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PRICOR TANZANIA

SUPERVISION OF THE VILLAGE HEALTH WORKER

prepared by: F.D.E. Mtango, Chairman of the  
Department of Epidemiology and  
Biostatistics, Faculty of Medicine,  
University of Dar Es Salaam

Z.J.Z. Killewo, Senior Lecturer,  
the Department of Epidemiology and  
Biostatistics, Faculty of Medicine,  
University of Dar Es Salaam

assisted by : M.C. Wilson, PRICOR Consultant,  
(for final report only)

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## Executive Summary

### Background

Pricor Tanzania addressed the topic of "Supervision of the Village Health Worker". The Pricor study was initially designed to improve the coverage and utilization of Primary Health Care services provided by the Village Health Worker (VHW) by increasing the level of performance of the VHW through improved supervision.

This study complimented the Ministry of Health strategy for PHC in Tanzania. The Government is committed to improving health care for the rural population and signed the Alma Ata Declaration in 1978. The Government has adopted and implemented a health strategy which includes eight elements to be provided by VHWs. These are: health education, improved food and nutrition, safe water and sanitation, maternal and child care including family planning, immunization, endemic disease prevention and control, appropriate curative treatment and essential drugs supply. The MOH and Pricor team recognize that provision of these services by a part-time worker with minimal training in PHC is a substantial order. They also believed that the discovery of an appropriate model of supervision, through research, would be invaluable to VHW service outcomes.

The research was originally meant to address three major technical issues:

- (a) the relationships between supervisory mechanisms and VHW performance and service outcomes;

- (b) cost-effectiveness of supervisory schemes in relation to VHW output; and
- (c) effectiveness and cost-effectiveness of dividing supervisory functions between community members and health professionals.

Time became a major obstacle as certain pieces of the research took far longer than initially expected. Other constraints were 1) changes in the Pricor team due to other opportunities and demands arising 2) serious difficulties in procuring computer time 3) ability and facilities to utilize analyses procedures originally agreed upon. As a result Pricor focussed on two general issues which produced results: a) the relationships between supervisory variables and the providers; b) the systematic involvement of the villagers, village governments, VHWs, supervisors, and all levels of decision-makers in the development of supervisory improvements.

#### Problem Analysis (Phase I)

Three sets of information were considered during this phase: Supervision (a) decision variables and characteristics of the supervisors, (b) performance of the VHW, (c) services and outcomes of these services provided by the VHW and (d) constraints.

- (a) Having completed an exhaustive exercise on the selection of the supervision decision variables the Pricor team prepared the supervision decision variable questionnaire. The questionnaire was keyed to supervisors, village health workers,

or village government/communities depending upon the variable. Further, the questionnaire allowed for weighted averages for each answer depending upon the category and education of the supervisor. The weights reflect what the Pricor participants believe to be a scale of the importance and knowledge of the respective supervisor in question.

The team then reviewed the selected variables and components thereof and developed the questionnaire composed of three forms; one each for supervisor, village health worker, and villager.

Data were obtained from 19 randomly selected villages in Bagamoyo district and in 18 randomly selected villages in Hanang. A total of 119 Form 1 questionnaires (supervisors), 29 Form 2 questionnaires (village health worker) and 76 Form 3 questionnaires (villager) were analysed.

This analysis met with two kinds of results; immediate decisions which were made and decisions which were based on this analysis toward supervision goal setting which was completed during phase II, solution development.

The Pricor team discovered that in general relationships between supervisors and VHWS needed considerable improvement, that logistic support for VHW performance was poor and that village government/community relations ranks very high in terms of importance in the local setting. This last observation emerged as a basis for the evolution of the rest of the study.

- (b) The development and implementation of the instrument to ascertain VHW performance levels changed substantially from what was initially envisioned to what actually happened.

Originally it was intended to determine the level of performance (skill and competence) with which the village health workers performed services relating to service outcomes. This was to be done using qualified observers who would use a scaled checklist to record performance for each relation task towards a specified service outcome. Time constraints coupled with the Pricor team's conception that frequency of the task performed rather than the degree of competence in performing an activity would be adequate to base supervision of VHW goals setting. It was also at this time that the original study plan using a mathematical model to predict optimal supervision solutions relating supervision decision variables, performance levels, and service outcomes began to be replaced with developing solutions based on a heuristic approach to goal setting.

A questionnaire was developed which included not only questions relating to most of the 10 service outcomes, but also included biodata of the health worker, questions on remuneration, and service outcomes not included in the original 10 service list.

Twenty villages in Hanang and eighteen villages in Bagamoyo were randomly selected and twenty medical students over a period of five weeks carried out the survey. Fifty eight village health workers were interviewed in all.

- (c) Considerable time and energy went into the development of the household survey which was prepared and pretested by the Pricor team. Thirty eight villages were randomly selected and approximately 125 households per village were interviewed. Twenty medical students were trained and conducted the interviews in pairs. The same twenty students spent 15 days in Bagamoyo and 15 days in Hanang implementing the survey. In addition to the 30 days on site they spent a week in training and a week travelling.

Altogether six thousand surveys were conducted, and although the Pricor team tried several alternatives, the tabulations for the analysis of this survey were never completed. Only two questions were tallied, one relating to measles vaccines and one to safe water preparation. These were done by hand which was time consuming and exhaustive, but funds were made available for this through other projects interested in the outcomes.

The Pricor team was resourceful and managed to assess the then present status for the 10 Pricor service outcomes by other means. Malaria treatment, nutrition monitoring, environmental cleanliness and pit latrine construction figures were calculated based on findings from three separate surveys conducted in Bagamoyo district. Home visits, health education sessions and oral rehydration therapy figures were derived through the review of village health worker monthly reports.

- (d) Seven constraints were identified for purposes of this study by the Pricor team, decision-makers, and Pricor consultants (appendix 5). Further to identification a survey was conducted to determine the amount of time or money presently available for each by district.

Upon completion of the problem analysis phase the Pricor team realized that supervision of the village health worker faced many obstacles. The question was raised "what levels of service outcomes can be achieved through manipulating supervision decision variables". It was determined that goals should be set. This became the focus of phase II.

#### Solution Development

It was initially envisioned that solution development would be determined through the utilization of a mathematical model (multiple goal linear programme) to ascertain relationships among and across three data sets, i.e. supervision decision variables and constraints, VHW performance levels, and actual service outcome figures.

There were two basic reasons this was not done. One, as mentioned in phase I, the information collected and the analysis of these for performance levels and service outcomes were inconclusive and incomplete. Secondly the team had never utilized such an analysis and although they were keen to implement this, sufficient understanding of the model and the ability to utilize it were lacking. A consultant familiar with the model and who was originally responsible for a pretest of the model with the team was unable to complete that task.

It was then decided to focus on goal setting exercises. This appeared a reasonable alternative as decision-makers, village governments, communities, the Pricor team, and all involved supervisors and VHWs were eager to pursue the improvement of supervision, VHW performance, and services. It was at this stage that the project became one which fully addressed community participation.

Goals were set by decision-makers, villages, supervisors and VHWs and focussed on what alterations of supervision decision variables would increase coverage and utilization of services offered by VHWs.

### Results and Conclusions

Since the study's focus evolved into one of goal setting for service outcome improvements the results are the goals themselves. The Pricor team believes that the goal setting exercises were invaluable as a means of drawing attention to VHW performance and supervision and as an effective tool for community participation.

The Pricor study also generated a series of decisions and improvements in the supervision system. The following changes are now in practice.

- The number of supervisors in the project area have doubles.
- The number of supervisor visits have increased and each supervisor visits assigned sites at least twice a month.
- Supervision schedules have been developed and each supervisor prepares a monthly work plan and a monthly report.

- Supervisors have been provided bicycles.
- A supervision checklist has been developed and implemented.
- Village health committees have been established and assist in supervision of the VHW.
- Relationships between supervisors and village leaders have been formalized and cooperation is good.
- The "team safari" concept was developed by the Pricor team and has been adopted by and implemented in all villages. The village health committee, VHW, supervisor, selected teachers, and agriculture and water development officers form a team and according to agreed upon schedule, visit every household in the village to discuss the health and well-being of the household members. The supervisor reports all followup activities to the village health committee once a month.
- The MCH has increased the budget for supervision of VHWs.

#### Administration and Budget

The Pricor Tanzania study was conducted between November 1983 and March 1986.

The Pricor team members were:

- |                    |                                |   |
|--------------------|--------------------------------|---|
| Dr. F.D.E. Mtango  | - Project Director             | - Senior Lecturer:<br>Epidemiology, School<br>of Medicine, University<br>of Dar es Salaam |
| Dr. J.Z.J. Killewo | - Senior Research<br>Associate | - Lecturer: Epidemiology,<br>School of Medicine,<br>University of Dar es Salaam           |
| Mr. G.R. Moda      | - Senior Research<br>Associate | - Lecturer: Statistics,<br>University of Dar es Salaam                                    |

Dr. E.P.Y. Muhondwa	- Senior Research Associate	- Lecturer: Behavioural Science, School of Medicine, University of Dar es Salaam
Mr. H.S. Rukinga	- Field Supervisor	- Pricor
Mr. D. Kashindye	- Field Supervisor	- Pricor
Mrs. A.S. Muze	- Research Associate	- Pricor

Budget

The total budget for this project was US\$ 55,000.

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## Background

In 1978 the infant mortality rate in Tanzania was reported to be 137 per 1000. In a study conducted by the Department of Epidemiology in 1984 in Bagamoyo District infant mortality was estimated at 150 per 1000. The most common diseases reported were malaria, pneumonia, measles, diarrhoeal diseases, and malnutrition. As in other regions in Africa and the developing world, Tanzania's most serious health problems face women and children under five years. These are Prigor/Tanzania's target population.

Tanzania's current health strategy dates from the Arusha Declaration of 1967, which proclaimed a development strategy based on the principles of self-reliance, community participation, and social justice.

Central to this strategy was the development of the rural areas, which included provision of, among other things rural health services and environmental sanitation. This approach confirmed at the party conference of 1971 led to a plan for the development of health services based on a network of dispensaries, health centres, and district hospitals staffed by inexpensively trained auxillary health workers. At this time it was envisioned that only one of every 3.5 villages would be covered by this network. Although the plan stressed the role of preventive care in health service provision, in practice curative services remained the primary focus.

