

APPLIED OPERATIONAL RESEARCH

Report of a seminar-workshop on
applied research in public health,
held at the University Center for
Health Sciences, Yaoundé,
Cameroon, 6-11 December 1976

©1977 International Development Research Centre
Postal Address: Box 8500, Ottawa, Canada K1G 3H9
Head Office: 60 Queen Street, Ottawa

IDRC IDRC-081e
Applied operational research — report of a seminar-workshop on
applied research in public health, held at the University Center for
Health Sciences, Yaoundé, Cameroon, 6–11 December 1976.
Ottawa, IDRC, 1977. 27 p.

/IDRC pub CRDI/. Report of a seminar-workshop on the use of
/operational research/ in the field of public /health service/s
especially in /Cameroon/ — discusses different stages in the
/organization of research/, particularly /project selection/, /project
design/, /research method/s, /project implementation/ and /project
evaluation/; preparation of two projects for the /evaluation/ of
/physician/ utilization and of /medical personnel/ /training/. /List of
participants/, /statistical data/, /bibliography/.

UDC: 613(671.1)

ISBN: 0-88936-144-4

Microfiche Edition \$1

Applied Operational Research

Report of a seminar-workshop on
applied research in public health,
held at the University Center for
Health Sciences, Yaoundé,
Cameroon, 6–11 December 1976

A report by: G. L. Monekosso, Yolande
Mousseau-Gershman, Patrick Kelly, Raoul
Devoto, T. C. Nchinda, Dan Lantum, Gladys
Martin, Lourdes Flor-Lachapelle, David
Henry, Susanne Koscielecki, and Michael
McGarry

Edited by: Alexandre Dorozynski

Contents

Foreword	3
Research becomes Operational	4
Selection of a Project	9
Elaboration of a Research Project	11
Preparing the Project	15
Operational Research Seminar	17
In Conclusion	21
Bibliography	23
List of Participants	27

Foreword

The following text is a report of a six-day seminar-workshop on applied (or operational) research in public health, held at the University Center for Health Sciences (UCHS) in Yaoundé, Cameroon. It has no pretensions to being a textbook on operational research, a discipline requiring a high level of expertise. Rather, it attempts to show that the scientific approach to a research project, in this case a health care project, is not necessarily very complex, and that the method in itself is accessible and should be familiar to all who are concerned with, and who can usefully participate in, the elaboration of a research program.

A new technique, even if its potential users have not had a chance to become familiar with it, can nevertheless be very useful. If necessary, a competent person, such as a statistician, can usually be called upon to help: he will at the same time contribute to the elaboration of the project, and familiarize the project team with the requirements of a systematic, rational approach.

This report attempts to illustrate what was accomplished during a week in Yaoundé. It could just as easily be done elsewhere.

Professor G. L. Monekosso

*Director
University Center for Health Services
University of Yaoundé
Yaoundé, Cameroon*

Dr Yolande Mousseau-Gershman

*Associate Director
Health Sciences Division
International Development Research Centre
Ottawa, Canada*



Professor Monekosso



Dr Mousseau-Gershman

Research becomes Operational

At the beginning of the industrial age, when engineers and managers attempted to use a scientific approach to solve organizational and managerial problems, they were engaged in "operational research," although the term did not then exist.

Operational research was developed in England during World War II, when scientists of various disciplines teamed up to try to find appropriate solutions to war-related problems. These teams have been credited with much of the success of operations such as the Battle of Britain. Later, similar teams in the United States and in Canada contributed to the design of other large-scale military operations, and thus can be credited with having contributed to the victory of the Allied Forces. Since then, operational research has become a discipline and a profession.

Today, its scope extends far beyond military matters. There are thousands of operational research specialists, and some of them use sophisticated techniques and a vocabulary that may be puzzling to the uninitiated: quadratic programming, either linear or nonlinear; stochastic process; Monte Carlo simulation; or feedback dynamics. But operational research represents, above everything else, an approach. As such, it can be used by people who have no computers, no profound mathematical skills, and who are not familiar with sophisticated models. The goal is to solve a problem and, in order to solve it, to use available information, as well as information that can be made available, in a rational and efficient manner. In the health field, a problem may appear to be as simple as the following:

How, in a given environment, in the face of numerous health problems and limited human and financial resources, can one provide a given population

with the best possible health care? Calculations and even mathematical models may be used to analyze the situation but they need not be so complex that they become inaccessible to most people involved in health care delivery.

One physician, or 20 auxiliaries?

Let us simplify the problem and say that a sum of 40 million CFA (Communauté Financière Africaine) francs can be allocated to a region with a population of 10 000 that heretofore has had no access to health care. If the training of a physician costs 20 million francs, simple division shows that two doctors can be made available to this population. On the other hand, if the training of a medical auxiliary costs only 1 million francs, 40 of them can be provided for the same amount of money.

