1.7	5.1	21.4	26.5
Lower Shabelle	12.7	47.5	0.8	6.8	11.9	13.6
Bay	7.1	67.5	0.9	4.4	13.2	5.3
N.W.	25.7	63.7	-	5.3	2.7	1.8
Togdheer	10.2	11.9	1.7	11.0	27.1	38.1
Sanaag	5.1	52.1	5.1	13.7	0.9	23.1
Av. %	16.3	41.7	2.0	7.7	13.0	18.1

Table 2. Diseases cited by dispensers
(Six Region, 30-Site Sample)

Diseases	Percent
1. Malaria	13.8%
2. Diarrhea & Dysentery	13.8%
3. Bronchitis	12.8%
4. Bilharzia	5.5%
5. Gonorrhoea and Syphilis	5.5%
6. Tuberculosis	6.4%
7. Pneumonia	3.7%
8. Conjunctivitis	2.8%
Total	64.3%

are being supplied through the governmental sector are not limited to the most essential drugs for treating the most common health problems. These factors contribute to the high morbidity and mortality rates in Somalia.

DEVELOPING SOLUTIONS

A simple group judgment technique was used to select solutions to these operational problems. A summary of the findings from the three surveys was circulated to seven decisionmakers in the MOH, along with a list of strategies to improve the delivery of drugs to the rural areas of Somalia. The MOH decisionmakers were asked to comment on the findings of the study and to rank the alternative strategies in terms of effectiveness and feasibility. The participants could "vote" for more than one strategy.

To address the problem of village-level demand for drugs exceeding public sector capabilities, six of the seven decisionmakers voted to encourage private sector initiatives in drug delivery. Five decisionmakers voted to improve existing public sector drug delivery systems. With regard to the relatively low number of disease treatments reported at the village level, six decisionmakers proposed to review the PHC drug lists, while only three thought that the present drug list should remain unchanged. With regard to the reports that village households purchased drugs from private sector sources, five of the seven voted in favor of seeking ways to ensure that these purchases are made at the lowest possible cost and in the most appropriate manner.

The PRICOR team presented the seven decisionmakers with six options for improving the availability of drugs at the village level. Six of the participants cited the following three options as the most feasible: (1) improve the drug distribution system, (2) improve inventory control at the central drug warehouse, and (3) improve dispenser awareness of appropriate drug use. The same six options were ranked from most to least important for improving the availability of drugs to the rural population. Seeking the local production of pharmaceuticals was ranked as the most important. Limiting the number of drugs to be handled and improving the distribution system tied for second place.

RECOMMENDATIONS

After examining the findings of the PRICOR study and the strategies suggested by the Somali MOH decisionmakers, the PRICOR team developed recommendations for improving the drug delivery to the rural areas. The researchers thought that both the public and the private sectors should be used for PHC drug delivery. They recommended that the MOH village-level diagnostic and prescribing capabilities be improved and expanded and, at the same time that private sector initiatives to improve the supply of drugs in the villages be encouraged.

The PRICOR team also recommended the preparation of a written "Guide to PHC Drug Use" that could be used to teach the Somali villagers. A functioning Somali women's organization was identified as a group to work with in developing the education program. It was also recommended that the MOH carry out a review of the PHC drug list with the goal of limiting the items.

SIGNIFICANT FINDINGS AND CONCLUSIONS ON BASIC DRUGS IN SOMALIA

This PRICOR study found that Somali villagers are willing and able to make out-of-pocket payments for drugs since they are already doing so. The demand for modern drugs in the rural areas is much greater than the government PHC facilities have been able to meet. In response to this shortage of drugs at public health centers, villagers who can afford to do so purchase drugs from the private sector. The private sector drug retailers have drugs in generally adequate quantities at generally acceptable prices. Many of these drugs have not passed through the official drug procurement agency, ASPIMA, but rather have been brought over the border through unofficial channels. These assembled findings led to the conclusions that there is, in fact, demand for drugs in the villages and that it is the drug delivery system that needs to be improved.

Several diseases were found to be major public health problems in the rural areas of Somalia. Malaria, diarrhea/dysentery, bronchitis, bilharzia, gonorrhea/syphilis, tuberculosis, pneumonia, and conjunctivitis were common diseases occurring in the survey households over the six months preceding the study. Of the 47 items recommended by the dispensers as treatments for these "most common diseases," 12 items would be sufficient to treat the spectrum of illnesses. These findings led the PRICOR researchers to conclude that there

was a need for education on basic drug use for the rural Somalis and a need to limit the variety of drugs available in rural areas to those most essential for treating the most serious health problems.

* * *

This study was conducted from April 1985 to December 1985 by the Somali National Academy of Arts and Sciences and Medical Service Consultants, Inc. This summary is based on the final report of the study prepared by the principal investigator, Dr. Norman S. Lane. Further information is available from Medical Service Consultants, Inc., 1716 Wilson Blvd., Arlington, Virginia 22209, or from Dr. Stewart Blumenfeld, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

COMMUNITY PARTICIPATION IN IMPROVING VILLAGE HEALTH WORKER SUPERVISION IN TANZANIA



Researchers from the Faculty of Medicine, University of Dar Es Salaam conducted an operations research (OR) study to address the problem of inadequate supervision of village health workers (VHWs) in Bagamoyo and Hanang districts of Tanzania. The objective of the study was to improve the utilization and coverage of primary health care services provided by VHWs by improving VHW supervision. The study, conducted from 1983 to 1986, relied on the extensive participation of villagers, village governments, VHWs, supervisors, and Ministry of Health decisionmakers.

BACKGROUND

Tanzania's land surface of approximately 1 million square kilometers holds a population of approximately 20 million. As in many other countries of Africa and the developing world, the people of Tanzania face serious health problems. The most common problems include malaria, pneumonia, measles, diarrheal diseases, and malnutrition. These diseases have their greatest impact on women and children under five. In 1978, the infant mortality rate (IMR) in Tanzania was reported to be 137 per 1000 live births. In 1984, a study conducted by the Department of Epidemiology of the University of Dar Es Salaam estimated the IMR at 150 per 1000. To improve health status in Tanzania, comprehensive nationwide primary health care (PHC) services are desperately needed.

To intensify efforts to meet this need, in 1983 the Tanzanian Ministry of Health (MOH) developed guidelines for implementing the primary health care program in Tanzania. These guidelines designate minimally trained village health workers (VHWs) as the providers of village-level health care. VHW tasks include: operation of the village first aid health post, provision of health education sessions to the community, promotion of latrine construction, home visiting, encouragement of vaccinations, treatment referrals, nutrition monitoring, visits to clinics for antenatal care, and home baby deliveries. Some of these activities have been assigned to VHWs on a trial basis, and the quality and quantity of services offered across the country vary widely.

Several different strategies for VHW supervision have been used in the 55 districts of Tanzania where VHWs have been introduced. The MOH, hoping to develop standard supervision policies, has recognized the need for research to

determine the best design for such a system. The PRICOR study was initiated to identify one or more optimal supervisory schemes.

ANALYZING THE CURRENT SYSTEM

To describe the current supervision system and identify any problems with VHW supervision three sets of information were considered. Data on supervision decision variables, VHW performance levels, and VHW service outcomes were collected through questionnaires directed to all of the parties involved, from the community to the MOH level.

Supervisory Decision Variables

First, supervisory decision variables were identified through a series of discussions among PRICOR investigators, MOH decisionmakers, and project leaders from the study districts. The "decision variables" considered were basically the characteristics of supervisors and the supervision system that effect the quality of supervision. The following variables were ultimately selected and used in the study:

Variables Regarding Characteristics of Supervisors:

1. Knowledge of the health sector and of the PHC program objectives
2. Ability to sustain good working relations with VHWS
3. Ability to sustain good working and human relations with village governments and communities
4. Effort to seek opinions of and involve the village government in supervising VHWS
5. Ability of home supervision team to sustain good working relations with a visiting supervision team
6. Sense of responsibility and commitment to PHC work
7. Good performance during supervisory visit
8. Ability to encourage supportive work relationships
9. Ability to motivate VHWS
10. Pressure applied to VHWS in supervision
11. Ability of supervisors to organize and sustain group decision mechanisms and implementation for PHC (i.e., the extent of the supervisors' involvement with village governments and communities in collaborating for PHC projects).

Variables Regarding Characteristics of the Supervision System:

12. Provision of logistical support, supplies, and other assistance to VHWs by the formal health service support system and/or the supervision system
13. Provision of logistical support to the supervisors by the formal health service support system
14. General sophistication of supervision site
15. Availability and use of supervision guidelines, such as schedules and checklists.

Having selected the list of variables, the PRICOR team developed a questionnaire directed to supervisors, VHWs, or villagers, depending on the variable in question. The ratings given to each supervisor for each supervisory decision variable were weighted depending on the position and education of the respondent. For example, the answers given by the District Medical Officer were given a weight of five, while those given by the Rural Medical Aide were given a weight of two. The Village Chairman's answers were given a weight of five, while the answers given by villagers not on the Village Council were given a weight of one. By this method, the opinions of those who had the best opportunity to implement changes in the supervisory system were given the most weight.

In order to locate weaknesses in the supervision process, weighted averages on a scale from one to five were calculated for all 15 variables for all supervisors combined. Particular low overall scores (indicating poor performance) were given to: variable 12 regarding the logistical support, supplies, and other assistance received by VHWs from supervisors; and variable 10 regarding the amount of pressure that supervisors put on VHWs to do a good job. Relationships between supervisors and VHWs also needed considerable improvement. In the course of the survey, the study team also learned that villagers felt it was very important for supervisors to have good relations with the community and with the village government. This last observation became an important focus point for the PRICOR study.

The survey itself had a positive impact on VHW supervision in the study areas. As a result of the individual supervisor evaluations elicited through the survey, two supervisors with poor performance ratings were replaced.

VHW Performance

The second source of information for analyzing the current supervision system was a survey of VHWs to determine their performance levels in 10 essential PHC activities:

1. Oral rehydration therapy
2. Proper pit latrine construction
3. Health education
4. Home visits
5. Malaria prophylaxis

6. Immunization
7. Malaria treatment
8. Nutrition monitoring
9. Safe water preparation and treatment
10. Environmental sanitation.

This evaluation was originally to be accomplished using qualified observers who would record on scaled checklists the VHWS' performance of each specific PHC task towards a specific service outcome. Because of time constraints, the PRICOR team decided that assessing the frequency of tasks performed would be adequate. In a survey conducted in 20 villages in Hanang district and 18 villages in Bagamoyo district, 58 VHWS (29 VHWS were interviewed in each village, but not all VHWS responded to every question) were asked how many times they performed certain activities, such as health education or oral rehydration therapy, within a two-week period.

The age, sex, marital status, and number of children of the VHWS varied considerably. All of the VHWS in both districts had a primary school education. The majority of VHWS cited farming as their main occupation.

Most VHWS had been trained in special VHW training centers. The mean number of months that the respondents had worked as VHWS was 10.4 in Bagamoyo and 45.3 in Hanang. In the majority of the villages, two VHWS worked as a team. The mean monthly salary for VHWS was 255.2 shillings (US\$ 15) in Bagamoyo and 202.4 shillings (US\$ 12) in Hanang. However, 26 out of 29 VHWS in Bagamoyo and 19 out of 28 VHWS in Hanang received below the mean. The majority of VHWS in both districts were usually paid late and often received less than the full amount due them.