In 1978 Tanzania became a signatory to the Alma Ata Declaration which described the role of primary health care in achieving health care (PHC) for all by the year 2000. PHC approach would cover the gaps in the former system. In 1983 the Ministry of Health published guidelines for Implementation of PHC Programme in Tanzania. This set the long term objectives of PHC to be:-

- (a) To raise life expectancy at birth from 46 to 55/60 years;
- (b) To reduce infant mortality from 137 to 50 per 1000;
- (c) To provide PHC to every village by year 2000;
- (d) To strengthen health care delivery management and supervision at all levels through training and development of health information system;
- (e) To promote inter sectoral cooperation and community participation;
- (f) To achieve self-sufficiency in health manpower, drugs, and supplies.

To achieve these goals the guidelines emphasized the provision of the 8 essential elements of PHC: health education, improved food and nutrition, safe water and sanitation, maternal and child care including family planning, immunization, endemic disease prevention and control, appropriate curative treatment and essential drugs supply. These elements were to be provided by Village Health Workers.

Tanzania's land surface of approximately 1 million km<sup>2</sup> includes wet coastal lowlands, near desert in the central plains, and fertile highlands in the north and parts of the south. Tanzania's population numbers approximately 20 million. The country is organized into 8,000 villages, 100 districts, and 20 regions.

The provision of Primary Health Care (PHC) services can be understood by examining the larger health care system in Tanzania. Health Care in Tanzania is provided by the government, voluntary agencies, parastatals, private organizations, and traditional healers. The organization is based on a hierarchical government structure with responsibilities devolving from the national level through the regional level to the district level. From the District level the lines of authority pass through the Divisional and Ward levels to the Village level. Parallel and inter related to it is the health care delivery system which operates within the government administrative structure.

The Ministry of Health and Social Welfare is divided into four Divisions and two units. The divisions are Hospital Services, Manpower and Training, Preventive Services and Social Welfare, the Units being the Administrative and Planning Units. The Hospital services division is responsible for 4 national referral hospitals, manpower allocation, technical advice to Regional and District Hospitals and the Administration of the Essential Drugs and Mental Health Programmes.

The Manpower and Training division is responsible for all health training institutions in the country. The Division of Preventive services is responsible for the following programmes; Primary Health Care (PHC), Environmental Sanitation, Tuberculosis and leprosy, Maternal and Child Health (MCH) including Nutrition and Family Planning. Expanded Programme of Immunization (EPI), Epidemic Control, and the School Health Programme (SCH). With the exception of PHC which is decentralized, the programmes are centrally planned and administered (vertical programmes) each programme being managed by its programme coordinator at national level.

The Regional Medical Officer (RMO) is responsible for planning, implementation, management and supervision of all health services/ programmes in the assigned Region. He reports technical matters to the Regional Development Director (RDD). Although health programmes such as TB, leprosy, MCH, EPI and SCH are in principle under overall supervision of the RMO in practice they are managed by their Regional Programme Coordinators. The RMO traditionally spends most of his time administering the Regional Hospital.

The organization of the health sector at District level is similar

to that at regional level. The District Medical Officer (DMO) is responsible in professional matters to the Ministry of Health through the RMO and in administrative matters to the Minister for local government through the District Executive Director (DED) and the RDD. The DMO is also director of the District Hospital. As with regional level, health programmes are managed and coordinated by District Programme coordinators.

Health services are delivered at division levels through health centres and at ward levels through dispensaries. A health centre on the average caters for 50,000 people. It provides outreach and supervisory services to 5-6 dispensaries within its catchment area. It provides inpatient and outpatient treatment including basic laboratory diagnosis, MCH, Nutrition, Family planning, environmental health and EPI. It is headed by a medical assistant and ideally is assisted by a team of 7-8 trained health workers which include a Rural Medical Aide, a nurse, an MCH aide, a Health Assistant and a laboratory assistant.

A dispensary caters for approximately 10,000 and provides referral support, outreach and supervisory services to 3-4 villages within its catchment area. It offers a limited range of preventive and curative services, including MCH, EPI, health education and delivery of births. Some of the larger dispensaries may also have inpatient facilities. It is headed by a rural medical aide, assisted by an MCH aide.

Village health workers (VHW) are responsible for the delivery and promotion of village level health care. This includes operation of the Village First Aid health post, health education sessions to the community, home visiting promotion of latrine construction, encouragement of visits to clinics for antenatal care, vaccinations,

treatment referrals, nutrition monitoring, and home deliveries. Some of these activities and their specifications, are still on an experimental basis and there are many discrepancies in quality and quantity of services offered. Not all regions are covered by VHWs.

The organization and delivery of the PHC programmes follow the reporting structures outlined above, but with National, Regional, and District PHC programme coordinators who are responsible for management and coordination at national, regional and district levels, respectively.

Tanzania's health system is certainly complex and bureaucratically sophisticated in nature, since lines of authority progress both vertically and horizontally. The Government of Tanzania recognizes this and believes that strengthening preventive and rural services can best be accomplished not through the traditional health system, but through the use of the village health worker.

#### Study Purpose

The Government of Tanzania is committed to providing effective primary health care services to its rural population. To this end, the government has developed a programme to introduce village health workers (VHWs) into selected rural areas, especially where there are no dispensaries and where mortality from preventable diseases such as diarrhoea, measles, and malaria is high. Village health workers are trained in the following interventions: oral rehydration therapy, malaria treatment and prophylaxis, immunization referral, referral and treatment for suspected pneumonia, nutrition monitoring, and environmental sanitation (specifically, pit latrine construction and maintenance). The VHW programme is targetted at mothers and children

under five in rural areas where primary health care has previously been lacking.

In implementing this programme, several approaches have been introduced regarding VHW selection, length and site of training, supervision, and support mechanisms. Although VHWs have been introduced in 55 districts, the Ministry of Health (MOH) has not yet investigated which of the planned and unplanned components of the various approaches are most appropriate in terms of costs, VHW performance, and service outcomes, nor is the MOH presently aware of the degree to which the services are provided. Such information is now called for by Ministry decisionmakers, as national strategies to address these issues are being formulated by the MOH.

The present health system focuses on alleviating and preventing a range of health problems, including malaria, measles, nutrition, pneumonia, gastroenteritis and diarrhoea, schistosomiasis, tuberculosis, trypanosomiasis, onchocerciasis, tetanus, cholera, leprosy and venereal diseases.

The system is experiencing deficiencies relative to: financial resources; qualified health personnel; health facilities, equipment and supplies; transportation; communication among different parts of the health network; and administrative and management support, of which health personnel supervision is of special concern.

The Government of Tanzania has sought to achieve three objectives in implementing its present health policy:

1. Decentralize health resources with emphasis on rural facilities, personnel and planning;
2. Develop preventive, rather than curative services; and

3. Ensure that donor contributions to health services and programmes are consistent with self-determination in health care (Tanzania Health Sector Strategy Statement, 1980, pp. 14).

The first two objectives contrast with the focus on urban-based, curative services which prevailed until after independence. Current programmatic emphases include maternal and child health, environmental sanitation, immunization, health education, and communicable disease control.

As described in the background section, Tanzania's health system consists of a hierarchy of facilities extending throughout the country and linked through referral. The smallest unit is the village health post, which provides first aid and preventive services, and is ideally operated by two volunteer VHWs. At the next level is the rural dispensary, which delivers outpatient, maternal and child health, and child-spacing services, and organizes health campaigns. Types of personnel operating this facility include rural medical aides, MCH aides or village midwives, and health auxiliaries or assistants. Groups of four to five of these clinics refer patients to the Rural Health Center, which includes outpatient clinics, as well as 20-30 beds for short-term inpatient care. The urban equivalents are the urban dispensaries and Urban Health Centers, which tend to dispose of greater resources in terms of personnel and equipment. The remainder of the system consists of district, regional and consultant (national) hospitals. There is one 100-150 bed hospital per district, one regional hospital per region, and five zonal consultant hospitals.

This study supports Tanzania's health policy by researching health alternatives specific to service delivery to the country's rural

populations. It focuses on investigating the best possible use of existing resources, and addresses directly a topic of considerable interest to the MOH, namely how to maximize the vast VHW network currently in place in order to increase service utilization and coverage. IN addition, the data which must be collected in order to determine supervisory schemes will help answer a variety of questions the MOH is presently asking relative to the quality and scope of VHW service delivery.

Of particular interest to the Ministry of Health are two issues: (1) supervisory mechanisms, both for the large network of VHWs already in place and for those being added, and (2) the length and site of training for performance and service outcomes. Training sessions range in length from three to nine months, but no information is available regarding the relationship between length of training and VHW outputs. Supervision is carried out using both centralized and decentralized mechanisms. Supervision, when it is delivered, is primarily done by a health assistant or a rural clinic nurse.

Again, the relationships between the various mechanisms for supervision and VHW output have not as yet been described. However, officials are very concerned about the generally low level of supervision and would use information generated by a study on VHW supervision for implementing cost-effective supervisory schemes.

Reduction of diseases and health care in Tanzania depends not only on the resources technology in place, but also on community and individual response and the management thereof. One important aspect of any management system is the supervision sub-system. The Government of Tanzania has adopted the PHC approach using VHWs as

the national way of improving the health of all Tanzanians, particularly children under five years. However, PHC supervision system or research addressing these have not been systematically considered in Tanzania, although some supervision mechanisms are in place.

The supervision of VHWS is conceived as a team effort involving District, Divisions and Ward PHC Coordinators. The role of the community leaders in supervision has not been clearly specified, although they have the responsibility of selecting and supporting VHWS in the PHC activities. The supervision roles of members of other health related sectors, e.g. education and agriculture have not been specified, although it is assumed, if not stated in "PHC Guidelines" that they should be members of PHC committees. The team approach as well as the involvement of intersectoral cooperation needs testing in a pilot area, including the investigation for its appropriateness in terms of costs and VHWS performance and service outcomes.

The Ministry of Health has not been aware of the types or degrees of services provided or the resources required or currently used. Such information was called for by the Ministry's decision-makers and planners.

The research findings will support Tanzania's health policy of analysing alternatives specific for service delivery to rural populations, in order to discover the best strategy for the attainment of health for all by the year 2000.