This is a mathematical model, albeit a simple one; it can nevertheless lead to some useful indicators. For example, one can calculate the doctor-patient ratio, or the average time a doctor can spend with each patient (the latter being a function not only of the number of physicians, but also of the distances they may have to cover, the available means of transportation, and so forth). To this simple model we can introduce other variables such as statistics on the incidence of various diseases in this population and the associated mortality rate.

Thus, if diseases that are relatively easy to diagnose and treat (such as digestive, respiratory, and infectious diseases) predominate, the kind of training required to recognize and treat them can be established. It may be concluded that treatment of 80-90% of the diseases from which this particular population suffers requires a health worker with 1 year's training rather

than a medical doctor with at least 7 years. The best solution to this health problem may then be to train one physician and 20 auxiliaries or no physician at all.

Such a method of reasoning is an example of operational research. Other elements, of course, have to be introduced in the analysis of a problem to show the several alternate solutions (otherwise, there would be no problem). In this case, the objective is the best possible health care delivery system in a given region, given certain constraints. Research serves to evaluate the alternatives in order to select the most appropriate one for the situation at hand.

It is important to define this situation within which the various elements will interact. Calculations must be balanced by good sense and experience, because the quantitative analysis of all parameters may become a byzantine, if not impossible, task.

The need for a multidisciplinary and systematic approach is obvious, for the goal goes beyond mere numbers and medical technology: it is health care policy. To attain such a goal, pertinent information must be sought, even information that appears at first glance to be only remotely related to the subject.

The physician's training prepares him to deliver preventive and curative services, whereas the needs of a health policy may involve the services of an economist, an accountant, and administrator, an architect, a statistician, a sociologist, an agronomist, and others. Large-scale projects may benefit from the participation of more than 20 specialists of different disciplines. In more modest projects, such deployment may be cumbersome and costly. Nevertheless, several well-chosen heads are better than one when it comes to defining objectives, constraints, obstacles, hypotheses, and

options in areas that extend beyond a single person's competence.

The Choice of Instruments

Research instruments or techniques must be selected, refined, and verified. A questionnaire, for instance, must be complete but avoid questions that may elicit biased or ambiguous answers. Multiple choice questions may limit the initiative of the person answering, but they do facilitate the statistical study of a large number of answers.

Not an uncommon error is the selection of an instrument with which the researcher is familiar, but which is not suitable to the project on hand. (As one author points out: "Give a child a hammer, and he will find a lot of objects that need to be hammered. In your case, a plumbline and a saw may be more appropriate, even though the hammer may be your favourite tool.")

A multidisciplinary team also facilitates the averaging or elimination of bias that is frequently introduced by one or several persons of the same discipline. A plumber may say that the solution of a sanitary problem is plumbing, whereas an urban designer may favour urban redesign. A blend of specialists provides for a more objective approach.

Operational research is still a newcomer in the field of health care. Most of the health care delivery systems in industrial countries are founded on a pragmatic rather than theoretical basis, and in spite of spectacular progress in medical science and technology, the present situation is far from perfect: uneven distribution, financial failure of social health schemes, depersonalization of medicine, disproportionate increase of medical costs and of medical and pharmaceutical consumption are but some of the illnesses of modern medicine.

Many nonindustrial countries have started along the same route simply because the path was there, or because

they were led to it during the colonial period. Some countries, however, have realized the shortcoming of this approach, and are trying to find their own way.

New and original solutions have thus been found, or are being explored. The "barefoot doctor" system is an example that appears to be well adapted to the Chinese context. The history of medicine in China since the revolution shows that at the beginning the "classical" solution (that is, the deployment of Western-style physicians) was tried, until it became clear that it was not succeeding. Then the idea arose of using traditional doctors in an integrated system, and, some years later, that of raising an army of "barefoot doctors." Such decisions may well have been the results of operational research.

In other countries attempts have been made to establish varying levels of health workers to achieve the best cost/effectiveness ratio: physicians, health workers, auxiliaries, and nurses work together as a team to achieve maximum coverage, given the financial and other constraints. In Zaire for example, research is underway to evaluate the possibility of integrating traditional healers into the health care delivery system.

The Cameroonian Approach

Cameroon has created the University Center for Health Sciences (*Centre universitaire des sciences de la santé*, or UCHS). Physicians are trained in a six-year program adapted to rural conditions and stressing teamwork with other members of the health professions such as health technicians and nurses. Although the experiment is still relatively new, it appears to have been able to ensure health care delivery to rural populations that had previously lacked it. Other African countries are now considering the adoption of such an approach.

The UCHS has also undertaken another initiative: the organization in December 1976 of a seminar-workshop designed to acquaint those concerned with health care delivery with an "operational applied research" approach to their problems. This systematic approach would then be used in the elaboration of future health policies.