The activities of the VHWS were also covered in this survey. The majority of the VHWS interviewed in both districts did not give chloroquine as malaria prophylaxis. On the average, about one diarrhea patient per fortnight (two-week period) per VHW were treated in Bagamoyo and 3.6 per VHW per fortnight in Hanang. (Tables 1 and 2 adapted from the full study report, provide more information on VHWS' ORT activities.) In Bagamoyo 44.8 percent of VHWS (n=13) did not know if there were any pregnant women in their village not attending the clinic. In Hanang 65.5 percent (n=18) did not know. In Bagamoyo, 69 percent of VHWS (n=20) did not know whether there were unvaccinated children in their villages. In Hanang, 82.8 percent (n=23) did not know. In both districts, the majority of VHWS interviewed had not conducted a health education session during the two months previous to the survey. In the week before the survey, the mean number of homes visited by the VHWS in Bagamoyo was 12.3 and in Hanang it was 35 (80 percent of VHW responses fell below this mean).

A majority of the 57 VHWS interviewed kept records of their work, including clinic attendance records, home visit records, referral records, special events records, and family record cards. The VHWS were also required to submit monthly reports.

PHC Coverage

The third source of information was a survey designed to determine VHW coverage for PHC services. A total of 6,000 questionnaires from VHWS and

Table 1. Diarrhea patients treated in the preceding fortnight

	<u>Bagamoyo (n=29)</u>	<u>Hanang (n=29)</u>
Total number of patients	27	106
Mean number of patients per VHW	.93	3.6
Number of VHWs below the mean	19	21
Number of VHWs above the mean	7	6

Table 2. Diarrhea patients given ORT in the preceding fortnight

	<u>Bagamoyo (n=27)</u>	<u>Hanang (n=106)</u>
Total number of patients given ORT	12	19
Percent of patients given ORT	44.4	17.9
Mean number of patients per VHW given ORT	1.5	1.3

households were collected. Unfortunately, analysis of this data was never completed. Only two questions were tallied, one relating to measles vaccine, the other to safe water supplies. As an alternative, the research team, using existing surveys and records, conducted a very limited analysis of the VHWs' coverage of a few PHC services. Malaria treatment, nutrition monitoring, environmental sanitation, and latrine construction were assessed from the findings of three existing surveys conducted in Bagamoyo district. Coverage figures for home visiting, health education, and ORT were calculated based on VHW monthly reports. VHW coverage was highest for latrine construction (78 percent of households had latrines) and health education (65.5 percent of the expected number of health education sessions were conducted by the VHWs). Coverage figures for ORT, malaria prophylaxis, and nutrition monitoring were all less than 10 percent.

Upon examination of these sources of information, it was clear to the researchers that both VHW supervision and VHW performance were inadequate. They reasoned that poor supervision was one of the factors that contributed to poor VHW performance. The next step was to identify the specific obstacles to good supervision in Tanzania. The PRICOR team, decisionmakers from the MOH, and PRICOR consultants identified seven constraints to good supervision. They found that the quality of supervision was limited by the time, petrol, stationery supplies, drug supplies, equipment, travel allowances, and vehicles available to the supervisors. A survey was conducted to determine the amounts of time and money currently available for those items in each district.

After examining the data from the problem analysis phase, the study team concluded that supervision of the VHW in Tanzania faced many obstacles. The team decided that goals for raising the performance of the supervision system needed to be set. They reasoned that these goals could be met by making improvements in the 15 supervisory decision variables. This became the focus of the second phase of the research.

DEVELOPING SOLUTIONS TO SUPERVISION PROBLEMS

It was originally envisioned that solution development would be carried out through use of a mathematical linear goal programming model. This model would have been used to ascertain relationships among the supervision decision variables and constraints, the VHW performance levels, and the PHC service outcomes. Since data analysis was incomplete and the model was overly complex, this plan was eventually dropped. Work did continue on the model, however, and two runs were eventually made in Dublin (Ireland) by one of the researchers. These runs did not affect the research outcomes as they were done after the study had been concluded. Instead, the researchers used the goals originally intended for use in the mathematical model as an exercise to involve the communities, VHWs, supervisors, and MOH decisionmakers in setting goals for PHC coverage and VHW supervision.

The PRICOR team first put 10 PHC goals in priority order according to both importance and feasibility. Importance was rated as low, medium, or high according to its value in preventing illness, death, and disability. Overall feasibility was determined by relating each service to technical feasibility, economic feasibility, and to the likelihood of good public response. The priority order arrived at was: (1) immunization coverage, (2) ORT utilization,

(3) proper latrine construction, (4) nutritional monitoring, (5) environmental sanitation, (6) malaria treatment, (7) home visiting, (8) health education sessions, (9) malaria prophylaxis, and (10) safe water preparation.

Ten villages in Bagamoyo and eight from Hanang participated in setting goals for PHC coverage and utilization for their villages. PRICOR researchers discussed each PHC service with 20 community leaders and residents in each village. The village council was always included in this group. A questionnaire was used as the basis for discussions. Most goals were expressed as percentage of population that could be covered by a given PHC intervention. For example, village no. 1 set goals of 63 percent immunization coverage, 100 percent ORT utilization, 99 percent construction of pit latrines, 33 percent nutrition monitoring coverage, 100 percent environmental sanitation coverage, 70 percent malaria treatment coverage, 60 health education sessions per year, and 64 percent utilization of safe water. The PRICOR investigators did not feel that it was absolutely essential that the goals be realistic, but rather that the goal-setting exercise motivate and educate the villagers about PHC and VHW supervision.

Supervisors were then asked, through a questionnaire, to set PHC goals for the VHWs under their supervision (bearing in mind the goals set by the villagers and the constraints on supervision). The questionnaire asked supervisors how much they could increase the coverage and utilization of specific PHC services through better supervision. For example, one question reads: "By what proportion can your supervision increase the number of families which boil water for drinking?" These goals continue to serve as an effective self-evaluation tool for the supervisors.

Six influential decisionmakers from the MOH participated in goal setting for the supervision system. In this exercise, the participants looked at two hypothetical supervision teams that differed in their supervision aptitudes and in one of the supervision decision variables. The decisionmakers then gave their assessment of what it would take to raise the performance of the poor supervisory team to that of the good supervisory team. The following is an example of one of the hypothetical situations presented to the decisionmakers:

If supervisory team A (with low aptitude for motivating VHWs to perform well) gets each VHW to treat from 60 to 70 episodes of diarrhea with ORT during a year, how many more episodes of diarrhea do you think that supervisory team B (with one point higher aptitude for motivating VHWs to perform well) can get each VHW to treat with ORT?

Although intended to develop quantitative factor-goal coefficients for the sequential linear goal programming model, the exercise was useful in its own right. Decisionmakers were encouraged to think quantitatively about their goals for supervision.

In another exercise, the six decisionmakers, the PRICOR team, and supervisors used nominal group process (Delphi technique) to come up with recommendations for a revised supervisory system. This system was based on the inputs from villagers, VHWs, supervisors, and decisionmakers.

IMPLEMENTING RECOMMENDATIONS TO IMPROVE SUPERVISION

As a result of the PRICOR study, it was possible to implement major revisions in the system of supervision in Bagamoyo district. Research findings confirmed the inadequacy of the supervision system, and the significant involvement of decisionmakers in the research process ensured that the findings would be acted upon.

The number of supervisors assigned to Bagamoyo district has been doubled. The number of supervisory visits required has been increased and each supervisor now visits his or her assigned sites at least twice a month. Supervision schedules have been developed and each supervisor is required to prepare monthly work plans and monthly reports. A checklist for use on supervisory visits has been developed and is now in use. Supervisors have been provided with bicycles. The budget for supervision of VHWs has also been increased. The supervision goals developed through the PRICOR study have been adopted by the MOH as the official goals for VHW supervision.

Just as important, the village people are now significantly involved in the supervision of their local VHW. Village health committees are active and assist in the supervision of the VHW. Supervisors have formed good relationships with village leaders in an atmosphere of cooperation.

A "team safari" supervision plan, developed by the PRICOR team, has been adopted in all villages. According to this plan, a team composed of the village health committee, the VHW, the VHW supervisor, local teachers, and agriculture and water development workers visit every house in the village on a regular basis. On each visit, the team discusses the health and well-being of the family with the household members. This is a way of checking to see if the VHWs are doing their job and of alerting the workers to health problems in the community. After the visits, the team makes a list of all cases requiring followup by the VHW. The VHW follows up on these cases and reports his activities to his supervisor. The supervisor reports all followup activities completed to the VHC once a month.

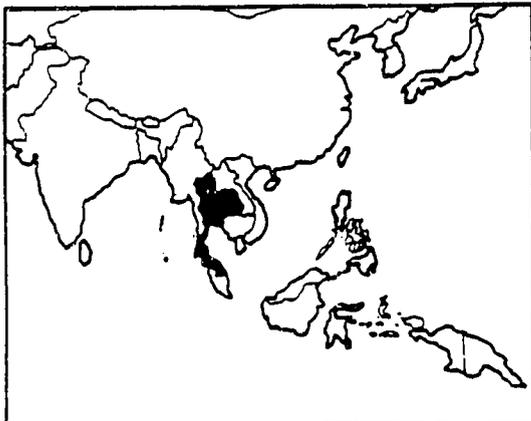
The operations research technique itself has also had an impact in Tanzania. The principal investigator and other team members have been asked to provide workshops and to lecture widely in the country on how to use OR to solve operational problems. Forums for these lectures and workshops have included: the National Public Nurses Workshop, the Italian Tanzanian Health Programme Workshop on Supervision of PHC programmes, and the National Annual Conference of Regional Nursing Officers.

* * *

This study was conducted by researchers from the University of Dar Es Salaam from January 1983 through March 1986. This summary is based on a final report of the study prepared by F.D.E. Mtango, Z.J.Z. Killewo, and Melinda Wilson. Further information is available from the principal investigator, Dr. F.D.E. Mtango, University of Dar es Salaam, Department of Epidemiology and Biostatistics, Faculty of Medicine, Box 65001, Dar es Salaam, Tanzania, or from Dr. Jeanne Newman, PRICOR study monitor (Chevy Chase).

Study Summary

ALTERNATIVE APPROACHES TO SUPERVISION OF COMMUNITY HEALTH WORKERS IN THAILAND



Since 1975 there have been some 500,000 community workers trained and deployed in Thailand to deliver basic primary health care services. Despite this impressive number, their overall performance is uneven. Many have found curative work more rewarding and preventive work too difficult. Other workers respond only to demands for services rather than needs. And the majority do not effectively mobilize the community to take responsibility for their own health care. Many of these problems have been partially

attributed to poor and infrequent supervision of these workers. Realizing that there was inadequate communication and supervision following the orientation and training of these volunteer workers, the Institute of Nutrition at Mahidol University and the Office of Primary Health Care of the Thai Ministry of Public Health (MOPH) therefore undertook an operations research study to develop alternative approaches to the supervision of village health workers. The study objective was to identify a model or models of supervisory strategies for volunteer workers which would most effectively utilize available supervisory agents.

BACKGROUND

Thailand's first Primary Health Care activities began long before the World Health Organization and other international organizations formally promoted national Primary Health Care (PHC) programs. These activities were initiated in 1964 by provincial health officers who recognized that delivering health services to rural areas could rely on manpower and material resources in the communities. During their earlier outreach efforts, these workers noticed a strong tradition of community support in the form of labor and time to organize participation in vaccination campaigns, malaria control, and other development activities. The villagers' support was particularly enthusiastic because these services fulfilled an important need in these remote areas with little access to formal medical care. Based on these observations, this grass roots PHC program was founded and continues to be based on a volunteer program.