Given the Ministry's constraints of inadequate health personnel and transportation, it does not appear feasible that supervision could be improved significantly through increased numbers of visits

to VHWs by the health personnel or by greater numbers of and/or duration of contacts. It is also unrealistic to expect community members to perform many of the supervisory functions believed to increase VHW expertise in health interventions. However, it may be that community members could be selected to provide various supervisory functions considered to be administrative and disciplinary in nature, such as checks on record-keeping, work hours, and conditions of the service unit and perhaps checks on supervisory visits. Health professionals could then perform supervisory functions such as technical assistance and in-service training, as well as provide valuable social contacts. All of the functions are indicators for increasing VHW performance and service outcomes.

Given these assumptions, this research project seeks to identify one or more "optimal" supervisory schemes as defined by "best: levels of those activities normally performed by VHWs. Thus, no specific schemes or mechanisms are defined a priori - only the activities normally comprising the schemes. The research then determines, and subsequently evaluates, appropriate levels for these activities.

In this effort, the research originally was meant to address three major technical issues:

- (a) the relationships between supervisory mechanism and VHW performance and service outcomes;
- (b) cost-effectiveness of supervisory schemes in relation to VHW output; and
- (c) effectiveness and cost-effectiveness of dividing supervisory functions between community members and health professionals.

As the study evolved so did unforeseen obstacles to accomplishing these specific research issues.

Time became a major obstacle as certain pieces of the research took far longer than initially expected. As a result only (a) above was addressed.

An interesting and significant observance crystallized while carrying out this Pricor study. That peoples opinions towards supervision of VHWS and tasks performed by both supervisors and VHWS took considerable time to mature. In addition, the opinions and attitudes of individuals including Ministry of Health Decision Makers, Decision Makers from the Prime Minister's Offices, Party Chairmen, other village leaders and indeed the villagers themselves began to take the question of supervision of VHWS very seriously and participated intensely in the various research efforts which involved opinions and attitudes. This involvement was very time consuming, but the researchers believe that although all the original issues were not addressed an even more valuable issue was. Opinions were sought in a systematic way. The effort taken in seeking opinions went way beyond the traditional means of doing so and the Pricor team was encouraged by the very positive feedback received in this endeavour. None of the players who participated in the various aspects of the research had ever used the systematic methods of organizing opinions or decision making employed in this study.

The purpose of the study became limited in terms of time due to the vast and intense involvement in the study of those needed both to implement and support study findings.

### Problem Analysis

Although the original goal of this study, in broad terms, "to improve supervision of VHWS and implement a more effective model of supervision", did not change, this study evolved considerably during its course and many changes were made in both design and utilization of research instruments and in the analysis of these. In order to explain and trace the evolution, the original plan for phase I, Problem Analysis, is included in brief here.

There will be two major phases in this research project. In the first phase, we will conduct a prescriptive study to:

- (a) describe supervision activities or characteristics (decision variables)
  - describe VHW performance levels
  - describe service outcomes
  - describe their relationships;
- (b) specify adequate levels of performance of VHWS for each health intervention, i.e., ORT, etc.
- (c) identify optimal supervisory schemes (activity levels) for meeting specified performance levels for essential health interventions.
- (d) identify optimal supervisory schemes for meeting all essential service performance levels together with specified (one or more) service outcomes.
- (e) specify adequate levels of service outcomes on health interventions, e.g. coverage, etc.
- (f) identify the least and most important supervisory characteristics in terms of their effects across any or all of the health interventions.
- (g) determine costs for the proposed optimal supervisory scheme(s).

At the conclusion of the Phase I, we assume specification of a "best" VHW supervisory scheme for each alternative. A multiple goal linear programming model will be utilized to analyse data collected on supervision variables, VHW performance levels, and service outcomes to determine (b) through (f) above.

In the second phase we will evaluate the relative effectiveness and cost-effectiveness of the optimal scheme(s) with respect to division of supervisory functions.

As described below in more detail, our sample will be randomly drawn from two districts, Hanang and Bagamoyo, and will include 35 villages respectively.

#### DATA COLLECTION FOR PHASE I

To describe the supervision mechanism (characteristics) in relation to VHW performance and service (intervention) outcomes, we will assemble three kinds of information. Each of these three sets of information will be useful in and of themselves as well as necessary to the overall study objectives described in (a) - (g) above.

The first kind of information will describe the supervisory mechanisms in terms of the activities (characteristics) as they currently exist in the two regions chosen for the study. The supervisory characteristics are the decision variables in this first phase.

We also will include length of training of the VHW and site of training as decision variables, as they may significantly contribute to VHW performance and service outcomes, and because this information will be both easy to obtain and relevant to other studies the Ministry wishes to conduct.

The underlying assumption in this study is that improved supervision will lead to better VHW performance, which will in turn yield improved service outcomes in the form of greater service utilization and coverage. Having identified the discrepancies between actual and optimal VHW performance - using the VHW performance assessment and service outcome data - for each intervention, it should be possible to improve VHW performance by modifying appropriate aspects of VHW supervision. The decision variables are those dimensions of supervision which can be altered to make an impact of VHW performance.

Therefore, the decision variables should reflect key components of the supervisory function, be readily observable, be expressed in measurable terms, and be susceptible to change.

As the original plan described above, during phase I, problem analysis, the same three sets of information (supervision variables, VHW performance levels, and service outcomes) remained the focus, however the research tools and methods were altered.

The study areas also remained the same during phase I.

The study was carried out in Bagamoyo and Hanang Districts of Tanzania because these were the two districts in the country with the most extensive VHW programmes. At the beginning of the study in 1983 Bagamoyo district had 72 VHWs covering 36 villages while Hanang district had 80 VHWs covering 40 villages. The Districts also represented divergent geographical and cultural features. Bagamoyo, with a population of 150,000, is the Coast Region, at the Indian Ocean Coast. It is of tropical rain forest climate and peopled by muslims of bantu decent, who are mainly agriculturalists. Hanang with a population of 300,000 lies in the north eastern

highlands of Tanzania in mountains and grasslands. It is peopled by Christians of mostly Hamitic decent, who are both agriculturalists and pastoralists.

Before addressing the three sets of information central to the study, discussions were held among the Pricor team and six decision-makers from the Ministry of Health. It was decided that prior to embarking on the study some thought should be put into how supervision of VHWS fits into the system at large. This discussion encouraged Pricor staff to list and describe where the VHW supervision subsystem fits into the central government scheme (Fig.1), how the Ministry of Health, VHW supervision, VHWS, and the communities relate to one another as subsystems (Fig.2) and how these subsystems interact (Fig. 3). These descriptions were then prepared diagrammatically. Ministry of Health officials were satisfied with this presentation and the next four steps were taken during Phase I. These included:-

Step

- 1 (a) selection of supervision decision variables;
- (b) development of the supervision decision variable questionnaire (appendix 1);
- (c) data collection;
- (d) analysis of the supervision decision variable questionnaire results;
- 2 (e) the definition of services presently provided by VHWS;
- (f) the development and implementation of the instrument to ascertain VHW performance levels (appendix 2);
- (g) the analysis of the above instrument (appendix 3);
- 3 (h) the development and implementation of the instrument used to assess present community health status (appendix 4);

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SOCIOECONOMIC DEVELOPMENT SYSTEM  
(Central Government)

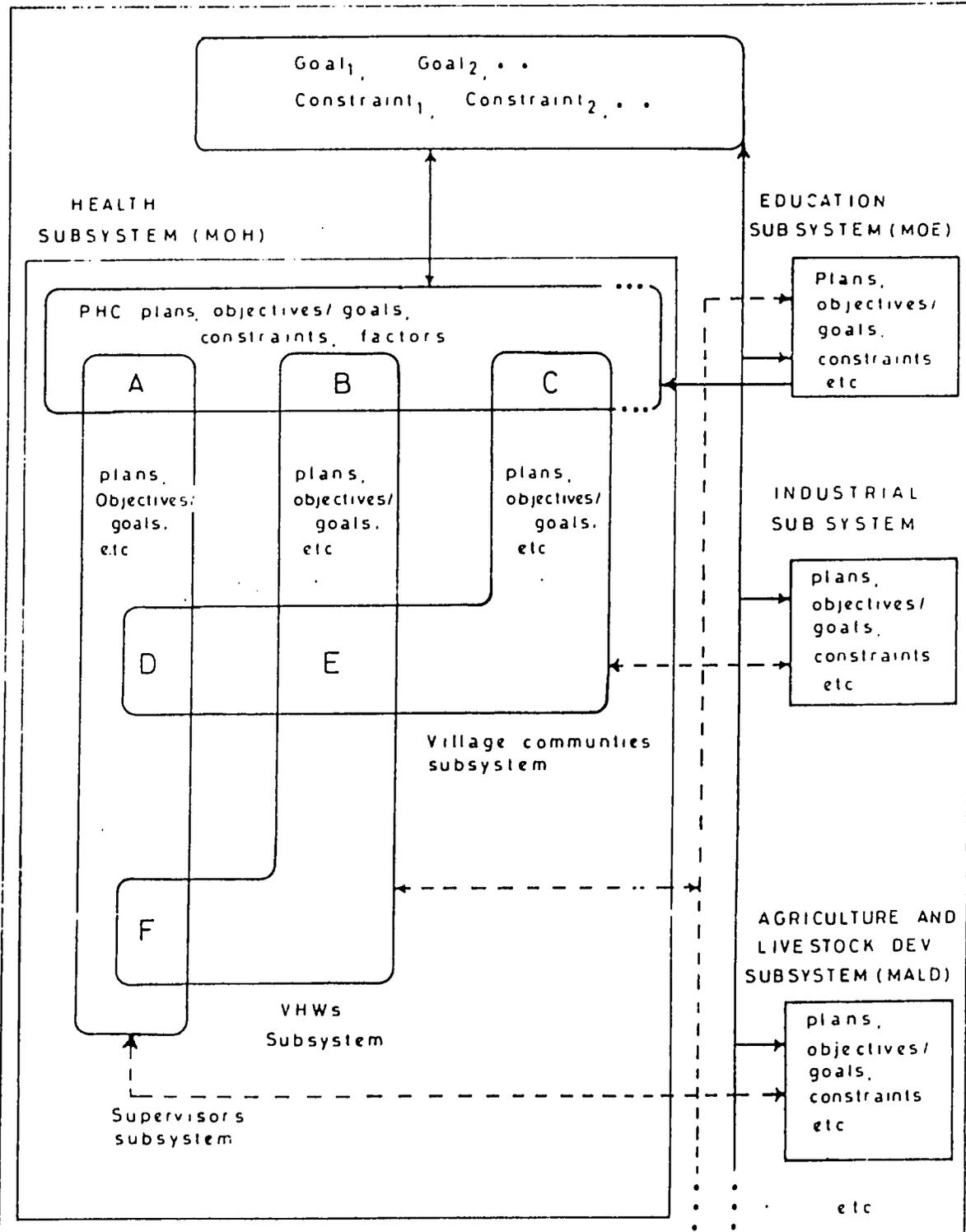


Fig.1: A systems view of the MOH and its environment subsystems supporting PHC – A macro model