Professor G. L. Monekosso, director of the UCHS, and Dr T. C. Nchinda, senior lecturer at the UCHS and secretary-general of an ad hoc "Commission on operational research at the UCHS," in collaboration with the Ministry of Health, selected 17 participants of different disciplines (see list, page 27) to explore the potential of such a logical approach to matters concerning health. This led to a seminar on operational research, a discipline Dr Nchinda defined as follows: "the application of scientific methods and techniques to the study of complex problems in a system with well-defined objectives and having economical, technical, and human constraints, with a view to establishing priorities and taking appropriate decisions that will lead to achievement of the stated objectives through an improvement in the functioning of the system."

Two members of the Health Sciences Division of the International Development Research Centre, Dr Yolande Mousseau-Gershman, and Dr Patrick Kelly, also participated in the seminar.

Dr Kelly outlined some of the techniques of operational research (a term that may be equated with applied research) as it can be applied to scientific or technical problems, or to those concerning management, administration, or education.

Whatever the nature of the problem, pointed out Dr Kelly, operational research can help to identify and evaluate alternate solutions. The relationship between research and appli-

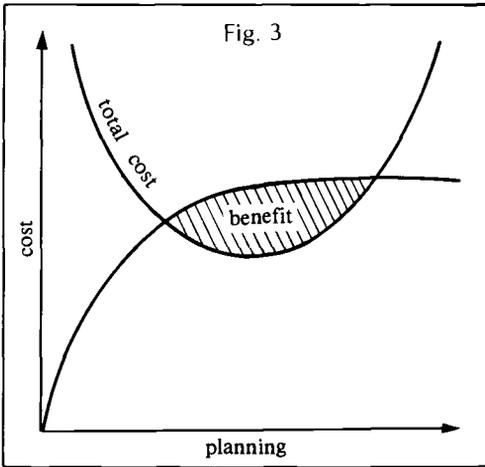
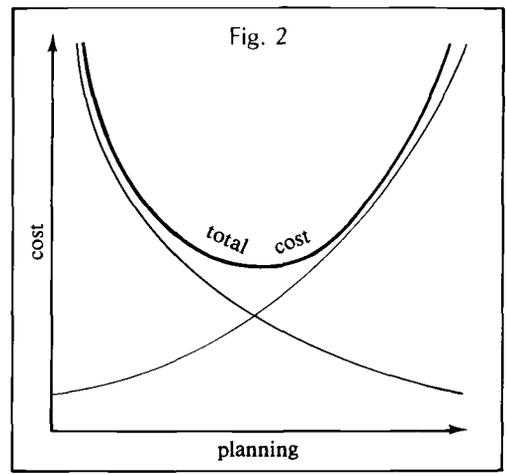
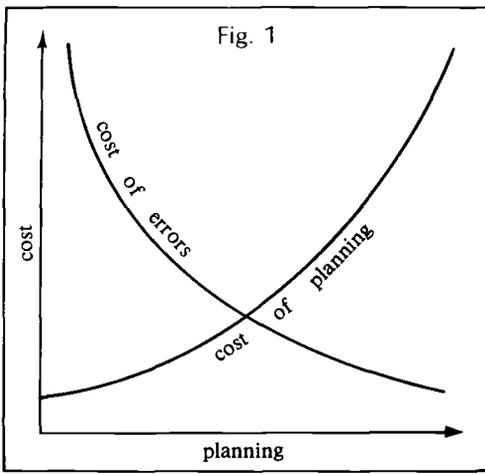


Fig. 1. It is known that planning helps avoid errors in the management of a project, but also that excessive planning becomes costly. The total cost of a project can be represented by a U-shaped curve, showing the costs of planning and of errors (**Fig. 2**). The point of lowest cost is, of course, at the intersection of the two. It is a valuable indicator that can help minimize costs while ensuring sufficient planning (**Fig. 3**). Illustrations by David Goete, School of Hygiene and Public Health, Johns Hopkins University (USA), published in *Perspectives*.

ation is of course reinforced when persons responsible for the implementation of a program also participate in the research. Such participation helps to identify the components of a problem and may be essential to the research itself as well as to the implementation of the decisions that result from it.

Evaluation: an Essential Step

Evaluation will, first of all, serve to ensure that the research methods themselves are valid. Later, evaluation can become an integral part of the unfolding of a project allowing a step-by-step control of its implementation and the correction of errors as they are committed along the way. Last but

not least, careful evaluation, based on a thorough knowledge of the various program elements and the way they interact can help in the formulation of new guidelines that may be applicable to other projects.

A system of continued evaluation can be integrated into the project itself. The general objectives, the means used to achieve them, the working hypotheses, and the related external factors should all be linked in such a way that the cause and effect relationships from one step to the next are evident and allow a clear assessment of the whole process. Such evaluations are sometimes called "progress indicators."

The rigorous formulation of a project is neither a luxury, nor merely an

academic exercise: success is directly related to planning. Good planning helps avoid errors — and it is no secret that errors can be very costly indeed.