As in other PHC programs the community became an essential cornerstone to their PHC strategy. The overall goal of Thailand's program was not solely to deliver basic health care services. Rather, it was hoped that this approach would help to encourage and usher in other development activities. It was

expected that communities would begin to determine their own priorities, design their own development projects, and overall, play a more decisive role in their well being. Since its initiation the following principals have remained largely the same.

1. Government officials do not work in place of villagers; nor do villagers work for government officials.
2. The key to primary health care is community involvement. Community support takes the form of labor, money or goods.
3. Primary health care works only when the community recognizes its health problems and cooperates in finding ways to solve them. The function of the government is to provide support to the community in gathering and analyzing data to define and prioritize the community's health problems.

The Thai PHC program is based on two types of workers who are selected from, and work exclusively in, their own villages. Simple curative services (provision of drugs, family planning, immunizations, and maternal and child health services) are provided by the Village Health Volunteer (VHV). Promotive and preventive services are provided by the Village Health Communicators (VHC). Their overall activities are guided by a Village Health Committee. Both types of workers are volunteer and receive no remuneration of any kind for their activities. The work of both these volunteers is supervised periodically by the Tambon Health Officer and by the District Health Officer.

PROBLEM ANALYSIS

The study team analyzed the macro and micro PHC supervision system by interviewing approximately 600 MOH officials, supervisors, village volunteer workers and community members. These interviews were supplemented by two-month anthropologic observation studies in eight villages from four regions in Thailand. The researchers used these two types of surveys to provide very different information. The formal interviews were used to describe the different functions, responsibilities and frequency of supervisory contacts both within the ministry and with the communities. These interviews helped define the supervisory hierarchy at all levels within the PHC delivery system.

The 2-month direct observation study, was undertaken so as to better document the content of these supervisory visits. The researchers reasoned that this survey would not only help define the potential roles of these different levels of supervisors, but that the information would help fill in research gaps about supervision.

Supervision is traditionally an ill defined activity, often viewed as any type of contact between a higher ranking professional with a junior. Additionally, few studies have illustrated how the content of supervisory visits relates to the overall effectiveness of the health workers at each level. Even when supervisory guidelines and standards are established, little research has been done which documents the content of these supervisory contacts. Realizing

this, the study team sought to employ a research approach which would help describe the concrete supervisory activities at the village, tambon, district, and central levels. They reasoned that before designing alternative strategies, the potential for each agent had to first be documented through direct observation methods.

SURVEY RESULTS

Interviews with MOH personnel were conducted with 200 policymakers and program managers at each of the different levels: central, provincial, district and tambon levels. Specific questions about the supervisory practices, frequency, duration and content of these visits were asked from both the supervisors and their corresponding supervisees. (The administrators at one level supervise those at the next level below them.) Also, a part of the interview consisted of open ended questions in order to document the participants' opinions about their time and financial constraints as well as potential areas of improvement. Some of the findings which emerged were the following:

1. Supervisory tasks/responsibilities are not properly coordinated among the different levels within the MOH.
2. Individuals with supervisory responsibilities at all levels have little training, or incentive, for carrying out supervisory tasks.
3. Budgetary constraints prevent regular visits to rural areas.
4. Officers at the district and tambon level are responsible for multiple activities originating from different offices and divisions within the Ministry of Public Health. These priorities are poorly coordinated.
5. No standardized measures of effective supervision exist.
6. Supervision of volunteers is difficult to enforce or make mandatory since neither VHCs nor VHV's are formal employees of the MOPH.
7. The role of supervision is seen as observing an individual's performance with the singular purpose of checking the performance of the worker according the targets set at the central level.

The findings from the anthropologic studies concurred with those from the formal interviews; namely, supervision was not routine and depended on current campaigns mandated at the central level. The survey results indicated that the supervisory hierarchy may also contribute to the supervision problem. The present system is largely vertical and centralized meaning that targets, programs and policies are often set at the central level without the necessary input from the local level. There are inherent problems with this structure in that the policies are often not always relevant to the peripheral levels where FHC activities occur. The investigators found that although many central and local administrators acknowledged the inherent problems of centralized planning, few had the time or resources to provide information and sustained contact with central level decision makers.

Another problem with this structure is that within each of the levels, different offices with varying priorities may often direct programs to the local tambon level. Hence, the provincial, district and local (tambon) levels become progressively more responsible for and answerable to the implementation and management of an array of health and development programs. This overload at the local level usually precludes the provision of necessary support services (including supervision) to help the workers sustain, prioritize, and more effectively deliver health services.

Findings from both of the survey studies showed marked regional differences in the variety of supervisory agents and their functions. These administrators were often unclear about their particular role in VHV supervision, and were not assigned specific functions in supervision. Through these observations and a review of other PHC projects in Thailand, the investigators identified the following eight channels of supervision currently being used in Thailand, although the last three are used primarily as tools for education and motivation.

1. Community leaders
2. Tambon Health Officers
3. District Health Officers
4. Provincial Officers
5. MOPH Officers
6. Printed Materials
7. Public Service Announcements
8. Radio

SOLUTION DEVELOPMENT

The study team then presented the survey findings and observations to MOH decisionmakers. It was decided that the development of supervisory strategies would depend on determining which supervisory agents could most effectively carry out different supervisory responsibilities. It was also decided that PHC decisionmakers, MOPH supervisors and village volunteer workers would each participate in the design of alternative strategies. Their input would be standardized by using a simplified decision model fashioned after a Multiple Criteria Utility Assessment (MCUA).

The overall objective of the MCUA was to determine which functions of supervision could be most effectively carried out by what agents. The study team used abbreviated forms of the MCUA with the PHC experts, program managers, and VHV/VHC to determine which combination of supervisory responsibilities should be carried out by each agent. The technique used is described below.

The three groups (PHC decisionmakers, MOPH supervisors, and VHV/VHC's) participated in the assignment of different responsibilities to supervisory agents. The first group, composed of 16 high-ranking MOPH officials and university professors determined the possible supervisory functions and agent based on survey information, previous experience and the input of volunteers

and supervisors. The following functions were determined and specifically defined:

1. Provide technical skills and training for VHV/VHC's in conducting PHC activities.
2. Assist communities to undertake different PHC activities.
3. Monitor PHC program activities on-site.
4. Coordinate village-level development activities.
5. Solve problems of a non-technical nature.
6. Manage technical, financial, and material support for VHV/VHC's.
7. Evaluate volunteer's performance in conducting PHC activities.
8. Motivate the community to use PHC services.

Once the functions were identified, the group listed the eight supervisory agents identified in the earlier surveys.

After defining the different supervisory functions and possible agents, each of the participants was given a blank matrix which listed the supervisory functions in rows and the agents in columns. Each participant then ranked the importance and effectiveness of the potential role of an agent for each particular function. These rankings were then averaged. Over fifty volunteer workers and supervisors followed the same procedure through the use of a simplified MUA. Clearer role definitions for the different supervisory agents emerged from this process.

Community Leaders

These leaders will take a more substantial role in motivating and coordinating PHC activities in the villages. They will also assist the community in evaluating its volunteers.

Tambon Officers

These officers are the major supervisors of the volunteers, offering technical knowledge, in-service training and evaluation.

District Officers

These officers are responsible for ensuring that financial resources and medicines from the central level are available in the community.

Media

Media will be used for communicating information transmitting knowledge, and providing motivation to the volunteers and the community.

Data obtained from the volunteers' from the observation survey demonstrated marked regional differences regarding the potential input of the community leaders. The 20 participating workers from the south of Thailand clearly

stated that leaders in this area do not carry the necessary influence to involve and ensure strong community participation. This evidence, revealing regional differences in the actual and potential strengths of supervisors, pointed the way towards developing four region-specific supervisory models. Each model delineated not only specific role-definitions for each type of supervisor, it also defined different combinations of supervisory agents which are most appropriately suited for that region. The combinations of agents and roles are based upon a working knowledge of what will work in the region given the personnel and the situation of the region. For this reason, these models have every chance of success in improving the supervision of VHV/VHC's within the PHC delivery system.

These designed strategies, each advocating the use of community participation in the supervision and motivation of their volunteer workers, is in keeping with basic PHC principles and Thailand's efforts to decentralize several of the ministries. Decentralization must be established through a series of sound management procedures based on self determination and self reliance. Systematic redesign of PHC delivery of services, in this case VHV supervision, is a necessary step in reorientating essential development activities in Thailand.

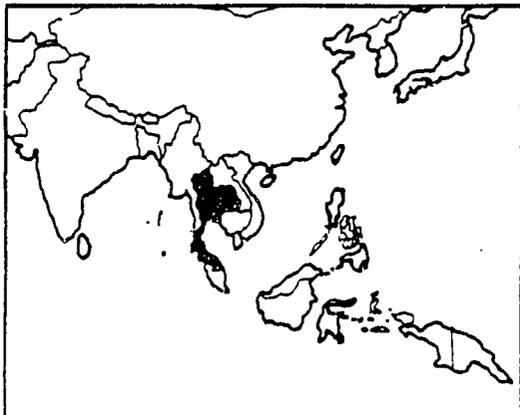
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This study was conducted from January 1985 through March 1986 by the Institute of Nutrition at Mahidol University and the Thai Ministry of Public Health. This summary is based on the final report of the study prepared by Dr. Kraissid Tontisirin and Ms. Suttalak Smitasri. Further information is available from the principal investigator, Dr. Kraissid Tontisirin, Institute of Nutrition, Mahidol University, c/o Research Center, Ramathibodi Hospital, Rama III Road, Bangkok 10400, Thailand, or from Dr. Jack Reynolds, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

COMMUNITY FINANCING MECHANISMS FOR SUPPORTING PHC ACTIVITIES IN THAILAND



In 1982, Thailand's Ministry of Public Health (MOPH) launched an ambitious new primary health care (PHC) program aimed at expanding services throughout the country and providing more innovative programs to reduce malnutrition in rural areas. This commitment entailed increasing coverage to an additional 24,000 villages. Programs were developed to conduct nutritional surveillance, establish supplemental feeding centers, and distribute locally-produced weaning foods. Programs were also instituted to provide funds for nutrition and sanitation activities.

Policy makers understood that such an effort would require substantial funding -- the mere cost of training the health workers would require over half the annual PHC budget. Such an endeavor would leave few resources for providing other necessary program components such as supervision, supplies, and construction of facilities. Furthermore, the MOPH realized that these interventions, which rely on grass roots support, would not be successful without community participation and commitment.

In Thailand, as in most developing countries, the majority of health services are financed directly by households. Reports revealed that the Government (including the Ministries of Health and Public Health) accounted for only 31.1 percent of all health expenditures, while households and other private sources represented 68.9 percent. These expenditures were largely in the form of fee-for-service or product. The MOPH, seeing this considerable private spending as a potential financial source for their services, created four different local financing modes for these new health programs. These included: (1) revolving drug funds, (2) nutrition funds, (3) water and sanitation funds, and (4) multipurpose funds (not limited to PHC). Over the past five years, the MOPH and other central Ministries have initiated over 18,000 funds, providing initial capital, material resources, management, and training to local villagers.

By 1985, informal reports indicated wide variation in these funds' performance, management, acceptability, and viability. This information prompted researchers from the National Economic and Social Development Board (NESDB) to undertake this operations research study to address three questions:

1. Which PHC funds are most successful?
2. What characteristics account for their success?
3. Which financing model or models would maximize community support of PHC services?