PROBLEM ANALYSIS

Inputs

Processes

Outputs

Outcomes

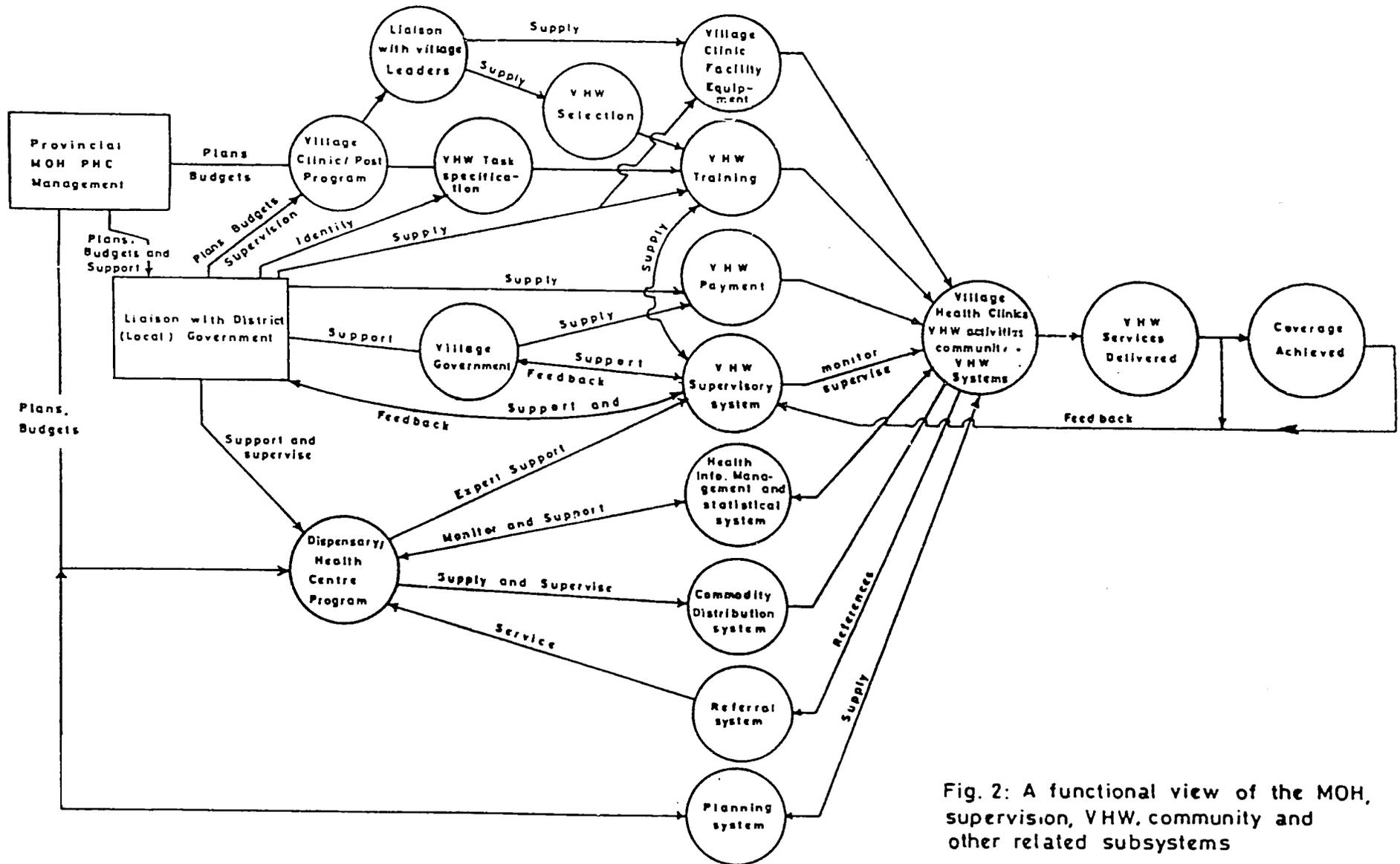


Fig. 2: A functional view of the MOH, supervision, VHW, community and other related subsystems

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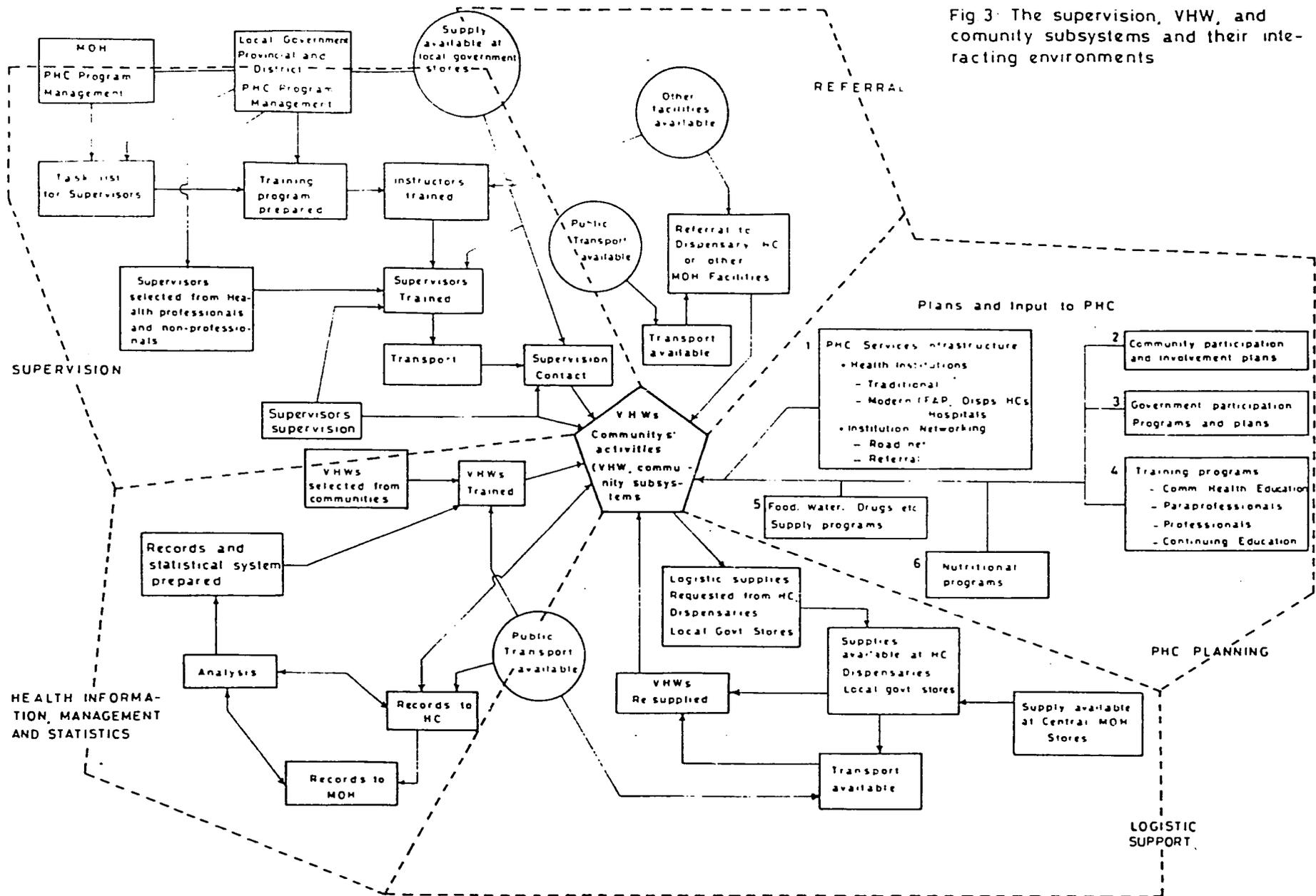


Fig 3: The supervision, VHW, and community subsystems and their interacting environments

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- (i) the analysis of the above instrument; and
- 4 (j) the selection of constraints (appendix 5).

The following is a description of (a) through (j) above.

- (a) Twenty-nine individuals were involved in the selection of the supervision decision variables addressed in this study. Eleven decision-makers in the Ministry of Health headquarters, six Pricor team members, six project leaders in Bagamoyo district and six in Hanang. Meetings and discussions were held over a period of two months. The Pricor team provided all involved with an initial set of variables and a review of literature on the subject. These discussion points included:-

1. Legitimation - For VHW services to be utilized, the VHW must be perceived by the village as a legitimate service provider. Because the VHW's paraprofessional status may cause the community to question his/her credibility as a health care provider, the VHW must be linked to other expertise and resources which are valid in the eyes of the villagers. The supervisor can help to achieve this by establishing a working relationship with the VHW in the community, thereby conveying by association the capability, authority, and support of the larger health network.

The status of the supervisor, site and frequency of supervisory contact, the distance between VHW and supervisory units, and the level of community interaction are variables contributing to the degree to which the VHW may be legitimized in the village community.

2. Protecting Role Integrity

The supervisor is also responsible for VHW role clarification. The function is related to legitimation, and involves conveying to the community what the VHW can and cannot do. If the VHW is to be effective, villagers' expectations must reflect the VHW's actual responsibilities and capability. The supervisor can achieve this through interaction with members of the community. Site of supervisory contact and level of community interaction are variables for this aspect of supervision.