One must not sin by omission — but one should not sin by excess either, as planning itself can become a costly item. The theoretical choice is indicated in Fig. 3: the shaded area represents the range in which the benefits of planning outweigh the costs. In other words, this is the area in

which the benefit/cost ratio is greater than one ($B/C > 1$).

Of course it isn't easy to define this area with precision, and even if it is defined, it is not always possible to abide by logistical and economic rules, particularly when it comes to the health and well-being of people. Nevertheless, the knowledge of the relationship of the cost and benefits of planning can serve as a useful guideline.

Selection of a Project

Following a brief introduction to the methods of applied research, the participants in the Yaoundé seminar-workshop selected two of Cameroon's high-priority projects that would later be used as working models. This selection was made by the "nominal group method" that was outlined by Dr Nchinda as follows:

"Imagine a research situation where the problems are not clearly defined, the cause-and-effect relationships are uncertain, and where the number of variables cannot be determined with precision. Furthermore, there are communication barriers between health care providers and consumers, as well as between professionals of different disciplines. Consider also the political and institutional realities. The result is a situation similar to the one with which we are faced today. Considering these difficulties, the first step in planning research is to determine the priorities that will be the objects of this research. The nominal group method can help identify these priorities. Its rules are as follows:

(1) Each participant is given 15 minutes to try to establish, on his own, a list of projects that he considers to have a high priority for research at the UCHS.

(2) A list is made up of all the projects thus identified.

(3) Then there is a discussion during which the projects are clarified, elaborated, and debated.

(4) Each participant now selects five projects, rating them in the order of priority he considers most appropriate, from 5 to 1 (5 being the top priority).

(5) Each project remaining on the list is now given a score by adding up the number of points it has received from participants. The five projects with the highest score stay "in the race," and the others are eliminated.

(6) Each participant, once more,

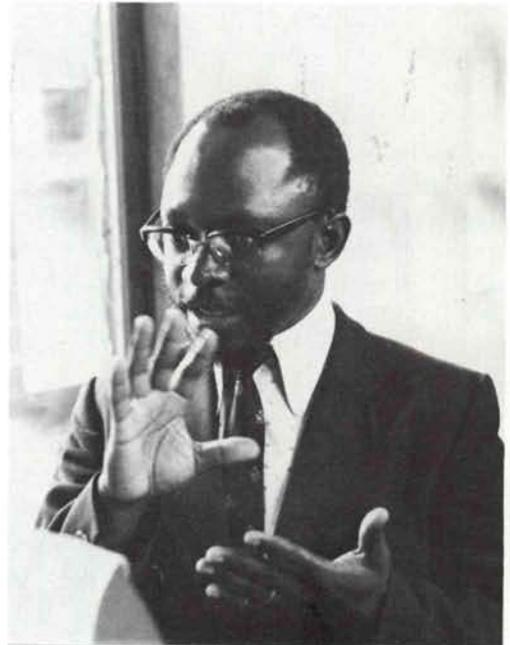
picks and rates five priority projects, scoring them from 100 to 0, the most important receiving 100 points. The increased range helps to more clearly establish the relative importance attributed to each project.

(7) After another discussion of the respective merits of the five top projects, and of the possible ways to improve them, one or two projects (usually those that have received the highest total scores) are selected as having the highest priority.

The nominal group method, developed in the United States, has now demonstrated its effectiveness in obtaining a consensus and is frequently used, particularly during interdisciplinary meetings, when each of the participants is likely to have his own bias (usually in an area closely related to his own discipline).

Choice of Priorities

To select high priority projects by the nominal group method, the participants at the Yaoundé seminar-



Professor T. C. Nchinda

workshop separated into two groups. One, predominantly francophone, was chaired by Professor Dan N. Lantum, professor of community medicine and coordinator of the Public Health Unit at the UCHS, the other, predominantly anglophone, by Professor Gladys E. Martin, a specialist in pediatrics and community medicine, and also of the Public Health Unit.

At the first tally, the anglophone group came up with 20 research projects. After a second "vote," this number was reduced to the following five:

(1) Evaluation of the existing UCHS program and of the means to improve it, particularly with regard to public health in rural areas. (This project received a total score of 740.)

(2) Evaluation of the UCHS curriculum and of its impact on the population (score: 640).

(3) A considerable portion of a family's health budget is expended on drugs. How can the UCHS curriculum be modified to reduce this expenditure? (score: 580).

(4) Evaluation of the utilization of health personnel (score: 500).

(5) Evaluation of the eventual creation of an education unit designed to improve health care education (score: 495).

The francophone group started with a list of 35 projects, from which it also selected five. (It is significant that in spite of different wording and emphasis, these five projects covered to a large extent the same areas of concern as the projects selected by the other group.)

(1) Operational research on the training of the different categories of health personnel.

(2) Research on hospital management in Cameroon.

(3) Analysis of the specific tasks of health personnel.



Professor Dan Lantum



Analysis of a project

(4) Research on the organization and performance of the laboratory services at the Yaoundé Central Hospital.