METHODOLOGY

The study team adopted an approach which allowed them to systematically examine the substantial number of existing PHC funds. Phase One began with researchers sending letters to health officers in each of Thailand's 5,000 tambons (subdistricts consisting of 6-10 villages) asking them to identify existing funds supporting PHC activities. In the same survey, they were asked about the funds' prime characteristics, activities, and performance.

Over 70 percent of the tambon health officers responded, identifying more than 12,000 funds supporting PHC. Next, a more detailed questionnaire was mailed to each of the health officers requesting specific information about the funds: their age and origin, management characteristics, procedures, diversification, problems, services provided, and households served.

Of the 12,000 funds identified, health officers returned a total of 4,631 correctly completed questionnaires. The information was used for descriptive and statistical purposes. Simple correlations and multiple regression analyses were done to uncover relationships between different variables. The different funds were categorized accordingly:

1. Single purpose funds (drugs, nutrition, water and sanitation)
2. Single purpose subsidized funds
3. Comprehensive PHC funds (support all PHC services)
4. Multipurpose funds (not limited to PHC services)
5. Health card funds.

After the initial analysis, a total of 63 funds from 22 provinces were selected for case-studies to provide more information. (The 63 included 23 drug funds, 23 nutrition funds, and 17 sanitation funds.) Their selection was based on the: (1) age of fund, (2) diversification of income sources and services, (3) profitability, (4) percentage of households benefiting, and (5) percentage of households contributing. Case studies were undertaken by three research teams making on-site observations. Tambon health officers, fund committee members, village shareholders and recipients of funds' services were separately interviewed. The health officers and fund managers were asked about the establishment and management of the fund, sources of income, diversification, and community characteristics. The shareholders and recipients of fund services were asked about their participation in the funds' activities, their socio-economic status, and assessment of the fund's performance.

RESULTS

Findings from these two surveys indicated that PHC funds were numerous and widespread. At least 40 percent of the tambons had PHC funds operating in one or more villages, with many villages having more than one fund. Of those villages with funds, the average number of funds per village ranged from about three in the South to as many as eight in the Northeast. There was significant regional variation with more numerous funds per village concentrated in the Northeast. The most common were drug funds (64 percent), followed by nutrition (24 percent), and sanitation funds (12 percent). Other funds found in smaller numbers were comprehensive PHC funds, multipurpose funds and health card funds. Some interesting features are presented below.

Drug Funds

Drug funds are the oldest, most numerous, most consistently profitable PHC funds in Thailand. They serve more households, have a higher proportion of share-purchase, show more potential for diversification of services and less regional variation than nutrition or sanitation funds. Similar to other funds, most drug funds are established by the MOPH which provides the working capital and drug inventory to selected villages. After this initial capital is donated, a village meeting is called to elect fund managers and sell fund shares. Most of the elected managers are from higher income and education levels than the village norm. Though there is a need for expertise in administering the fund, the success of the funds often stems more from a member's devotion and commitment than from actual experience. Such dedication is required since this position is compensated for only by the most profitable funds.

The initial capital provided by the Ministry for individual funds does not exceed US\$ 65. The proportion of the funds' capital raised locally through the sale of shares is normally higher than the government's contribution. Share prices begin at around \$28, and increase as the fund becomes more profitable. However, there is a limit to share subscription; as the number of available funds in the village increases there is a marked decrease in the subscribed shares for each individual fund. This has important policy implications since many villages have over four individual PHC funds.

Though most drug funds cannot boast of high profits, a substantial number keep the fund revolving with minimal profit margins. Only nine percent of the studied funds decapitalized. Those that make exceptionally high profits have diversified their range of products beyond drugs and also enjoy the full time labor of a drug manager. Another indicator of the fund's success is that over 70 percent of the villagers are recipients of the fund's services. In all cases, drug funds in villages ensure the regular provision of inexpensive government supplies.

Nutrition Funds

Nutrition funds are the second most common and account for 24 percent of reported PHC funds. Similar to drug funds, these are initiated by central level government officials who mobilize local officials to persuade villagers to set up the fund. Nutrition funds require a higher level of initial capital contributions from the government, totalling about US\$ 115.00 per fund. This contribution is in the form of food stuffs and food processing and packaging equipment. Local capital support rarely exceeds the government's input. This is probably due to the poverty stricken communities where nutrition funds normally operate. Local contributions only exceed the government's where the funds are not intended to tackle local nutritional problems but are established as an income generating business. Therefore, funds which are the most successful in terms of capital appreciation are usually located in communities where malnutrition is not a major problem, and serve to generate activities other than nutrition. Conversely, decapitalizing funds are often those which are directly addressing malnutrition problems in poorer villages.

Similar to drug funds, the success of the nutrition funds depends on highly dedicated and motivated committee members and managers. The membership of

these funds differ from all other funds in that mothers and caretakers provide the labor and are compensated in kind rather than cash.

Sanitation Funds

Sanitation funds, representing the newest financing option in Thai villages, comprise only about 12 percent of the identified funds. They require the highest initial capital input from either the government or external agencies. Selected community members are trained in key activities such as the construction of water cisterns, privies, and wells. Management responsibilities, though rigorous (for record keeping, inventory control, and loan collection), do not appear to be overwhelming for the untrained fund managers. This is likely explained by the fact that the funds serve few clients.

Committee members are rarely compensated in this initial stage, since these loans for sanitation activities are interest free. Fund managers are reluctant to charge interest because the borrower provides counterpart contributions in the form of labor, money, or food during construction. The few funds which charged interest made substantial profits. Those funds which diversified their services also proved to be very successful.

Local capital contributions were low for sanitation funds, in part due to their newness, and in part because some communities may have exhausted their available resources on other funds. These funds require much larger investment, and hence, are now being used almost exclusively by well-to-do villagers.

Health Card Funds

This fund is another innovative PHC fund which is fashioned after pre-paid insurance schemes. Card-holders are entitled to a pre-determined number of free clinic visits for designated services (generally MCH). The money collected from the sale of the cards is then loaned out to card holders for community development projects. Fund members are also given preferential treatment at tambon health centers with the hopes that this incentive would increase utilization at these primary health centers. Although the MOPH has established directives about what portion of health card proceeds should be devoted to reimbursement of health providers, actual reports indicate that villagers tend to design their own levels of reimbursement, set health card costs and determine eligible services. In many cases, the capital from the health card fund was used to establish village stores, which effectively become "multipurpose funds".

Card members were very enthusiastic about being guaranteed one year's medical services for a comparatively low cost. The cards, however, did not serve to change people's health seeking behavior in the desired direction; villagers continued to bypass local health clinics to consult physicians at the district hospital.

Health cards have proven to be affordable to most households below the poverty line. Reports clearly indicate that their cost remains well below the average annual health expenditure of rural households. The few households which cannot afford these may be directly subsidized.

The most significant threat to the viability of these funds stems from their inability to generate the necessary revenue to cover the costs of the largely hospital-based services sought by card holders. People are reluctant to use primary care providers and feel entitled to select their services since they paid for and used their health cards. This remains a difficult problem; several revisions have not changed the likelihood that secondary and tertiary providers will have to sustain losses.

Multipurpose Funds

Multipurpose funds may be broadly defined as any fund which includes both PHC and other services. Unlike the other funds previously described, most of these funds are established through local initiative. From their inception, villagers have shaped the funds' activities so that they conform to their needs. The typical form of multipurpose funds is the village store offering retail consumer and producer goods. These stores will often sell drugs or profitable items such as petroleum products for agriculture. Profitability, financial viability, and growth remain prime concerns for these funds. This emphasis has made most of these funds very successful and able to amass large profits.

Multipurpose funds also are much more time-efficient for fund managers and members. As mentioned earlier, most villages report having more than three community funds. This number does not include other organizations outside of health which pool community resources such as village development committees or education committees. Interviews revealed that the same managers are often selected by several different funds, and have responsibilities which exceed their available time. Several managers complained that they had no time for their families and livelihood. These points argue for a single multipurpose fund which would conserve time, resources, and management skills.

Though profitability and economic viability of these funds may cause communities to deviate from health concerns, the opposite may also occur. In some cases, profitable multipurpose funds channel parts of their profit to finance unprofitable activities such as nutrition services. They prove more profitable because they are diversified; they select products and activities based on ongoing experience. Such funds however, require management training to follow and respond to market trends, and to handle the different health and financial services.

In summary then, the principal finding from the first stage suggests that (1) multipurpose funds, and (2) health cards, are the most promising community financing schemes in Thailand. The other three funds could become more viable if they diversified their activities and products.

PROSPECTIVE DESIGN AND FIELD TESTING

Having identified essential characteristics of different funds' performance and viability, the research team began designing and field testing different financing models. This process consisted of four steps. First, certain financing schemes were selected for field testing in each region of Thailand. Based on earlier survey findings, it was decided to test four types of funds: (1) single purpose funds, (2) multipurpose and health card funds, (3) comprehensive PHC funds, and (4) health card funds. Second, an information

system was created whereby local personnel could file bi-weekly data on fund performance and community utilization. Third, regular visits to villages where funds were being field-tested were conducted by research teams to monitor change, gather qualitative and quantitative information, and suggest necessary refinements. Finally, three seminars were conducted with the MOPH to keep them informed of findings and to discuss possible policy implications.

A total of 16 sites were selected for field testing. Each of the selected funds was tested in four sites. The four preexisting health card funds were monitored only; the remaining twelve funds were redesigned as well as field tested.

Initial results from the ongoing longitudinal analysis have provided a wider perspective of the requirements for supporting the funds, highlighting the importance of providing managers with training in fund operations, and mobilizing community support and participation. Assistance and training should not only concentrate on starting these funds; routine support and supervision is essential particularly as the funds become more profitable. Questions of long term profitability and sustainability may only be answered after the funds have been operating for at least one year.

This study also found that the most successful single purpose funds--drug funds--are able to diversify to offer other needed services. This is particularly promising from a policy standpoint since these funds require the smallest initial capital and reach the most households. They also require only the minimal and most common management expertise, namely managing a retail store. Such a fund is good for creating a community financing mechanism responsive to villagers' needs.

Multipurpose funds with health card insurance spread risks and provide more rapid capital growth which in turn, encourages share purchase. These funds conserve scarce management skills, time, and labor. Although the multipurpose funds' characteristics and performance may overshadow health concerns, this trend could be mitigated by incorporating and providing health services demanded by the community.

Despite these general findings, experience indicates that there is no single model or single set of models which is applicable to all communities. Rather, the essence and merits of setting up community financing mechanisms do not rest in the type of model, but in their potential for assuring that pooled resources are self-generating and can be used for the community's benefit.

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This study was conducted from March 1983 through January 1986 by the National Economic and Social Development Board (NESDB) of Thailand. Further information is available from the principal investigator, Ms. Orathip Tanskul, NESB, Krung Kasem Rd., Bangkok 10100, Thailand, or from Dr. Jack Reynolds, PRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

COMMUNITY ORGANIZATION IN RESOLVING HEALTH PROBLEMS IN BLUE-COLLAR NEIGHBORHOODS OF MONTEVIDEO, URUGUAY



During the last few years Uruguay has registered an increasingly skewed income distribution which has been accompanied by a deterioration in the living conditions of the majority of the population. While morbidity and mortality rates for the country as a whole rank below those in much of Latin America, important disparities exist among population groups within Uruguay. Thus, while the national infant mortality rate is 28 per 1000 live births, it is estimated that in blue-collar areas of Montevideo, where the average monthly family income is equivalent to US\$ 143, rates range from 37 to 45 per 1000. Sanitation services are almost non-existent in these neighborhoods, although most of the houses (87 percent)

have potable water. Medical care is provided through private neighborhood polyclinics (community health centers) run by social and religious organizations. These polyclinics, however, provide mainly curative services and have little community outreach.