3. Motivation

As Esman et al. state "Because paraprofessionals are working in isolated areas with little material compensation, sustaining motivation and morale are constant problems". (p. 51). Site and frequency of supervisory contact and level of community interaction contribute to this aspect of supervision. Regular compensation and valuable contacts with credible members of the larger health system provide other incentives to VHWs.

4. Education and Counseling

The supervisor is responsible for providing the VHW with training and allied support. Education and counseling represent an inservice training function designed to supplement and expand preservice training. This process reinforces preservice learning and provides new skills and knowledge to meet the particular demands of a local situation. The level of inservice training, as well as training site and length, are the relevant indicators.

5. Technical Assistance

This component of supervision helps the VHW respond to special problems which may not have been covered during formal training. Availability of competent and timely assistance to handle unforeseen situations is an important part of the support system required by the VHW. The level of technical assistance provided is included among the decision variables to be examined in the study.

6. Linkage

To perform effectively, paraprofessionals require access to the necessary material and technical resources, all of which may not be available within the community. The supervisor must facilitate this backup support - whether it be equipment, supplies, and transportation, or in the form of referral channels linking the village health post and rural clinics to larger health facilities. The variables for this function are health personnel supply and proximity and level of logistical support provided.

7. Monitoring and Control

Assessing the VHW in his/her daily functions, monitoring and consumption and utilization of supplies and equipment, recordkeeping, and other administrative tasks represent an additional supervisory function. The relevant variable is level of administrative monitoring.

8. Evaluation

Supervisors are responsible for determining whether VHWs are performing in accordance with established standards and programme objectives, and for collecting adequate data to

contribute to programme decisionmaking. Variables for this function are the Vhw's and the supervisors' perceived levels of adequate supervision.

At least two meetings were held with each participant and minutes of the meetings were kept. Based on these minutes the Pricor team selected variables and was compelled to weight each variable according to the occupation of the supervisors, since it was determined through discussions that the backgrounds of the supervisors varied considerably. It was also important to include all the various types of supervisors so that ultimately an optimal division of supervisory tasks could be determined and implemented.

The following supervision decision variables were ultimately selected and investigated as:

- $x_1$  = Knowledge of the health sector and of primary health care programme objectives.
- $x_2$  = Ability of supervisors to sustain good working relations with VHWS.
- $x_3$  = Ability of supervisors to sustain good working and human relations with village governments and communities.
- $x_4$  = Effort by supervisors to seek opinions of and involve the village government in supervising VHWS.
- $x_5$  = Home supervision team's ability to sustain good working relations with visiting team.
- $x_6$  = Sense of responsibility and commitment of supervisors to PHC work.
- $x_7$  = Performance of supervisor during visit.

- $x_8$  = Logistic supplies and other assistance given to VHWs by the formal health service support system and/or supervision system.
  - $x_9$  = Logistic support given to supervisors by the formal health service support system.
  - $x_{10}$  = Ability of supervisors to encourage supportive working relationships.
  - $x_{11}$  = Ability of supervisors to motivate VHWs.
  - $x_{12}$  = Amount of supervision pressure applied to VHWs.
  - $x_{13}$  = Ability of supervisors to organize and sustain group decision mechanisms and implementation in matters pertaining to PHC (i.e. extent of supervisor's involvement with village community and government in teaming up for PHC work).
  - $x_{14}$  = General sophistication of supervision site.
  - $x_{15}$  = Supervision standards: components:
    - a) Availability and use of schedules
    - b) availability and use of supervisory checklist.
- (b) Having completed an exhaustive exercise on the selection of the supervision decision variables the Pricor team prepared the supervision decision variable questionnaire. The questionnaire was keyed to supervisors, village health workers, or village government/communities depending upon the variable. Further, the questionnaire allowed for weighted averages for each answer depending upon the category and education of the supervisor. The weights reflect what the Pricor participants believe to be a scale of the importance and knowledge of the respective supervisor in question.

The weights are as follow:

1 lowest - 5 highest

Supervisor Category 1:	Weight
District Medical Officer (DMO)	5
Medical Assistant (MA)	4
District Health Officer/ Health Assistant (DHO/DHA)	3
Rural Medical Aide (RMA)	2
MCH/TB/Leprosy/School Health Coordinator	1

Supervisor Category 2:

Village Chairman	5
Village Secretary	4
Village Manager	3
Village Councillor	2
Other non-village resident	1

Educational Status of Supervisor:

Secondary school education and professional training	5
Primary school education and professional training	4
Secondary school education	3
Primary school education	2
No formal education/adult education	1

The team then reviewed the selected variables and components thereof and developed the questionnaire composed of three forms; one each for supervisor, village health worker, and villager.

- (c) Data were obtained from 19 randomly selected villages in Bagamoyo district and in 18 randomly selected villages in Hanang. A total of 119 Form 1 questionnaires (supervisors), 29 Form 2 questionnaires (village health worker) and 76 Form 3 questionnaires (villager) were analysed.
- (d) Analysis of the questionnaires provided the following weighted averages with 1 being the lowest rating and 5 the highest.

<u>Variable</u>	<u>Weighted Average</u>
$x_1$ = Knowledge of health profession	3.04
$x_2$ = Ability of supervisor to sustain good working relations with VHW	2.46
$x_3$ = Ability of supervisor to sustain good working relations with village government/community	2.04
$x_4$ = Effort by supervisor to seek opinion and involve village government in supervising the VHW	2.42
$x_5$ = Home supervision team/village government ability to sustain good working relations with visiting team	2.4
$x_6$ = Sense of responsibility of supervisors	2.19
$x_7$ = Performance of supervisor during visit	1.92
$x_8$ = Logistic supplies and other assistance to VHW	1.74
$x_9$ = Logistic support given to supervisors by health services	1.34

<u>Variable</u>	<u>Weighted Average</u>
$x_{10}$ = Ability of supervisor to encourage supportive working relationships	2.35
$x_{11}$ = Ability of supervisor to motivate VHWs	2.18
$x_{12}$ = Amount of supervision pressure applied to VHW	1.88
$x_{13}$ = Extent of supervisor's involvement with village government/community in teaming up for work	2.85
$x_{14}$ = General sophistication of supervision site	1.77
$x_{15}$ = Supervision standards	2.53

This analysis met with two kinds of results; immediate decisions which were made and decisions which were based on this analysis toward supervision goal setting which was completed during phase II, solution development.

The most profound immediate results were that two supervisors were withdrawn from service due to what emerged through the questionnaire as unsuitable behaviour.

It is interesting to note that the knowledge of the health profession  $x_1$  and the supervisor's involvement with village government and community in work  $x_{13}$  scored highest, and those variables which relate to how the VHW perceives the supervisor's performance  $x_6$ ,  $x_7$ ,  $x_8$ ,  $x_{11}$ , and  $x_{12}$  all scored relatively low.

The Pricor team discovered that in general relationships between supervisors and VHWs needed considerable improvement, that logistic support for VHW performance was poor and that village government/community relations ranks very high in terms of importance in the local setting. This last observation emerged as a basis for the evolution of the rest of the study.

- (e) It was well known that services actually provided by village health workers varied substantially, both in kinds of services provided and in quality. Nevertheless, the Ministry of Health and the project areas specified services which should be offered by the village health workers.

The improvement of the provision of these services as related to improved supervision of village health workers who provide them remained the focus of this Pricor study. These service outcomes are:

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 cleanliness

- (f) The development and implementation of the instrument to ascertain VHW performance levels changed substantially from what was initially envisioned to what actually happened.

Originally it was intended to determine the level of performance (skill and competence) with which the village health worker performed services relating to 1-10 above (e). This was to be done using qualified observers who would use a scaled checklist to record performance for each related task towards a specified service outcome. Time constraints coupled with the Prigor team's conception that frequency of the task performed rather than the degree of competence in performing an activity would be adequate to base supervision of VHW goals setting. It was also at this time that the original study plan using a mathematical model to predict optimal supervision solutions relating supervision decision variables, performance levels, and service outcomes began to be replaced with developing solutions based on a heuristic approach to goal setting.

A questionnaire was developed which included not only questions relating to most of the 10 service outcomes, but also included biodata of the health worker, questions on remuneration, and service outcomes not included in the original 10 service list.

Twenty villages in Hanang and eighteen villages in Bagamoyo were randomly selected and twenty medical students over a period of five weeks carried out the survey. Fifty eight village health workers were interviewed in all.

- (g) A hand tabulation was made of the survey results (appendix 3). A synopsis of the findings are presented here. The number roughly corresponds to the number of the table 1-33 in appendix 3 which relate to the questions 1-37 in appendix 2.

Table

1 & 2

72.2% of villages in Bagamoyo and 50.0% in Hanang had two village health workers each, while 82.7% of village health workers in Bagamoyo and 58.6% in Hanang worked with a village health worker colleague.

Table

3, 4, 5 & 6

The majority of village health workers (52.6%) in Bagamoyo District are below 25 years of age while in Hanang this is only 34.4%. Females and males are in similar proportions in Bagamoyo about 50 - 50, while in Hanang females represent only 34.5%. In Bagamoyo 62% of village health workers are married as compared to 67% in Hanang. The majority of village health workers in both districts have 0 - 3 children.

The national PHC Guidelines call for VHWs to be married and over 25 years with equal numbers of men and women within the district. Although not accomplished within this study's scope, the Pricor team hopes to further analyse performance information to determine whether age, marital status, or sex makes a difference in performance.

Table

7, 8 & 9

All village health workers (100%) in both Bagamoyo and Hanang districts had a primary school education. Most of them are farmers. (89.6% in Bagamoyo and 100% in Hanang). (Table VII). Most training of village health worker was done in special

training centres (Bagamoyo 89.7%, Hanang 72.4%) (Table VIII). The mean number of months as village health workers were 10.4 for Bagamoyo and 45.3 months in Hanang (Table IX).

Table

10, 11 & 12

The mean payment to village health workers, was 255.2 shillings in Bagamoyo and 202.4 shillings in Hanang. (1 US\$=17 Tanzania Shillings). However 26 of the 29 in Bagamoyo and 19 of the 28 in Hanang received below the mean. In both districts regularity of payment showed that the majority of village health workers, 73% in Bagamoyo and 51% in Hanang, were not paid in time (Table XI). Majority in Bagamoyo (62%) were usually not paid the full amount but in Hanang the majority 68% were usually paid the full amount (Table XII).