(5) Research on the organization and performance of the primary health care systems in the health centres and in the DASP 1 area (a demonstration area in the field of public health activity).

The two groups then met in plenary session for a discussion of the projects they had identified and the final selection of two of them to represent the priorities to be developed into research projects.

Elaboration of a Research Project

The two groups, each on its own, now tackled another task: to define the selected projects with more precision, to examine their basic components in the framework of an operational plan, and to describe, step by step, the implementation of each project. At the end of this exercise, each group was to describe on paper a complete project in a form acceptable to research organizations as well as to various donor agencies. The participants were provided with a standard project outline developed by the Health Sciences Division of IDRC and summarized below:

- *Title*: a brief sentence describing the project.

- *Organization that proposes the project*: name, address, description. (Other projects previously carried out by this institution, can be mentioned at this point.)

- *Other organizations* that have participated in the design of the project or likely to participate in its execution.

- *A concise description of the problem*: a brief outline of the circumstances that have prompted the proposal of the project, giving the socioeconomic framework of the country. (Favourable repercussions or the possible use of the results in other countries of the region can also be mentioned.) In addition, key terminology that will be used in the presentation of the project can be defined, particularly if this terminology is likely to be interpreted differently elsewhere. A bibliography of similar or related projects, already carried out elsewhere, can be added.

- *Hypothesis* (if any): A hypothesis can suggest an explanation or the solution to a problem. The objective of a research project can be the verification of a hypothesis, or the formulation of a hypothesis.

- *Objectives*: immediate and long-term objectives, clearly defined.

Project Methodology

Description of the experimental process, including the choice of tools for and methods of gathering and processing data to answer the question being asked. The choice of methodology will be dependent on the variables, the sample, the instruments, and methods of analysis, etc.

- *Sampling*: a description of the method used to select a sample so that it is representative of the population being studied (see Fig. 4).

- *Variables*: Indicate the quantifiable variables such as age, weight, blood pressure, distances, etc., and the nonquantifiable ones such as attitudes or behaviour patterns. Nonquantifiable variables can be gauged by means of "indicators" (for example, longevity is one indicator of health, among many others). The object of a research project may be to study the effect of one variable (for instance, the number of birth attendants) on another (infant mortality). The number of variables to be measured must be limited so that the researchers are not drowned in a sea of data they are unable to analyze.

- *Instruments*: These include questionnaires, observations, physiological tests, quantitative measurements, interviews, study of behavioural patterns, or other instruments that will be used to follow the evolution of variables. The instruments must of course be appropriate, as valid as possible and reliable. It is necessary to pretest them on small samples before launching the actual project, in order to refine them before it is too late or too costly to do so.

- *Analysis of data*: Before gathering a mass of data, it is advisable to make sure that this data can be analyzed



Dr Patrick Kelly

fruitfully. Many research projects have floundered because researchers found themselves holding a bagful of information, gathered at great cost, but useless with respect to the objectives of the project. Statistical analysis can be done only with certain data. A researcher with a mass of useless data is in trouble, and he is in deeper trouble if the data is misinterpreted so that the survey leads to erroneous conclusions. (This happens, not infrequently in demographic surveys, when quantifiable data are filtered through a researcher's bias.)

When it comes to data interpretation the computer can be a wonderful tool, but it is no panacea. What comes out of a computer corresponds to what is fed in, and not infrequently computers have simply multiplied human error.

- *Time schedule:* Establishing a schedule prior to launching the program serves not only to forecast its progression in time but encourages researchers to adhere to deadlines, and provides a schedule for periodic evaluation.

- *Teaching value:* This aspect should not be neglected. In addition to helping attain the selected objectives, an applied research program can also help researchers learn the process of reaching operational objectives in general.

- *Utilization:* That the results of a research project must be useful may be self-evident — but then, why is it that so many projects lead nowhere? There are two distinct aspects to the problem. First, the results must benefit the whole population that is represented by the sample studied. Second, the results should be made available to others who can benefit from them, such as governmental authorities, or researchers in other countries. This implies that the results be published and disseminated. Once a research project is completed, it becomes part of the capital of human knowledge and experience.

- *Administration:* Who will administer the project, and how? Good administration goes beyond accounting. It must ensure favourable working conditions, see that deadlines are followed, and keep researchers informed of the progress of the various aspects of the project. Financial administration should be simplified to avoid bureaucratic inefficiency.