Recognizing the need for more preventive health activities by the polyclinics in such areas, the Centro Latinoamericano de Economía Humana (CLAEH) undertook an operations research project with assistance from PRICOR. This study was conducted in six urban blue-collar neighborhoods of Montevideo from July 1983 through September 1985. The overall objective of the study was to demonstrate that certain health problems could be resolved through community organization activities, namely through the creation of volunteer health committees that would select, train, and supervise community health promoters. The researchers hypothesized that the activities of the health committees and promoters would serve as the catalyst for changing residents' attitudes toward health problems, increasing their awareness of factors affecting their health, and encouraging them to take action to resolve those problems.

PROBLEM ANALYSIS

During the first phase of the research, the investigators gathered information to better understand community health conditions and problems and to provide a

baseline from which to measure the health effects of the committees' and promoters' efforts. To do this, three methods were used: a baseline survey, interviews, and direct observation.

The baseline survey was undertaken of 849 households in the six neighborhoods to obtain socioeconomic data and to determine community knowledge, awareness, and practices concerning health issues. In addition, CLAEH researchers conducted 20 structured interviews of key informants (i.e., community leaders and polyclinic staff) in the six communities. From these interviews, the researchers identified problems affecting the level of health in the communities as well as persons, groups, or organizations which could be involved in the selection or formation of the health committees. Finally, direct observation was used to describe adverse environmental health conditions in the neighborhoods. This included assessing the sanitary conditions of local activity centers and the adequacy of community services that affect health (polyclinics, trash disposal facilities, availability of clean water, etc.). Due to the generation of a large amount of survey and observational data, problem analysis was undertaken for four months rather than the anticipated one month.

SOLUTION DEVELOPMENT

During the solution development phase of the study, the health committees were formed and the volunteer promoters selected and trained. It was expected that the health committees and promoters would identify health problems and set priorities among those that they would focus on. The researchers also hoped to learn from the committees the best actions for mobilizing community resources to improve health conditions. To develop and test the community health promotion intervention using health committees and promoters, the researchers selected four of the six neighborhoods to receive the intervention, with the remaining two communities serving as controls. However, one of the four experimental communities was subsequently dropped from the study. In this case, the polyclinic staff decided not to participate because of conflicts with residents of the neighborhood.

The health committee in each neighborhood was made up of five to six members, including polyclinic staff, representatives of community organizations, and one CLAEH researcher. The health committees then selected promoter candidates based on a uniform set of criteria (developed by CLAEH to ensure effective health promotion) which included: (1) residence in the community, (2) interest in community problems, (3) level of acceptance by community members, (4) availability of free time to dedicate to promoter work (approximately six hours per week), (5) ability to communicate on an individual basis and with groups, (6) age 18 years or older, and (7) ability to read and write.

The promoter candidates were interviewed by CLAEH researchers and the health committees. Using results from the interviews, each health committee selected four to six promoters to be trained by CLAEH as part of the community intervention. Two to three alternates from the group of promoter candidates not selected also participated in the training.

The training for the health committee members, promoters, and alternates covered the basic principles of health promotion and the environmental and

individual factors affecting health. The training was carried out in each of the three neighborhoods in eight two-hour sessions over a one month period. In each community, the training was led by a physician and a social worker. In addition, other collaborators (including a group dynamics expert, CLAEH neighborhood coordinators, and training specialists) participated in the preparation of training sessions.

Specifically, health promoters and committee members were trained to:

1. Identify and set priorities among health problems in the neighborhood;
2. Plan health promotion interventions;
3. Work with existing organizations (i.e., religious, sport, social) and form groups of individuals with a common health problem (i.e., parents of malnourished children);
4. Use evaluation techniques in health promotion activities;
5. Understand the environmental and behavioral factors that influence health, including the agent-host-environment relationship;
6. Identify individual and community activities to confront health problems;
7. Identify and analyze factors that affect individual health;
8. Specify actions to achieve positive behaviors that maintain health;
9. Identify the most important factors which influence the demand for and use of health services for both individual and collective health issues; and
10. Raise community consciousness about health issues.

The size of each training group was approximately 13 members (5 health committee members, 4 to 6 promoter candidates and 2 substitute candidates). Training methods included group discussions, nominal group technique, role-playing, and group-dynamics exercises. Session participants were not trained to carry out specific health interventions such as first aid, or to give ORT. Training sessions were evaluated through the use of questionnaires covering each session.

SOLUTION VALIDATION

During the solution validation phase of the research study, the promoters and health committees selected and implemented health promotion activities to address problems identified in their neighborhoods. In one of the three experimental groups, after the health committee was formed and promoters trained, no further actions were taken. In the two remaining intervention communities, the promoters and health committees, using group consensus, proceeded to develop criteria for selecting the activities to be carried out. In the first community, Peñarol, the following criteria were selected for the identification of priority health issues: (1) severity of the problem, (2) number of community members exposed, (3) level of community concern, and (4)

possibility of developing a solution. In the second experimental community, Piedras Blancas, the group selected actions that could be feasibly undertaken rather than to begin with an identification of priority problems. The criteria which the health committee and promoters used to determine these actions were: (1) geographic area (specific area within the community), (2) existence of pre-formed groups the promoters could work with (i.e., parents, teachers, etc.), and (3) the presence of organizations which the promoters could work through.

In Peñarol, health committee members and promoters were concerned with sanitation in the neighborhood of La Bolsa and with malnutrition. In La Bolsa, the promoters visited homes and held meetings with neighbors at the polyclinic to discuss the concept of health and the role of the health committee, define health problems, and determine possible community solutions to these problems. In these meetings the lack of safe drinking water was identified as the priority problem. Subsequent meetings resulted in the preparation of a letter petitioning the authorities for action on the water problem. To address the malnutrition problem, the health committee and promoters met with concerned individuals, and then created and funded (through a festival) a feeding center to provide lunches on weekends for poor and malnourished children. In addition, recreational activities for neighborhood children were organized by the promoters and health committee members.

In the experimental community of Piedras Blancas, promoters and health committee members worked with teachers from different schools on the health problems of children (i.e., nutrition and hygiene). They held meetings with teachers in the community and interviewed three school directors and 15 school teachers. Through these meetings and interviews, health problems were discussed and possible solutions identified. In addition, a school delegate was chosen to convene periodically with the promoters. Promoters and health committee members in Piedras Blancas also met with health professionals and representatives from the polyclinic and the Ministry of Public Health to discuss nutrition, sanitation and potable water. In this community, the health promoters also worked with the local development commission and conducted a survey to investigate the possibility of creating a first aid center in the neighborhood.

Health committees held bi-weekly or weekly meetings to gauge the progress of the promoters' efforts. Neighborhood coordinators, hired by CLAEH, attended these meetings and met weekly with the research team. The researchers provided technical assistance to the health committees throughout the study.

An evaluation of the promoters' and health committees' efforts was undertaken after six months to assess the process of their work and the impact of the health promotion intervention.

During the process evaluation, CLAEH researchers analyzed the mechanisms through which the health committee and promoters in each neighborhood made decisions. This included the criteria utilized and the alternatives selected for the resolution of the identified problems. CLAEH researchers used a descriptive outline of the health promotion intervention process to assess the promoters' efforts. This outline related beneficiaries, inputs, activities undertaken, outputs obtained, effects, and objectives.

Evaluation of the effect of the health promotion intervention compared the knowledge, attitudes, and practices of the population concerning the use of health services and the level of community organization around the issue of health, before and after the intervention. A follow-up survey and 10 interviews with key informants were carried out in the five remaining experimental and control communities.

Changes in the health knowledge, attitudes and practices of respondents in each community and the differences between experimental and control neighborhoods were compared. The researchers focused their evaluation on changes and differences with regard to the communities' responses to health problems, and the level and type community organization to confront health problems. Community perceptions and evaluation of the health committees and promoters were also assessed.

RESULTS AND CONCLUSIONS

The principal results of the operations research study were as follows:

1. In the intervention communities, people identified the following problems as having the greatest negative effect on health: (1) garbage dumps, (2) inadequate sanitation, and (3) socioeconomic problems including unemployment, low wages and malnutrition.
2. Some of the problems identified as the most important by the neighborhood informants, such as the lack of potable water, were addressed solely by the health committees.
3. The intervention communities had a superior level of organization and engaged in more health-related activities than the control neighborhoods.
4. In the neighborhoods where the health promotion activities took place, people were more likely to view malnutrition, sanitation and environmental issues as health problems, and to view solutions to these problems as part of an overall health improvement strategy.
5. Health committees functioned more effectively when membership on the committee included representatives of existing community groups.
6. Community organization around health in the form of neighborhood health committees was associated with an increase in the use of polyclinics and broader knowledge of clinic services.

In general, the health promotion intervention tested was successful in creating community groups which have the capacity to organize the population and to effectively treat the local health problems. It is apparent that the use of neighborhood promoters to identify health problems is more appropriate than using outside agents to do this work. The health committees and promoters identified the communities' health problems and goals and developed local solutions that responded to these needs and interests. In addition, the involvement of diverse community agents in the process permitted consideration of a wider spectrum of alternative solutions. Consequently, problems that had not previously been defined as health issues, such as nutrition, became viewed

and treated as such. The above mentioned actions satisfied the immediate demand of the population by ensuring that those who benefit from community projects have responsibility for them. Although the research study ended in late 1985, CLAEH researchers maintain an ongoing relationship with the health committees.

The government in power in Uruguay from 1973 until did not consider health to be an important aspect of government policy and did not view community organization as an appropriate means for confronting health problems. However, in 1985, a new, democratically elected government came into power. This government has implemented a national plan for health, of which primary health care is an important component.

The Principal Investigator, Dr. Obdulia Ebole, reported in June 1986 that the Ministry of Public Health (MOPH) has shown much interest in utilizing CLAEH's experience from this project. Dr. Ebole stressed that: (1) the MOPH is implementing PHC and considers CLAEH's experience to be among the most relevant in the country; (2) CLAEH researchers are represented on the MOPH's PHC committee; and (3) CLAEH's program in the interior is using the experience from this project in conducting operation research studies in other parts of the country. In addition, other organizations working in PHC, such as UNICEF, have expressed interest in utilizing the approach followed in this study to replicate the same health promotion intervention in other areas of Uruguay.

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This study was conducted from May 1983 through September 1985 by the Centro Latinoamericano de Economía Humana (CLAEH). This summary is based on the final report of the study prepared by Dra. Obdulia Ebole, A.S. Myriam Mitjavila, and Dr. Daniel Alonso. Further information is available from the principal investigator, Dr. Obdulia Ebole, CLAEH, Casilla de Correo 5021, Montevideo, Uruguay, or from Lani Fice Marquez, FRICOR study monitor (Chevy Chase).