Table

13 & 14

The majority of village health workers usually do not give chloroquine prophylaxis, 72.4% in Bagamoyo and 82.7% in Hanang (Table XIII). In Bagamoyo when given the prophylaxis is usually given in both home visits and during patients attendance at health post. In Hanang it is usually given at health post (Table XIV).

The use of chloroquine in Tanzania is primarily reserved for treatment.

Table

15, 16 & 17

On the average about one diarrhoea patient per fortnight per village health worker is treated in Bagamoyo and

3.6 per village health worker per fortnight in Hanang. Of these 44.4% received ORT in Bagamoyo against 17.9% in Hanang. 33.3% of the patients were referred in Bagamoyo as compared to 48.1% in Hanang.

Table

18 & 19

In 44.8% of the village in Bagamoyo and 65.5% in Hanang the village health workers did not know if there are pregnant women at their villages not attending clinic. Of those who knew 52.9% in Bagamoyo were visited, in Hanang 66.7%.

Table

20 & 21

In 69% of village health workers in Bagamoyo and 82.8% in Hanang, village health workers did not know whether or not there are unvaccinated children in their villages. However, when asked whether they visited parents of vaccinated children 65.5% in Bagamoyo and 51.7% in Hanang said they did.

Table

22

The mean number of births not assisted by village health workers was 9 per village in Bagamoyo and 15.1 per village in Hanang. Total figures for births per village per month are still being calculated.

Table

23 & 24

75.9% of village health workers in Bagamoyo, and 69% in Hanang had no knowledge of any children in their villages not attending clinic. Of those who were known not attending clinic 70.4% were visited in Bagamoyo as compared to 62.1% in Hanang. (Tables XXIII and XXIV).

Table

25 & 29

75.9% of village health workers in Bagamoyo and 79.3% in Hanang had not given a health education talk during the 2 months previous to survey. (Table XXV). Nearly all village health workers think villagers have learned something about health education (Table XXIX).

Table

26

Village health workers thought there was no Bilharzia in their villages in Bagamoyo compared to 86% who believed there was Bilharzia in their villages in Hanang (the prevalence may be less in Hanang). 20.7% and 27.6% of village health workers in Bagamoyo had instructed children and villagers respectively on Bilharzia. In Hanang the corresponding figures were 6.9% and 6.9% (Table XXVI).

Table

27 & 28

The mean number of houses per village health worker visited in Bagamoyo was 12.3% per week and for Hanang 35. 96.6% of village health workers in Bagamoyo, 86.2% in Hanang do home visiting two days in a week. (Tables XXVII and XXVIII).

The 35 visits reported in Hanang per week using only 2 days a week appears to be unreasonably high.

Table

30 & 31

Over 90% of all villages in both districts have had a census taken. In 69% of villages in Bagamoyo both deaths and births are registered, in Hanang 75.9% (Tables XXX and XXXI).

Table

32

For 65.5% of village health workers in Bagamoyo there were work schedules, in Hanang 55.2% (Table XXXII).

Table

33 & 38

69% of village health workers in Bagamoyo kept records of all work done, in Hanang 82.8% did. Attendance records were kept in 93.1% of village health workers in Bagamoyo, and in 65.5% in Hanang. Records of home visits were done by 41.4% of village health workers in Bagamoyo, Hanang 58.6%. Records of referrals were kept by 34.5% of village health workers in Bagamoyo, in Hanang 31% were kept. Special events records were kept by 17.8% of village health workers in Bagamoyo, Hanang 27.6%. Family records cards for every family were kept in 93.1% of village health workers in Bagamoyo, and in Hanang 0.% (Tables XXXIII to XXXVIII). This last figure represents a programme difference.

Table

31, 39

93.1% of village health workers in Bagamoyo prepare monthly reports, in Hanang 82.8% do. Date of last monthly report was on the average 2.7 months in Bagamoyo, and in Hanang 1.6 months was the average last date for a monthly report.

Table

41, 49

61.5% of the village health workers in Bagamoyo talked to the parents of kwashiokor children, in Hanang 72% did.  
(Tables XXXXI to XXXXIX).

The Pricor team realized that many of these findings were incomplete or inconclusive, but in the interest of time, decided to glean what they could from these results and concentrate on goal setting. The team concluded that the instrument did not provide them with conclusions regarding VHW performance, however, there was evidence that VHWs were not being supervised adequately and that they were not on the whole performing adequately.

- h,i) The Pricor team experienced similar disappointments regarding the development, implementation, and analysis of the findings of the instrument used to assess the community health status at the onset of the study. Considerable time and energy went into the development of the household survey which was prepared and pretested by the Pricor team. Thirty eight villages were randomly selected and approximately 125 households per village were interviewed. Twenty medical students were trained and conducted the interviews in pairs. The same

twenty students spent 15 days in Bagamoyo and 15 days in Hanang implementing the survey. In addition, to the 30 days on site they spent a week in training and a week travelling.

Altogether six thousand surveys were conducted, and although the Pricor team tried several alternatives, the tabulations for and analysis of this survey were never completed. Only two questions were tallied, one relating to measles vaccines and one to safe water preparation. These were done by hand which was time consuming and exhaustive, but funds were made available for this through other projects interested in the outcomes.

The Pricor team was resourceful and managed to assess the then present status for the 10 Pricor service outcomes by other means. Malaria treatment, nutrition monitoring, environmental cleanliness and pit latrine construction figures were calculated based on findings from three separate surveys conducted in Bagamoyo district. Home visits, health education sessions and oral rehydration therapy figures were derived through the review of village health worker monthly reports.

The following percentages for the provision by VHWS of services were calculated:

1. ORT	6.74%
2. Latrine Construction	78%
3. Health Education	65.5%
4. Home Visits	52.5%
5. Malaria Prophylaxis	0.0%

6. Immunization	42.8%
7. Malaria Treatment	0.85%
8. Nutrition Monitoring	15.1%
9. Safe water preparation	37.3%
10. Environmental cleanliness	34.1%

(j) Seven constraints were identified for purposes of this study by the Pricor team, decisionmakers, and Pricor consultants (appendix 5). Further to identification a survey was conducted to determine the amount of time or money presently available for each by district.

<u>Constraint</u>	<u>Quantity available</u>
1. Time for supervision	15,864 hours
2. Supervision petrol allocation	224,000/T.Shs.
3. Stationery supplies (per VHW)	2,880/T.Shs.
4. Drugs supplies for supervisors	43,393/T.Shs.
5. Equipment for supervisors	97,200/T.Shs.
6. Supervision travel allowance	333,360/T.Shs.
7. Vehicle spares and maintenance	210,000/T.Shs.

Upon completion of the problem analysis phase the Pricor team realized that supervision of the village health worker faced many obstacles. The question was raised "what levels of service outcomes can be achieved through manipulating supervision decision variables". It was determined that goals should be set. This became the focus of phase II.

DECISION VARIABLES SURVEY RESULTS

<u>Variable No. &amp; Name</u>	<u>Average Weighted Score</u>
x <sub>1</sub> = Knowledge of health profession	3.04
x <sub>2</sub> = Ability of supervisor to sustain good working relations with VHW	2.46
x <sub>3</sub> = Ability of supervisor to sustain good working relations with village government/community	2.04
x <sub>4</sub> = Effort by supervisor to seek opinion and involve village government in supervising the VHW	2.42
x <sub>5</sub> = Home supervision team/village government ability to sustain good working relations with visiting team	2.4
x <sub>6</sub> = Sense of responsibility of supervisors	2.19
x <sub>7</sub> = Performance of supervisor during visits	1.92
x <sub>8</sub> = Logistic supplies and other assistance to VHW	1.74
x <sub>9</sub> = Logistic support given to supervisor by health services	1.34
x <sub>10</sub> = Ability of supervisors to encourage supportive working relationships	2.35
x <sub>11</sub> = Ability of supervisors to motivate VHWS	2.18
x <sub>12</sub> = Amount of supervision pressure applied to VHW	1.88

<u>Variable No. &amp; Name</u>	<u>Average Weighted Score</u>
$x_{13}$ = Extent of supervisor's involvement with village government/community in teaming up for work	2.85
$x_{14}$ = General sophistication of supervision site	1.77
$x_{15}$ = Supervision standards	2.53

FORM I : 119 Questionnaires

Variables  $x_1, x_5, x_9, x_{13}, x_{14}$  and  $x_{15}$

FORM II : 29 Questionnaires

Variables  $x_2, x_6, x_7, x_8, x_{10}, x_{11}, x_{12}$

### Solution Development

It was initially envisioned that solution development would be determined through the utilization of a mathematical model (multiple goal linear programme) to ascertain relationships among and across three data sets, i.e. supervision decision variables and constraints, VHW performance levels, and actual service outcome figures.

There were two basic reasons this was not done. One, as mentioned in phase I, the information collected and the analysis of these for performance levels and service outcomes were inconclusive and incomplete. Secondly the team had never utilized such an analysis and although they were keen to implement this, sufficient understanding of the model and the ability to utilize it were lacking. A consultant familiar with the model and who was originally responsible for a pretest of the model with the team was unable to complete that task.

It was then decided to focus on goal setting exercises. This appeared a reasonable alternative as decisionmakers, village governments, communities, the Pricor team, and all involved supervisors and VHWs were eager to pursue the improvement of supervision, VHW performance, and services. It was at this stage that the project became one which fully addressed community participation.

Goals were set by decisionmakers, villages, supervisors and VHWs and focussed on what alterations of supervision decision variables would increase coverage and utilization of services offered by VHWs.

The following exercises were completed:

- (a) The ten PHC goals were quantified in priority order for both importance and feasibility (appendix 6).
  - (b) Village leaders and villagers set PHC goals for their communities (appendix 7).
  - (c) Supervisors set PHC goals for their related VHWS (appendix 8).
  - (d) Decision makers through the use of the Delphi technique and nominal group processes participated in a goal setting exercise relating the supervision variables to the service goals and constraints. The Pricor team prepared an analysis of this (appendix 9).
- 
- (a) The ten PHC goals were quantified in priority order for both importance and feasibility by twelve well qualified decision-makers (appendix 6). Importance was rated as low, medium, and high relating the PHC service to prevention of illness, prevention of deaths, and prevention of disability. Overall feasibility was determined by relating each service to technical feasibility, economic feasibility, and to the likelihood of good public response.