- *The project's budget:* This is a key area. A budget must be complete and realistic, neither underestimated (increases are not so easy to come by) nor overestimated (here, the risk is that the whole project be turned down). It must include salaries compatible with local practice, and costs for office space and supplies, travel, data processing, publications, seminars, or conferences. Expenditures must be scheduled, and financial contributions to the project can be tentatively claimed (so much from the institution carrying out the project, so much from the government

Fig. 4

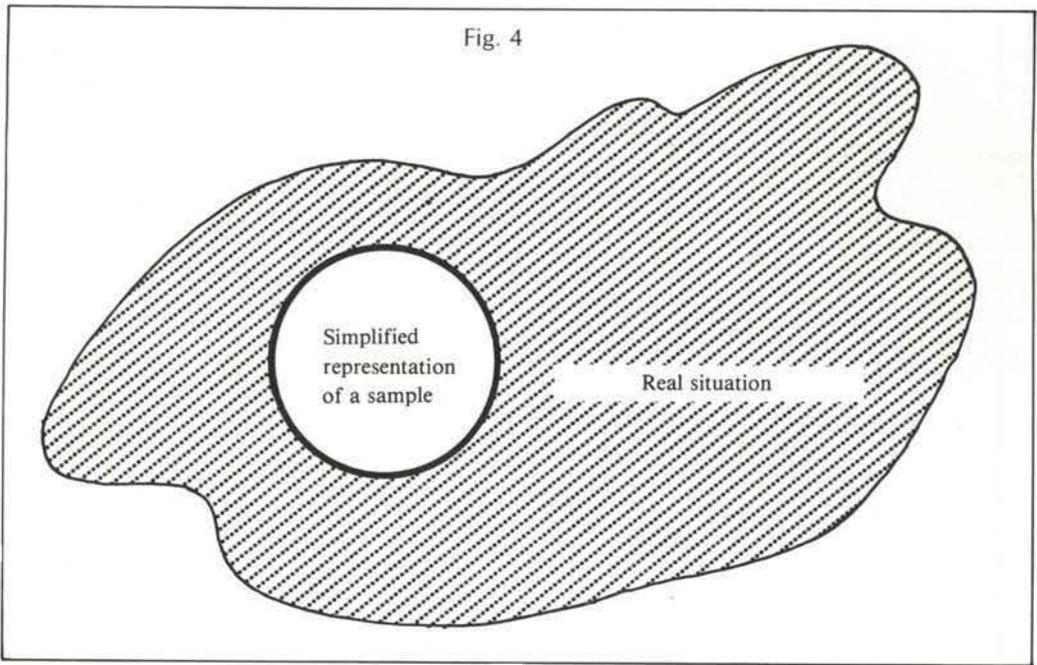


Fig. 4. A real situation that is the object of a research project can be too complex and vast to be thoroughly examined, understood, and eventually controlled. Useful and functional information about it can be obtained from a simplified representation that lends itself better to examination and use in a logical model. When the whole situation contains too large a number of units a sample can be extracted. Sampling can sometimes increase the risk of error, but when it is done according to established rules, the resulting error can be minimal. (For example, the results of an election for a country of 200–300 million people can be forecast from a sample population of 1500 or 2000; if the sample is well selected, the error will be less than 1%.)

	Resources	Activities	Goals
Planning	Funds, personnel, equipment, and other program aids	Course of selected procedures	Modifications in sanitation
Implementation	Required purchases, personnel, equipment	Planned sequence of activities	Ongoing review of progress and objectives
Evaluation	Assessment of resources used in the project	Evaluation of quality control	Evaluation of success in achieving objectives

Fig. 5. One of the simplest project evaluation models is the RAGPIE model (for Resources, Activities, Goals, Planning, Implementation, Evaluation), after John J. Dempsey and John Grant, School of Hygiene and Public Health, Johns Hopkins University.

or a ministry, so much from an agency likely to provide financial support).

- *The names of the researchers* who are to be involved in the project should be named, and their specific tasks described, without omitting professional and administrative staff. Brief curriculum vitae of project leaders can be included.

- *Project Diagram:* Several diagrams and outlines have been designed to help subdivide a project into its various components. These facilitate a rational approach and help avoid omissions. One of the simplest diagrams (Fig. 5) is called RAGPIE, for Resources, Activities, Goals, Planning, Implementation, Evaluation.



Mr Simon Awasum



Mrs Damaris Mounlom

Preparing the Project

On the third day of the Yaoundé meeting, on the basis of these principles, the two working groups elaborated actual projects corresponding to priorities in the field of health delivery in Cameroon.

The francophone group, chaired by Professor Lantum, focused on the training and utilization of nursing personnel (including midwives and birth attendants) graduated from the National School of Nursing and Midwifery (ENISFAY). The school is directed by Mrs Damaris Mounlom who participated in the Seminar and pointed out some of the shortcomings of the training program:

- The training of some 5000 nurses and midwives has been planned as a part of the Third National Plan. In fact, less than 500 have graduated.

- Deep dissatisfaction regarding the quality of nursing services has been reported in several provinces.

- Complaints have also been made by both male and female nurses concerning working conditions. A number of them had resigned within a year after having assumed their posts.

To identify the various elements of the problem (constraints, hypotheses, means of remedial action) the group adopted a working model, more detailed than RAGPIE. It consisted of 16 blank squares to be filled in during the discussion of the various aspects of the problem (see Fig. 6). At first glance, this model may appear to be overly complicated, but in fact, entering related data in its appropriate position helps identify the different aspects of the project and lay the groundwork for its implementation.