PRICOR Primary Health Care Operations Research

Study Summary

TESTING ALTERNATIVE PAYMENT SCHEMES IN HEALTH CENTERS IN ZAIRE



Zaire is a large country with a population of 30,000,000 people and a total surface area of 2,345,000 square kilometers. Economic hardships since the mid-1970s have resulted in a limitation of the services provided by rural hospitals and dispensaries. To initiate systematic development of health services, the Government of Zaire's 1982-86 Health Plan recommended that 300 urban and rural health zones be created and made responsible for the planning and supervision of all health activities within defined service areas. This new health decentralization policy gave basic administrative responsibility to health zones in order to facilitate PHC

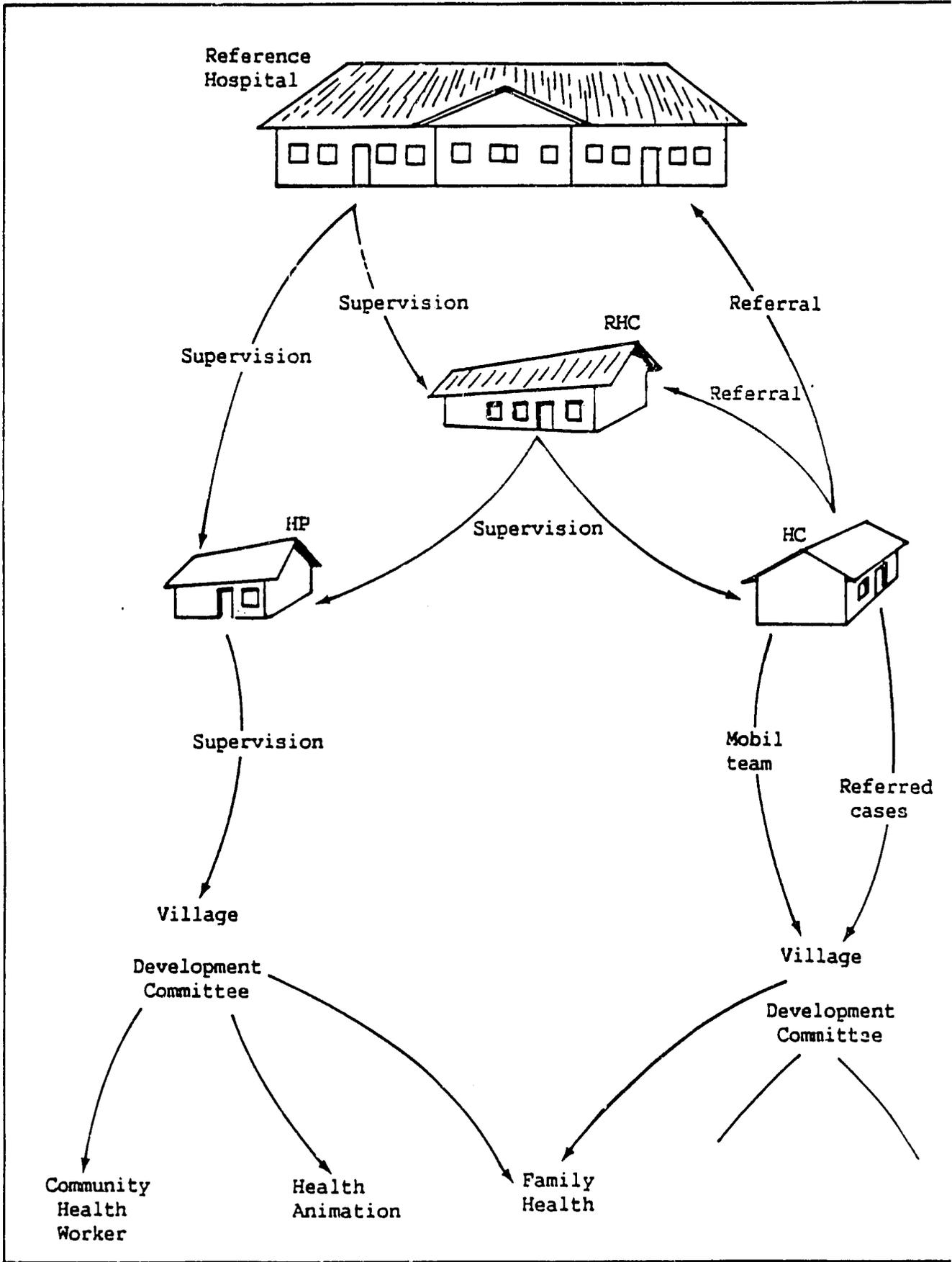
implementation. These zones were to be largely self-financed. A typical health zone has many service providers functioning independently, including state and private health services as well as Catholic, Kimbanguist and Protestant organizations. Duplication of services could be reduced with a more appropriate and efficient use of health resources for curative and preventive care.

Ideally, each rural health zone would contain one referral hospital, two or more referral health centers, 6 to 20 health centers and Village Health Committees plus one or more community health worker/traditional birth attendant per 500 persons. These optimal zone requirements would vary with local needs and population density (Figure 1).

The Basic Rural Health Services Project (SANRU), a collaborative effort of the Government of Zaire, USAID and the Church of Christ of Zaire, was created in 1981 to coordinate this reorganization. In the first five years of the project, SANRU has assisted in the development of 50 rural health zones which coordinate the provision of a comprehensive PHC program, including pre-school clinics, prenatal clinics, vaccinations, family planning, sanitation and water, health education, control of endemic diseases and basic curative medicine.

One of the early interests of SANRU, and the focus of the PRICOR study, was to identify community financing schemes to effectively sustain PHC in rural health centers.

Figure 1. The components of a health zone



The specific objectives of the PRICOR study were to:

1. Identify payment schemes in use at the health center level;
2. Identify alternative payment schemes for PHC;
3. Establish the effect of alternative payment schemes on service utilization; and
4. Determine the cost of PHC under different financing schemes.

PROBLEM ANALYSIS

An advisory group of national PHC experts and decision-makers met several times to choose a study focus within the broad national health system which might have a significant impact on community health status. The advisory group chose to study the impact of community financing schemes on the utilization of available PHC services. All agreed, however, that maximizing utilization was not the only concern. In discussing problems associated with the impact of financing on utilization, the group felt that each health center would need to maintain quality services and balance self-financing to sustain services with community affordability.

After a brainstorming session, PHC managers and investigators agreed that the most significant influences on utilization were the need for services, the quality of services, the cost to consumers, the range of services, the payment scheme in use in the health facilities and the socioeconomic status of the community. The research team developed a health service delivery system model using these components (Figure 2).

An interaction matrix with components similar to those in the model was used to establish priority research topics (Figure 3). Investigators, decisionmakers and other experts were asked to rate interactions between components on a scale from 0 to 5, with 5 indicating a strong interaction. The scores were then tallied and a single score retained based on group consensus. Strong interactions were expected between price of service and utilization, payment scheme and utilization, economic status and utilization, price and payment scheme, range of services and biological environment and community health worker and socio-cultural environment. Given the research purpose and system constraints, the interaction between utilization rate and payment scheme was identified as the most appropriate for study. The other variables which produced strong interactions could not be easily changed within the context of the study.

SOLUTION DEVELOPMENT

The only decision variable was the type of payment scheme, with all other matrix variables uncontrolled. To identify possible payment schemes, information was collected on schemes in use in 37 rural health centers throughout the country.

Figure 2. PHC Service delivery and utilization subsystem

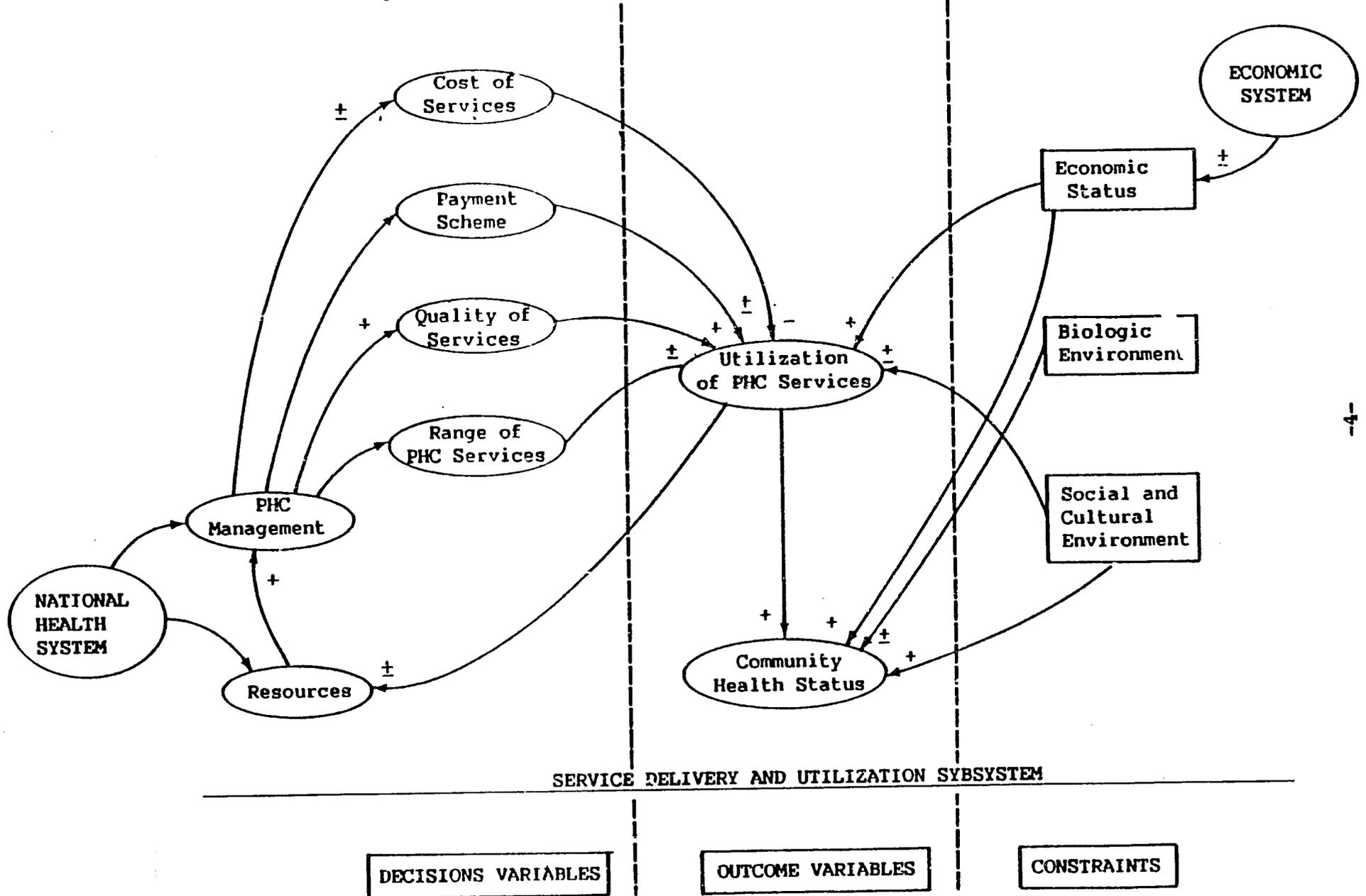


Figure 3. Interaction matrix

	Utilization of Services	Cost of Services	Payment Scheme	Quality of Services	Range of Services	Community Health Worker	Economic Status	Biological Environment	Social and Cultural Environment
Utilization of Services	X	4	4	3	2	3	4	3	2
Cost of Services	4	X	3	4	2	1	1	0	1
Payment Scheme	4	3	X	2	1	1	2	0	2
Quality of Services	3	4	2	X	0	1	1	0	0
Range of Services	2	2	1	0	X	1	4	3	3
Community Health Worker	3	1	1	1	1	X	0	0	3
Economic Status	4	1	2	1	4	0	X	0	1
Biological Environment	3	0	0	0	3	0	0	X	0
Social and Cultural Environment	2	1	2	0	3	3	1	0	X

These data were compiled from a short questionnaire completed by the Medical Directors of SANRU zones. The schemes are identified in below.