The following shows the overall score and priority order:

Priority order of PHC goals according to  
scores by PHC decision-makers

Goal	Score	Priority Order
Immunization coverage	35	1
ORT utilization	34	2
Proper latrine construction	33	3
Nutritional monitoring	32	4
Environmental sanitation	30	5
Malaria treatment	28	6
Home visiting	27	7
Health education sessions	26	8
Malaria prophylaxis	25	9
Safe water preparation	24	10

- b) Village leaders and villagers set goals for coverage and utilization percentage rates for their villages. Ten villages from Bagamoyo and eight from Hanang were included in this exercise. Pricor staff discussed each service with 20 community leaders and villagers at each village. The village council was always included. A questionnaire was used as a basis for all discussions. The Pricor team found that although village goals varied considerably, the interest and enthusiasm was very high and it was at this time that the Pricor team in agreement with the village decided to use the figures produced by the village as the basis for monitoring progress. The Pricor team did not believe at this

time that it was important for the figures to be realistic, but rather that the exercise and the comparison of the actual rates and those set during this exercise would over time be a valuable educational experience for the villagers and a useful basis for future monitoring and evaluation.

The following tables present the results of the PHC goals set by the ten communities and village leaders in Bagamoyo and Hanang Districts.

BAGAMOYO

GOAL PERCENTAGES SET BY VILLAGES

PHC Goal	1	2	3	4	5	6	7	8	9	10	Range
Immunization Coverage	63.1	80	50.1	2.5	100	100	100	100	100	28.5	3-100
ORT Utilization	100	100	100	100	100	100	100	100	100	71.4	71.4 - 100
Proper pit latrine construction	99.4	49	67.1	23	23.3	74.5	85.7	59.0	35.7	65.9	23 - 99
Nutrition monitoring	32.9	15.2	66.4	100	75	100	39.7	62.6	65	100	15 - 100
Environmental sanitation	100	75	84	72	23.3	100	53.3	87.3	35.7		23 - 100
Malaria treatment	70	50	75.6	100	52.4	63.2	44.4	75	100		44 - 100
Home visiting											375 - 1374 per year
Health education sessions	60	24	60	64	54	51	26	46			24 - 26 per year
Malaria prophylaxis											
Safe water preparation	63.6	50.1	60	48	78.7	100	74.6	43.6	100	100	44 - 100

- 9/10

HANANG

GOAL PERCENTAGES SET BY VILLAGES

PHC Goal	1	2	3	4	5	6	7	8	Range
Immunization coverage	53.7	3.3	6.8	26.3	74	100	100	18.6	3 - 100
ORT utilization	100	100	100						
Proper pit latrine construction	56.6	84.1	46.9	75.6	55	64.3	45.1	98.3	45 - 98
Nutrition monitoring	2.3	16.9	3.1	100	54.5	1.8	3.2	100	2 - 100
Environmental sanitation	44.3	34.1	14.3	0.6	24.0	35.4	6.1	100	1 - 100
Malaria treatment	53.7	100	100						54 - 100
Home visiting *									465 - 1659* per year
Health education sessions*	24	12	21	12	12	52	36	12	12 - 52 per year
Safe water preparation	100	50	82	50	48.1	64.5	50	38.7	39 - 100

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A. LIST OF 15 DECISION VARIABLES ( $x_1 - x_{15}$ ) AS USED IN THE PRICOR STUDY

---

- $x_1$  = Thorough knowledge of the health profession and of the ARI and PHC programme objectives.
- $x_2$  = Ability of supervisors to sustain good working relations with VHWs (VHW's perspective)
- $x_3$  = Ability of supervisors to sustain good working and human relations with village governments/communities (village governments/communities perspective).
- $x_4$  = Effort by supervisors to seek opinion of and involve the village government in supervising VHWs (village government perspective).
- $x_5$  = Home supervision team's (i.e. village government) ability to sustain good working relations with visiting team (visiting team perspective).
- $x_6$  = Sense of responsibility and commitment of supervisors to PHC work (VHW's perspective).
- $x_7$  = Performance of supervisor during visit.
- $x_8$  = Logistic supplies and other assistance given to VHW by the formal health service support system and/or supervision system.
- $x_9$  = Logistic support given to supervisors by the formal health service support system.  
(Logistic support may include: transport facility, backup kits, teaching aids, books, etc.)

- $x_{10}$  = Ability of supervisors to encourage supportive working relationships.
- $x_{11}$  = Ability of supervisors to motivate VHws.
- $x_{12}$  = Amount of supervision pressure applied to VHw.
- $x_{13}$  = Ability of supervisors to organise and sustain group decision mechanism and implementation in matters pertaining to PHC (i.e. Extent of supervisor's involvement with village community and government in teaming up for PHC work).
- $x_{14}$  = General sophistication of supervision site.
- $x_{15}$  = Supervision standards: Components:
- (a) Availability and use of schedules.
  - (b) Availability and use of supervision checklist.

B. LIST OF 10 GOALS ( $b_1 - b_{10}$ ) AND 7 CONSTRAINTS ( $b_{11} - b_{17}$ )  
AS USED IN THE PRICOR STUDY

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- $b_1$  = ORT utilization (rate) goal.  
 $b_2$  = Proper pit latrine construction and utilization goal.  
 $b_3$  = Health education discussion (groups) sessions goal.  
 $b_4$  = Home visits goal.  
 $b_5$  = Malaria prophylaxis utilization (rate) goal.  
 $b_6$  = Immunization service (coverage) goal.  
 $b_7$  = Malaria treatment service (utilization rate) goal.  
 $b_8$  = Nutrition monitoring (coverage rate) goal.  
 $b_9$  = Safe water preparation and utilization (rate) goal.  
 $b_{10}$  = Environmental cleanliness goal.

----- + -----

- $b_{11}$  = Time resource (constraint).  
 $b_{12}$  = Petrol resource (constraint).  
 $b_{13}$  = Stationery resource (constraint).  
 $b_{14}$  = Supervision drugs resource (constraint).  
 $b_{15}$  = Supervision equipment resource (constraint).  
 $b_{16}$  = Supervision remuneration resource (constraint).  
 $b_{17}$  = Supervision spares and repairs resource (constraint).

No further analysis of these figures has yet been prepared by the Pricor team.

- (c) The supervision goals set by supervisors corresponding to appendix 8 were used as monitoring aids for the supervisors and not analysed by Pricor. However, the figures provide a base for monitoring and evaluation.
- (d) Decision makers, through the use of the Delphi technique and nominal group processes participated in a goal setting exercise relating the supervision variables  $x_1 - x_{15}$  to the selected services goals  $b_1 - b_{10}$  and constraints  $b_{11} - b_{17}$ .

Formulation of the supervision system design involved computation of the structural relationships between the set of supervision decision variables and each of the identified supervision goals and resource constraints. (Lists 1 & 2).

The approach used in this study assumed (on the basis of expert and user knowledge and experience) that the type of relationship obtained between the set of decision variables and goal/constraints would fairly sufficiently estimate the time relationship. A linear relationship was assumed and each linear structure was computed on the assumption that the set of the independent decision variables combine additively linearly to relate to each supervision goal and resource constraint.

The computation of the structural relationships (i.e. the model) involves the determination of coefficients, one for each decision variable/goal pair that represents the unit contribution of that variable to each and every given goal and its unit utilization of each and every given resource.

The task of determining what constitutes a unit of each of such amorphous decision variables is not a straightforward one as in an industrial production situation since different decision variables inevitably have different units of measure. For example, a unit of decision variable  $x_1$  (i.e. thorough knowledge of the health profession and of the health programmes) is definitely not the same as a unit of decision variable  $x_2$  (i.e. ability of supervisors to sustain good working relations with VHWs). The problem of units of decision variables can be handled implicitly for each variable by taking two hypothetical supervision teams chosen in such a way that they differ by one level in their supervision aptitudes in the variable in question. A comparison, on the basis of expert knowledge and user experience of these two teams' performance in the variable in question with respect to a given goal or resource constraint gives a numerical quantity that represents that variable's unit contribution to the goal or utilization of the resource in question. It must be emphasized that this comparative coefficient must be estimated from expert knowledge and users experience of, for example, decision-makers and carefully selected supervisors with sufficient experience.

For the comparison to be fair, both teams must be allowed to operate under similar physical, political and socio-economic environmental conditions. It must also be assumed that both teams are working independently under similar conditions, i.e. independently supervising similar sets of VHWs who are in turn working in similar community groups and environmental systems for a similar planning period of, say, one year.

In order to estimate the coefficients, a model coefficients questionnaire was designed for each of 15 variables. In each

questionnaire two hypothetical supervision teams each with 5 supervisors were considered. The characteristics (qualities or attributes) of each member in the teams were then listed and given a numerical score which increased with the level of sophistication. For example, a supervisor who is an MCH aide was given a score of 1, and RMA was given a score of 2, a village manager was given a score of 3 and a medical assistant was given a score of 4. This system of scoring depended mainly on the level of contribution to supervision work each member was placed by the given characteristic. The scores for each characteristic were multiplied with each other for each supervisor and the total scores obtained for all supervisors were summed up and divided by 5 to obtain an average score for the team. This average score was then used to place a team in its respective aptitude level according to pre-determined categories of scores from the lowest to the highest possible.

The questionnaires with all this information were then given to the supervisors to answer questions that would lead to an estimate of the coefficients based on their own experience as supervisors. As an example, in Table 1, the top left hand coefficient of 15 was obtained from the following questionnaire:-

ORT utilization (rate goal (b<sub>1</sub>) questionnaire:-

Incidental condition:

Suppose each supervision team A and B is independently confronted with frequent diarrhoea cases. Suppose further that each team has a plan to supervise so that by the end of the planning year each VHW will have administered 100 ORTs.