Lively discussion marked the work-

ing session at the UCHS. But as time went on, digressions became more scarce, and information pertinent to the selected programs increased in accuracy. Participation in the meeting was total: everyone quickly became familiar with the "rules of the game" and enthusiastically played his part:

- half an hour or so to realize that a sample is not just pulled out of a hat, but that other more precise selection techniques can be used such as random numbers, which can be read from a table or generated by a small pocket calculator;

- another half an hour to go through some examples of questionnaires. To produce usable results, they must be as complete as possible, yet not so lengthy that they become boring to the respondents. Questionnaires must avoid biases and ambiguous questions, and should not be formulated in such a fashion as to elicit the responses an investigator would like to see;

- another half hour again to grasp how to undertake a KAP survey (survey of knowledge, attitudes, and practices) in such a way that the results can be integrated into the program.

Toward the end of the fifth day, the participants, diligent and punctual, had come to a consensus on the general descriptions of the two projects, and the committee reporters — Mrs Mounlom for the francophone group, and Mr Simon Awasum for the anglophone — contributed considerable overtime enabling the projects to be written, typed, and mimeographed for the following morning. One of the projects was presented at the seminar as follows:

Fig. 6

	Summary	Objective indicators	Means of verification	Preliminary hypothesis
Overall objective	Improving training given by ENISFAY	CUSS Ministry of Health ONAREST; Ministry of Public Service; Ministry of the Plan; Ministry of National Education	National Plan (3rd and 4th) Health policy (over 10 yr)	The results will be used
Middle-term objectives	Operational research on training of nursing, midwife, and birth attendant personnel at ENISFAY	—Failure of 3rd plan objectives —Unsatisfactory standard of public health care —Alarming number of resignations (administrative and professional restrictions)	—Training service statistics —Institute reports	Operational research in this area is a priority Financial resources are available: Ministry of Health; CUSS; donor agencies
Short-term objectives	Evaluation of nurses, midwives, and birth attendants (1) Midwives and birth attendants over the past 3 yr (2) Nurses over the past 5 yr Evaluation of the ENISFAY training program	—Insufficient funds —Specific objectives: <input type="checkbox"/> Assignment <input type="checkbox"/> Housing <input type="checkbox"/> Salaries <input type="checkbox"/> Working hours <input type="checkbox"/> Quality of the team. All of these influence performance, but do not necessarily imply poor training.	Questionnaire by mail and visits —Questionnaire to supervisors —Supervisors' reports —Interviews with teachers	Nurses, midwives, and birth attendants will reply as well as physicians; the replies will be valid
Resources	<i>Material resources</i> <input type="checkbox"/> Documents, resolutions, decrees, programs, annual reports <input type="checkbox"/> Equipment <i>Human resources</i> <input type="checkbox"/> Teachers, Ministry of Health <input type="checkbox"/> Ministry of the Plan, former students <input type="checkbox"/> Users, CUSS <i>Financial resources</i>	(1) Project budget: —National resources —Foreign resources Their use should be described (2) Experts (3) Consultants, national and foreign	The project will be presented in several stages. After each stage a descriptive progress report will be prepared on results achieved and problems encountered, as well as a financial statement on the cost of each stage.	The project is feasible and acceptable to CUSS, the Ministry of Health, ENISFAY, ONAREST, and will be later, to the donor agency.

Operational Research Seminar

Yaoundé, 6–11 Dec 1976

President: Professor Lantum

Reporter: Mrs Mounlom

Report by group 1

I. Title of the project:

Operational research to evaluate the training and utilization of nurses, midwives, and state-certified birth assistants graduated from ENISFAY from 1972 to 1976.

II. Introduction — Name of institutions — department proposing the research:

ENISFAY is the National School of Nursing and Midwifery in Yaoundé; it also trains technical sanitation agents. Cameroon has another school at the same level: the Nursing and Midwifery School of Bamenda. Personnel are trained to the level of the state diploma of nurse (male or female) and the state diploma of midwife and birth assistant.

The duration of courses is three years (33 months) for nurses and 18 months for midwives and birth attendants who have already been awarded the state diploma for nurses.

Competence of personnel: When training is completed, the personnel must be able to:

(1) recognize the positive signs of physical and mental health in persons of any age;

(2) observe, recognize, and interpret the physical, psychic, and emotional manifestations of disease;

(3) participate in various means of preventing diseases with the view to promoting health;

(4) apply various methods of sanitary education suited to the family and the social environment in urban and rural areas;

(5) organize and direct sanitary and

social action teams, after enlisting the collaboration of local personnel for them.

(6) organize and perform nursing services, either on one's own or with the direction of a medical doctor;

(7) administer a unit with responsibilities for health care and sanitation;

(8) participate in the training of working personnel, and supervise medical students or paramedical personnel; and

(9) collaborate with local and regional authorities and the private health sector.