Payment Schemes Used in 37 Rural Health Centers in Zaire

Scheme	Health Centers Using Scheme	Remarks
1. Fixed fee for episode, regardless of illness.	4	Fees adjusted for inflation rate. Fees cover drugs, laboratory examinations, salary for HC auxiliary and HC maintenance. They are adjusted for inflation.
2. Fixed fee for visit, with varying drug fee related to daily dosage and drug cost.	27	Visit fee provides for salary of HC auxiliary and HC maintenance.
3. Fee for episode, varying with severity of illness and cost of drugs.	5	
4. Fixed fee for visit and drugs, but reduced fees for necessary repeat visits.	1	First visit fee is fixed and includes all drugs.

Though not in use in the centers surveyed, prepayment was proposed as another alternative but rejected by the practitioners who felt that the communities did not have enough financial liquidity to support such a scheme. Thus, the fixed fee per episode and the fee for visit with variable fees for medication were selected for detailed study. The two alternative financing schemes actually contain two variables, fixed vs. variable fees and fee for episode vs. fee for visit. Only the latter was the focus of this study.

SOLUTION TESTING

A field test was conducted in five health zones, all of which were participating in the SANRU project. The investigators anticipated that shifting from a fee per visit to a fee per episode at the health center level would be followed by an increase in the utilization rate for services offered

by the health center as well as an increase in the receipts of the health center. Those favoring fixed fees for episode cited the following advantages:

1. Health care continuity: once payment is made, there are fewer financial reasons to interrupt treatment;
2. Ease in health center management: the fee level is known to everyone to facilitate monitoring of receipts;
3. Reinforcement of solidarity in the community: health care prices are equally shared by all users.

Five rural health zones were selected for study because of their geographic location and staff's willingness to participate. In each zone, two health centers with similar populations, service costs and lengths of time in operation were chosen. One of the two health centers was asked to adopt a fee per episode payment scheme. (Four had previously used fee for visit schemes and switched to fee for episode. One simply retained a fee for episode scheme already in use.) The other center in each respective zone continued to use or shifted to a payment scheme based on a fixed fee for visit and variable drug fee. Fee levels were established locally.

These health centers were studied for approximately one year. Data were collected in two ways - through household surveys and through reviews of health center records. Data were collected on health center utilization, costs, and revenue.

Household Survey

Household surveys gathered information on economic status, a two week recall of illness episodes, expenditures for health care during the illness and utilization of curative and preventive services.

Both pre- and post-test surveys were carried out during the dry season (June - August) in all five health zones. Four hundred households were selected from the service area of each participating health center using a cluster sampling technique. A list of villages in the area and their populations was obtained, and a sampling proportion was calculated for the total area population and used to select villages to be surveyed. A household was selected near the center of each village for the first interview, and the interviewer continued with the next closest house until the number of interviews needed for the village were completed. Respondents were heads of households. Different samples were chosen for the pre- and post-test surveys.

Review of Health Center Records

Cost studies were done for 12 month periods in 1982-83 and 1984-85. Information was collected during site visits to health centers and zone offices. All resources consumed in providing health services were included. Financial records and monthly reports were used when available; however, recordkeeping was not standard, and costs often had to be estimated. Costs for donated items were specified by donor agencies and included in the analysis. Foreign currency was converted to Zaires at the exchange rate of US\$ 1 = Z 43.8 from October 1984 - March 1985, and US\$ 1 = Z 52 from April 1985 to September 1985. Costs for direct services, supervision, training, mobile team visits, and vaccinations were included in the health center costing while

overall administrative costs of the zones were included at the zone level. The number of private voluntary organizations providing support to rural health zones precluded a reasonable estimate of their investments outside of the zones.

For each health center and zone office, costs were divided into investment and operating costs for six-month periods. Resources with a life expectancy of more than one year were considered investment costs.

Zonal administrative costs were calculated by dividing the total administrative costs by the number of health centers being supervised.

HEALTH CENTER RESULTS

Statistical results are analyzed below by health center. In many cases, variations by zone were more pronounced than variations by payment scheme, so a zone by zone analysis follows.

Utilization

The reactions of community members and service providers to the shift in payment schemes were strong and unexpected. Several of the health care personnel preferred the fixed fee with variable drug cost payment scheme because it allowed them to adjust fee levels themselves to some extent. In Katanda Health Center, the auxiliary nurse was dismissed after showing open hostility to the shift to fee per episode. He subsequently opened a private dispensary in the same service area, and many patients from the center went to his dispensary due to his prestige in the community. An open conflict developed in Kindamba between members of the Village Development Committee and the auxiliary nurse who was hostile to the fee for episode payment scheme. The nurse felt that fees had been set too low for self-financing the center.

Communities favored the fee for episode scheme. Utilization of some services decreased in Keba because of the negative reaction of the community when the payment scheme shifted to fee per visit.

Review of health center records yielded information on curative visits per capita during the 12 month period between October 1984 and September 1985. These rates varied enormously from one health center to another, from a low of 3 visits per year per 100 population in Katanda and Tshileo to a high of 245 per 100 persons in Lukunga. (Table 1.) One reason for this was that people seeking health care were far more likely to go to the SANRU-supported health center in some areas than they were in others. The fifth column of Table 1 shows that the proportion of persons seeking health care who went to the health center during the 1985 two week recall period ranged from 1.4 percent in Katanda (where the nurse set up a competing private practice) to 83.2 percent in Lukunga (a small, well-defined, and isolated service area). A second, less interpretable, explanation was that people in some areas reported very infrequent use of any health care provider (only 10 visits per 100 persons per year in Tshileo, for example), while in other areas (Kangoy, for example) visits were up to 35 times more frequent. Results in one area were affected by the large number of followers of an apostolic faith who reported their source of care as "other". Visits per episode of illness also varied greatly, from scarcely more than 1.0 in Lukunga and Muadi Kayembe and Kaniama to over 6.0 in Kangoy. (Table 2.)

Table 1. Health center visits for curative care
October 1984 - September 1985

Health Center	Population	No. of Health Visits*	Visits per Capita to Health Center	Percent of Conditions Treated at Clinic **	Visits per Capita to All Care Providers ***
1) Kabambaie	6257	2436	0.39	47.1%	0.83
2) Mbau	8403	NA	NA	45.5%	NA
3) Katanda	33455	843	0.03	1.4%	1.80
4) Tshileo	43870	1374	0.03	31.2%	0.10
5) Kindamba	1908	2332	1.22	50.7%	2.41
6) Lukunga	1972	4824	2.45	83.2%	2.94
7) Muadi Kayembe	12924	2489	0.19	18.5%	1.04
8) Kaniama	10337	5823	0.56	15.1%	3.73
9) Kangoy	16941	29086	1.72	48.8%	3.52
10) Keba	13839	7992	0.58	17.1%	3.38
Medians			0.56	38.4%	2.41

* From Health Center records

** Household survey, two week recall data

*** Estimated by combining Health Center and two week recall data

Table 2. Illness episodes treated by health centers
October 1984 - September 1985

Health Center	No. of Episodes	Episodes per Capita	Visits per Episode
1) Kabambaie	NA	NA	NA
2) Mbau	949	0.11	NA
3) Katanda	391	0.01	2.16
4) Tshileo	955	0.02	1.44
5) Kindamba	960	0.50	2.43
6) Lukunga	2304	1.17	2.09
7) Muadi Kayembe	2382	0.18	1.04
8) Kaniama	5412	0.52	1.08
9) Kangoy	4794	0.28	6.07
10) Keba	1810	0.13	4.42
Medians		0.18	2.12

Although researchers anticipated increased utilization in centers charging fixed fees per episode, before/after changes were inconsistent and conclusions difficult to interpret. No general conclusion can be made based on the data collected in the two-week recall survey and the review of health center records. However, much of the variance in utilization can be explained when these data are complemented with a qualitative analysis of the context of events and behavior in each zone.

Cost Analysis

The greatest operating costs for health centers were medical supplies, personnel and transport, in that order. Average personnel time spent on curative care was about double that for preventive care. The median health center operating cost was \$3,000 in 1984-85. Health center investment costs were relatively low compared to operating costs with a median of \$200.

Researchers calculated three basic cost measures for curative care, namely: cost per capita, cost per visit, and cost per episode. (Unless otherwise indicated, the figures given below are for direct operating costs only, including associated supervision and mobile team support from the zonal level.) These measures, like the utilization indicators described above, varied enormously from one center to another, suggesting considerable inequity in the services provided.

In Tshileo (the area with low utilization mentioned above), direct operating costs for the twelve months between October 1984 and September 1985 totaled only 2 cents per capita, while in Lukunga they were 90 cents. Costs per visit ranged from 4 cents in Kangoy to \$3.46 in Katanda. The latter center experienced extremely low utilization so that fixed costs were spread over a relatively small number of visits, while the former had extremely high utilization.

Health center operating costs per episode ranged from 27 cents in Kangoy to \$7.46 in Katanda, with a median of 95 cents. At the average center, a patient payment of 95 cents per episode would cover personnel salaries, zonal supervisor and mobile team salaries for the time they spend on field activities, all inservice training, administrative and maintenance supplies, drugs, vaccines, kerosene, minor building repairs, and transport for personnel and materials including supervisors and the mobile team.

The right hand side of Table 3 shows that medical supply costs (mainly for drugs) accounted for nearly half of all curative care costs, ranging from a low of 8.8 percent in Katanda (where fixed personnel costs were high for an underutilized clinic) to a high of 70.1 percent in Kaniama. Health centers in Lukunga, Kaniama, and Kindamba substantially outspent others in per capita terms, while on a per visit basis Mwadi Kayembe and Kaniama faced especially high costs.

Table 3. Health center operating costs for curative care
October 1984 - September 1985

Health Center	Curative Care Costs				Medical Supply Costs			
	Per Capita	Per Visit	Per Episode	Percent of Total Costs	Per Capita	Per Visit	Per Episode	Percent of Total Curative Costs
1) Kabambaie	\$0.33	\$0.84	NA	69.1%	\$0.14	\$0.36	NA	42.6%
2) Mbau	0.26	NA	\$3.22	86.6%	0.12	NA	\$1.05	32.7%
3) Katanda	0.09	3.46	7.46	35.6%	0.01	0.30	0.66	8.8%
4) Tshileo	0.02	0.79	1.12	28.7%	0.01	0.31	0.44	39.2%
5) Kindamba	0.51	0.41	1.01	77.8%	0.25	0.21	0.50	49.7%
6) Lukunga	0.90	0.37	0.77	72.2%	0.49	0.20	0.42	54.0%
7) Muadi Kayembe	0.18	0.91	0.95	67.6%	0.11	0.56	0.58	61.0%
8) Kaniama	0.42	0.74	0.80	70.0%	0.29	0.52	0.56	70.1%
9) Kangoy	0.08	0.04	0.27	73.3%	0.04	0.02	0.14	52.3%
10) Keba	0.09	0.16	0.71	65.1%	0.04	0.07	0.29	40.7%
Medians	0.26	0.74	0.95	69.6%	0.12	0.30	0.50	46.2%

Table 4 shows that most health centers spent 22 to 34 percent of their funds on preventive care, though Katanda and Tshileo (both in the same zone) spent substantially more (64.4 percent and 71.3 percent respectively). Preventive costs per capita ranged from 3 cents per annum in Kangoy to 35 cents in Lukunga.