Question:-

If team A, whose aptitude in  $x_1$  is of level 1, and is able to get each VHW to administer between 30 and 40 of the required ORTs: How many more ORTs do you think team B (with aptitude level 2 in  $x_1$ ) would be able to get each VHW to administer given the same conditions,

Answer - 15.0

Each of the 5 API supervisors independently thought of a reasonable and attainable number of ORTs and then filled the questionnaire. The five answers were then averaged and a final figure of 15.0 was obtained. This figure was later converted to a percentage so that all the coefficients were percentages to facilitate comparison.

Interpretation of the table of coefficients:-

Goals:

Each of the figures in the goal section of the table represents the percentage by which a supervision team with an aptitude one level higher than another can perform better in goal achievement. It can be seen that better teams with one level higher could contribute to the goals between 0 and 33% higher than the worse-off teams. Zero contribution means that improvement in the characteristics of a team in the variable in question may not increase performance in goal achievement. A large contribution, say 33%, means that improvement in the characteristics of a supervision team in the variable will increase performance in goal achievement to a large extent. These are the important decision

variables on which decision-makers should concentrate and invest upon. For example, improvement in variable  $x_8$  seems to give the biggest contribution in achieving higher levels of goals  $b_1$  and  $b_4$  as shown by the highest percentage contribution in that variable. Similar information can be obtained from Table 1 by looking for the variable with the highest percentage contribution in any one given goal.

Resources:

Some figures in the resources portion of the table have a negative value. This indicates that a supervision team with an aptitude of one level higher than another uses less resources to achieve the same goal. This trend was seen in most of the resources in decision variable  $x_{14}$ . In resource  $b_{15}$ , for most of the decision variables the two teams with different aptitude levels would utilize similar resources to achieve the same goal. This means that improvement in the characteristics of a team in the variables concerned may save on resource utilization.

Table 1 gives complete results.

TABLE 1

Factor - Goal, Input - Output Coefficients (%) for the Supervision Operational Research Model Design

Goal	Var $x_1$	Var $x_2$	Var $x_3$	Var $x_4$	Var $x_5$	Var $x_6$	Var $x_7$	Var $x_8$	Var $x_9$	Var $x_{10}$	Var $x_{11}$	Var $x_{12}$	Var $x_{13}$	Var $x_{14}$	Var $x_{15}$
$b_1$	15.0	16.0	9.5	15.0	15.0	20.0	10.9	22.8	21.5	15.0	19.1	10.0	20.7	15.0	15.0
$b_2$	20.0	20.0	20.0	20.0	22.5	32.5	24.0	15.0	15.7	20.0	13.5	12.2	20.4	10.6	15.0
$b_3$	10.0	20.0	20.0	20.0	15.0	21.0	15.7	15.7	23.0	21.6	19.1	14.4	24.7	32.7	10.0
$b_4$	19.7	16.4	20.0	13.3	16.0	17.7	21.3	22.3	21.0	17.8	16.8	20.9	12.2	6.8	15.0
$b_5$	13.0	16.1	8.0	12.0	16.0	6.5	12.0	15.4	12.0	17.3	8.3	10.2	19.3	14.3	15.0
$b_6$	10.0	12.1	15.0	20.0	22.0	28.0	16.0	12.3	20.4	10.0	26.1	23.6	17.9	21.8	15.0
$b_7$	14.8	14.0	10.0	13.0	14.0	13.3	22.3	20.0	20.7	15.8	20.0	15.7	27.1	13.6	15.0
$b_8$	10.0	11.0	9.0	12.0	11.0	12.5	12.0	15.0	17.5	17.8	15.0	14.7	18.9	15.5	15.0
$b_9$	6.0	11.0	4.0	9.0	8.0	10.0	4.4	6.6	11.1	11.8	6.4	16.4	14.7	12.3	15.0
$b_{10}$	9.5	17.0	10.0	25.0	14.0	33.0	12.5	8.8	22.1	12.5	12.9	30.0	46.9	0.0	15.0

TABLE 1

Goal	Var $x_1$	Var $x_2$	Var $x_3$	Var $x_4$	Var $x_5$	Var $x_6$	Var $x_7$	Var $x_8$	Var $x_9$	Var $x_{10}$	Var $x_{11}$	Var $x_{12}$	Var $x_{13}$	Var $x_{14}$
Resource														
$b_{11}$	5.3	-6.0	0.0	4.0	5.5	17.3	9.7	5.8	10.2	5.8	6.9	7.4	12.2	-10.1
$b_{12}$	14.0	0.0	6.0	4.0	11.3	19.6	10.1	21.7	9.1	5.0	6.0	12.9	6.0	-3.0
$b_{13}$	12.1	3.3	-2.5	3.0	-2.5	11.7	1.8	2.9	3.9	2.7	2.6	4.3	5.7	-7.1
$b_{14}$	7.5	-6.1	-0.2	2.5	3.5	-4.3	3.9	3.1	0.0	6.0	3.3	7.9	5.9	5.2
$b_{15}$	31.9	5.6	19.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-8.0
$b_{16}$	21.7	1.8	5.0	5.0	7.0	6.6	10.8	5.7	5.1	5.2	6.0	5.0	5.3	-4.0
$b_{17}$	21.1	1.7	6.6	6.6	7.3	10.8	14.3	31.9	15.7	4.9	8.8	5.0	10.7	-8.0

Solution validation has not yet been conducted as solution development included only the preliminary step of goal setting.

### Results and Conclusions

Since this study's focus evolved into one of goal setting the results are the goals themselves. These have been discussed in the solution development section of this report. The goals adopted by the Ministry of Health for supervision are those percentages given in the table relating to the Delphi exercise carried out by the Pricor team and MOH decision-makers. Goals set by the supervisors and communities were not adopted. However, the Pricor team believes that the goal setting exercises were invaluable as a means of drawing attention to VHW performance and supervision and as an effective tool for community participation.

The Pricor study also generated a series of decisions and improvements in the supervision system. The following changes are now in practice.

- The number of supervisors in the project area have doubles.
- The number of supervisory visits have increased and each supervisor visits assigned sites at least twice a month.
- Supervision schedules have been developed and each supervisor prepares a monthly work plan and a monthly report.

- Supervisors have been provided bicycles.
- A supervision checklist has been developed and implemented.
- Village health committees have been established and assist in supervision of the VHW.
- Relationships between supervisors and village leaders have been formalized and cooperation is good.
- The "team safari" concept was developed by the Pricor team and has been adopted by and implemented in all villages. The village health committee, VHW, supervisor, selected teachers, and agriculture and water development officers form a team and according to agreed upon schedule, visit every household in the village to discuss the health and well-being of the household members. The supervisor reports all followup activities to the village health committee once a month.
- The MOH has increased the budget for supervision of VHWs.

In addition to these substantial programme changes another result of the Pricor study can be considered. This is the impact this study had on individuals in the Tanzanian health system.

From the beginning of the project in 1982 MOH officials (decision-makers) for PHC were fully involved in the study. The decision-makers were involved in the whole exercises of determination of supervision decision variables, primary health care goals, resources constraints, prioritization of goals, community PHC goals and supervision goals. They were also involved in the exercise of determining factor goal input output coefficients. Dr. Dahoma one of the Senior Medical Officers in the Ministry of Health also took part in the Pricor International Workshop held in Swaziland in June 1983. Also at various stages of the project, several consultants visiting the project were introduced to officials of MMC and MOH. In the past year three important national events could be considered as definite move by the MOH towards establishing operations research (OR) as a management tool. These were:

- (1) In the March 1985 National Public Nurses Worksho', held in Korogwe set aside 4 hours of the workshop for two lectures/discussion on operational research by Dr. Mtango, Pricor Project Director.
- (2) In June 1985 a one day workshop sponsored by the Italian Tanzania Health Programme was held at

Bahari Beach Hotel on the Topic of Supervision of PHC Programmes. Dr. Mtango, Pricor Project Director and Dr. Killewo, Senior Research Associate were among the participants. The minutes of this meeting have been published and widely distributed in Tanzania.

- (3) In November 1985 a National Annual Conference of Regional Nursing Officers in Tanzania was held in Mbeya. Two full days were set aside for seminars on Operational Research conducted by Dr. Mtango.

In his opening address, the Principal Secretary of MOH, Mr. J. Sepeku stated that the theme of the annual meeting was Operational Research in Health Care because it was noted that there was a great need for scientific planning and management in health care in Tanzania. He sighted many examples of mismanagement and lack of achievement in objectives giving examples in immunization and family planning services. At the end of the seminar all participants pledged to adopt the OR approach in their day to day activities.

TIMETABLE OF ACTIVITIES

<u>Problem Analysis</u>	<u>Month/s/Year</u>
- selection of supervision decision variables	- Oct/Nov 1983
- development of supervision decision variable questionnaire	- Oct/Nov 1983
- data gathering for above	- Feb/March 1984
- analysis for above	- June/July 1984
- development of household survey	- Feb. 1984
- data gathering for above	- May/June 1984
- development of instrument for VHW performance	- March 1984
- implementation for above	- May/June 1984
- analysis for above	.
- development of instrument for goal setting for:	
- decision-makers	- Oct/Nov 1984
- villagers and community leaders	- Feb. 1984
- supervisors	- June 1984
- analysis of goal setting	- March 1985
- development of new supervision system	- September 1985
- implementation of supervision system	- November 1985 to Present

Administration and Budget

The Pricor Tanzania study was conducted between November 1983 and March 1986.

The Pricor team members were:

- |                     |                                |   |
|---------------------|--------------------------------|---|
| Dr. F.D.E. Mtango   | - Project Director             | - Senior Lecturer:<br>Epidemiology, School<br>of Medicine, University<br>of Dar es Salaam |
| Dr. J.Z.J. Killewo  | - Senior Research<br>Associate | - Lecturer: Epidemiology,<br>School of Medicine,<br>University of Dar es Salaam           |
| Mr. G.R. Moda       | - Senior Research<br>Associate | - Lecturer: Statistics,<br>University of Dar es Salaam                                    |
| Dr. E.P.Y. Muhondwa | - Senior Research<br>Associate | - Lecturer: Behavioural<br>Science, School of<br>Medicine, University of<br>Dar es Salaam |
| Mr. H.S. Rukinga    | - Field Supervisor             | - Pricor  |
| Mr. D. Kashindye    | - Field Supervisor             | - Pricor  |
| Mrs. A.S. Muze      | - Research Associate           | - Pricor  |

Budget

The total budget for this project was US\$ 55,000.