Table 4. Health center operating costs for preventive care
October 1984 - September 1985

Health Center	Per Capita	Percent of Total Costs
1) Kabambaie	\$ 0.15	\$ 30.9%
2) Mbau	0.06	13.4%
3) Katanda	0.16	64.4%
4) Tshileo	0.06	71.3%
5) Kindamba	0.14	22.2%
6) Lukunga	0.35	27.8%
7) Muadi Kayembe	0.08	32.4%
8) Kaniama	0.18	30.0%
9) Kangoy	0.03	26.7%
10) Keba	0.05	34.9%
Medians	0.11	30.4%

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Zone level operating costs varied by the location of the zone, the staffing patterns and the availability of donor support. Personnel and transport represent the greatest zonal operating costs. The operating costs of four of the five zones were \$3,500 to \$5,500 per year although the number of health centers that they supervised differed significantly from 6 to 47. The median amortized annual zonal investment costs were calculated at \$12,000, primarily representing vehicle costs.

Revenue

The fees that clinics set varied from one health center to another and were set in diverse ways. No technical formula for setting prices was agreed upon, yet the six centers with usable revenue data reported that they covered a median of 107.3 percent of their curative costs which includes costs of zonal supervision and mobile teams (Table 5). Preventive revenues covered between 0.4 and 10.6 percent of preventive costs, but three health centers collected revenue from curative care in excess of costs permitting cross-subsidization of preventive care. The weakest health center in terms of cost recovery was Katanda, where personnel costs were high relative to utilization, while the strongest center was Kabambaie. Overall, the six clinics reported median cost recovery of 66.5 percent.

Table 5. Percentage of health center operating costs covered
October 1984 - March 1985*

<u>Health Center</u>	<u>Curative</u>	<u>Preventive</u>	<u>Total</u>
1) Kabambaie	197.1%	10.6%	136.6%
2) Mbau	139.8%	1.6%	120.0%
3) Katanda	33.0%	0.4%	7.6%
4) Tshileo	119.3%	4.7%	35.7%
5) Kindamba	NA	NA	NA
6) Lukunga	NA	NA	NA
7) Muadi Kayembe	95.3%	8.3%	63.2%
8) Kaniama	94.1%	2.7%	69.8%
9) Kangoy	NA	NA	NA
10) Keba	NA	NA	NA
Medians	107.3%	3.7%	66.5%

* Cost data are for the time period indicated. Revenue data are for September 1984 - February 1985.

ZONAL ANALYSIS

KALONDA: Kabambaie and Mbau Health Centers

Both health centers - Kabambaie and Mbau - are fairly isolated health centers because of the poor road conditions throughout the rural health zone of Kalonda. The nurses at both facilities are technically competent and respected by the communities they serve.

At Kabambaie, where the fee per episode scheme was introduced, the community, through the Local Medical Committee, was actively involved in adopting the scheme to the health center including setting the fees. The extensive involvement of the community in health center decisions proved to be the primary source of friction in the implementation of the scheme, as the nurse resented others interfering with his job. New roles of the community, medical director, and the health center staff that were being established as a result of the decentralization of PHC at the same time the scheme was being introduced were an important factor in how the scheme was implemented.

The health centers in this zone had the best cost recovery results. Kabambaie and Mbau recovered 137 and 120 percent of their costs respectively, well above the median despite the fact that both had per capita curative costs above the median and Mbau had the highest overall curative costs. This is partially explained by the fact that each of them earned significant revenue from a specialty service: deliveries at a new birthing center at Kamambaie and surgery at an enhanced operating room at Mbau. Visits per capita to all providers in the Kabambaie service area is very low, only one third of the median, though the health center treats a large percent of those illnesses reported (47 percent). Mbau health center treated 46 percent of reported illnesses, also above the median.

BIBANGA: Katanda and Tshileo Health Centers

Katanda and Tshileo serve large population bases with Katanda being the administrative/political headquarters for the area. As a result of disruptions in service during the research period, the Katanda health center had an extremely low utilization rate for curative services (1.4 percent of all conditions reported were treated there) and high operating costs. Hostile to the change of payment scheme from fee per visit to fee per episode, the nurse was dismissed and opened a private dispensary nearby which took many of the public health center patients. After his departure, staffing continued to be unreliable and disruptive. While costs for medical supplies were only a small portion of total curative operating costs, operating costs for Katanda were very high because of high fixed costs during a period of low utilization. Both the Katanda and Tshileo service areas were characterized as low users of health providers in general with the Tshileo service area having the lowest utilization rate per capita for all health providers: 10 visits per 100 persons compared to 180 per 100 persons in Katanda and a median of 241 visits per 100 persons for all health centers.

The preventive care costs were extremely high in both health centers, 64 percent and 71 percent, relative to the median (30 percent). Preventive services were maintained throughout the research period by the mobile team from the zone office which was responsible for the supervision of six health centers, the least number of health centers supervised for any of the five zone offices. Because they provided MCH services to a very limited number of health centers, their high fixed personnel and transportation costs are a significant burden on those health centers served. These high preventive costs greatly reduce the total cost recovery potential of the health centers in this zone as demonstrated in Tshileo where 119 percent of strictly curative costs were covered from curative revenues while only 36 percent of total costs were covered from total revenues.

SONA BATA: Kindamba and Lukunga

The Rural Health Zone of Sona Bata has an extensive PHC infrastructure including many private providers such as the Red Cross and Salvation Army, understandable considering its proximity to Kinshasa. Health centers in the zone are responsible for small, well-defined service areas which identify very closely with the communities they serve. The per capita, per visit and per episode utilization rates for Kindamba and Lukunga are all at or above the median.

Curative operating costs were average for these two health centers. With very small service areas, the per capita curative costs for the health centers was twice the median. However, the per visit costs are half the median. Revenue data was not available for the analysis.

Kindamba was late in introducing the new fee per episode scheme, February 1984, because the Medical Director was out of the country. On his return, the Village Health Committee with his assistance, set the new fees which the nurse found to be too low. Overall, the nurse was not happy with the change and spent more of his time in a nearby private clinic. The result was a 26 percentage point decrease, from 77 percent to 51 percent, in conditions treated at the health center and a parallel increase in utilization of private dispensary services.

KANIAMA: Mwadi Kayembe and Kaniama I

The Kaniama I health center is located near the Kaniama hospital, while Mwadi Kayembe health center serves a rural population 20 kilometers from the hospital. Both experienced very low curative care utilization during the research period, treating less than 20 percent of reported conditions in their service area at the health center. The Medical Director questioned these figures, finding them low relative to his experience in the zone. It is interesting to note that in examining the data for sources of care, there was an increase in the use of market sellers and drug stores and a decrease in the use of the health center and hospital in both service areas, possibly indicating a change in the local private pharmaceutical market which affected utilization of zone health services.

There was little resistance to the introduction of the fee per episode scheme at Mwadi Kayembe. The Medical Director worked with a local committee to set the fees. The nurse was supportive of the change in payment scheme because the new scheme simplified health center management. The Medical Director and the nurse found that educating the community about the scheme and training the village health committee in health center management were the two biggest problems.

Cost recovery was remarkably similar in both health centers. Approximately 95 percent of curative operating costs were recovered in each of them while 67 percent of total costs were covered by total revenues.

KONGOLO: Kongoy and Keba

Kongolo was the only zone where the fee per episode of illness scheme was in operation before the study began. In October 1984, Keba health center introduced the fee per visit scheme: people paid a fee for the illness episode card (valid for 7 days) and then had to pay for medications separately. The community and nurse were not happy with the change despite the fact that the change was only a slight variation of the existing scheme. The community objected to the increased cost of health care, though the total cost was still below the equivalent treatment by a private provider. The nurse found the accounting complex and complained that people did not purchase a complete treatment, stopping when symptoms were initially relieved.

Annual utilization of all care providers was very high in both health centers, 352 visits per 100 persons in Kongoy and 338 visits per person in Keba. Visits per episode of illness treated at the health center were also extremely high, 6.1 visits per episode in Kongoy and 4.4 in Keba. These high figures may reflect health seeking behavior as the result of experience with paying by the episode of illness combined with either a generous definition of what constitutes an episode of illness or questionable recordkeeping (considering in Kongoy an illness episode was supposed to be limited to treatment during a 7 day period). An additional explanation for the high fee for episode rates is the fact that a local company pays for the health care of its employees who constitute a large portion of that health center's clients. About half of the illnesses treated in the Kongoy service area were handled by the health center. Keba, the center which changed payment schemes, treated only 17 percent of illnesses reported, a relatively low rate considering the high visits per capita to all care providers.

Costs per capita, per visit and per episode for both health centers are well below the median. Revenue data for the Kongolo zone health centers was not available for the analysis.

DISCUSSION

This study started out as an effort to find the "best" community financing scheme for Zairian health zones, looking particularly at the differences between fees per visit and fees per episode. The effect of fees on utilization was a prime concern; investigators anticipated that patients paying fees per episode would be more likely to return for follow-up visits than those paying separately for each visit. The possible cost effect of the expected extra visits was viewed as a constraint, to be evaluated during implementation. These research issues were highly germane to the government's decentralization policy, which was being developed and implemented at that time.

While encountering difficulties, investigators learned a great deal about the process of introducing or changing community financing schemes and about the effect of this process on clinic operations and community utilization. Fee levels set through the "unscientific" process of community decisionmaking and crude cost calculation proved to be adequate for significant cost recovery, especially for curative care. Clinic management, staff quality and morale,

drug supply, and relations with the community as a whole were probably more important influences on utilization in these ten centers than was the payment scheme, yet these factors were themselves affected by staff and community reaction to change. Clinic staff in several locations disliked either the payment scheme they were asked to implement or the fee levels that had been set. Utilization declined severely in one center because the nurse quit and established a competing private practice; his successor was subsequently dismissed for malfeasance. A community asked to switch from fee per episode to fee per visit objected to what they considered a less desirable system and began making greater use of other providers. During this time period in this country, the way in which a payment scheme was established and managed appeared to be more important for utilization, cost, and cost recovery, than was the precise nature of the scheme.

Other significant findings from this study concern the importance of health zones and of decentralization in general. Differences between zones in cost, cost recovery, and utilization appear to be greater than differences on these variables between payment schemes. Part of these differences was apparently due to zonal management policies, including those relating to drug availability and the degree of emphasis on preventive care. At the same time, results documented prevailing inequity in service expenditures and utilization, partly due to major system-wide changes underway in staffing patterns, lines of authority, types of services provided, and other program elements.

In the real world, conditions are rarely ideal for controlled testing and evaluation of alternative health delivery systems, and this was certainly the case in Zaire. Even in normal times, Zaire exhibits extreme variations in health conditions, facility and staffing levels, the quality of service, socioeconomic factors, and other influences on both service utilization and costs. In times when a major new policy initiative (decentralization) was being implemented, experimental controls were less likely to succeed, as proved to be the case for this study. Service utilization declined in most health centers regardless of payment schemes, while costs moved in an erratic fashion dependent more on factors such as inflation and drug availability than on fee structures. Aggregate statistical comparisons based on payment scheme proved to be infeasible.

As stated by one of the senior Zairian investigators, "the community financing of primary health care survey has been without doubt a dynamic and positive experience with regard to research on self-financing at the very moment when a decentralization and autonomy of health zones policy was a current issue. It appears that this study has revealed more problems instead of solving problems. However, its real merit is that it opened roads and posed questions in an area significant to the success of primary health care. Also, it is a thoughtful work from which we can now take action."

* * *

This study was conducted for SANRU through the African Intermennonite Mission from September 1983 through March 1986. Information is available from the principal investigator, Dr. Lusamba Dikassa or from Dr. Frank Baer, P.O. Box 3555, Kinshasa, Zaire or from Ms. Marty Pipp, PRICOR study monitor (Chevy Chase).