These qualified personnel will be called upon to work in any of the following activity sectors:

- central, regional, and provincial hospitals;

- ward hospitals and modern health centres;

- departmental centres of preventive medicine;

- mobile units, vaccination and treatment teams;

- specialized dispensaries: anti-tubercular, antivenereal, leprosoaria, maternal and child protection centres;

- public health demonstration and action areas;

- elementary health centres;

- training establishments or centres of instruction for paramedical personnel;

- hygiene and sanitation services in urban centres; and

- public health laboratories.

This research project is proposed by the UCHS in collaboration with the Ministry of Public Health.

III. Name of the project leader and coordinator: to be determined.

IV. Collaborating institutions:

UCHS, Ministry of Public Health, ONAREST (National Office of Scientific and Technical Research), Ministry of Public Service, Ministry of National Education, Ministry of the Plan, UNICEF, WHO, ENISFAY.

V. Brief summary of the situation:

Before the inauguration of ENISFAY in 1971, male and female nurses were trained at Bamenda and Ayos, and midwives abroad, mostly in Europe. ENISFAY study programs have remained unchanged since 1971; there has been no operational evaluation of the ENISFAY since it began.

According to the third Five-Year Plan, which recently ended, the objective was the training of 5000 nurses with a state diploma in five years (1000 per year). This objective has not been reached, and as of now both schools have graduated only 280 nurses and 50 midwives and birth attendants.

Many complaints have been voiced in hospitals and health centres concerning the quality of nursing care

provided by the nursing personnel and birth attendants. There are reasons to believe this dissatisfaction results from inadequate training or the improper application of knowledge in the field. Thus it is necessary to undertake operational research on the training and utilization of personnel graduated by the ENISFAY from 1971 through 1976.

VI. Overall objective:

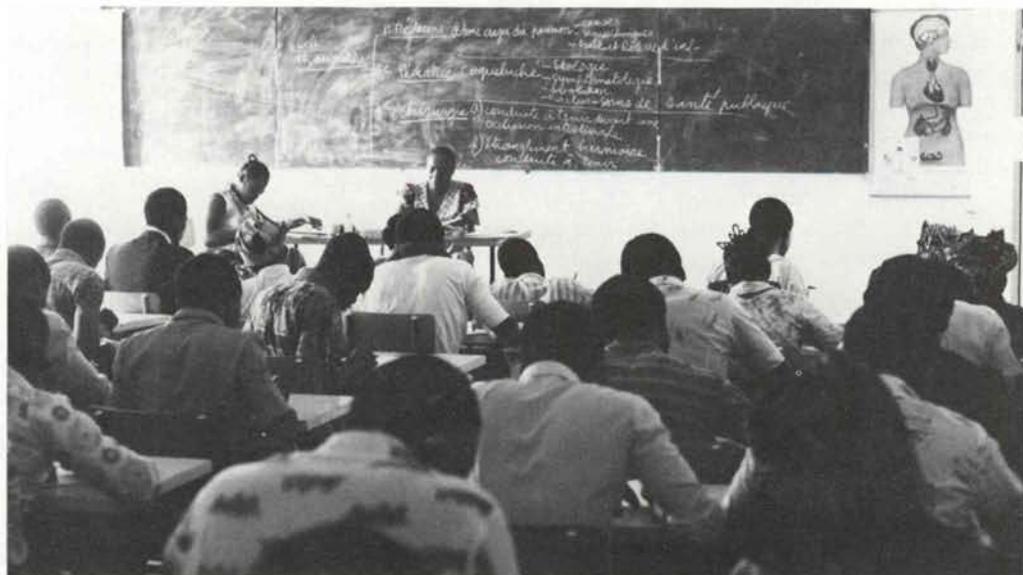
To improve the training methods and the utilization of ENISFAY nurses and birth attendants.

Intermediate objectives:

- Evaluate why the provisions of the third Five-Year Plan have not been carried out;
- Evaluate the levels and causes of satisfaction and dissatisfaction of nursing personnel, of users, and of the population;
- Determine the number of resignations and the reasons for them; and
- Evaluate the working conditions of nurses and birth attendants.

Hypotheses:

- ENISFAY nurses and midwives are not properly utilized.
- Their training is not adapted to the



A class at ENISFAY



Midwife instructor

health needs of the country.

- The working atmosphere is poor.

The result of this research will be used by the Ministry of Health and by educators.

Operational objectives (specific):

(1) Evaluate the utilization of personnel with regard to their knowledge, their attitudes, and their intended jobs.

(2) Evaluate the cognitive, psychomotor, and affective aspects concerning this personnel with regard to the sanitary requirements of their assignment; and

(3) Find out whether working conditions permit them to apply knowledge, attitudes, and techniques acquired during their training.

VII. Methodology:

- Area of research: United Republic of Cameroon (some nurses with the Ministry of Health and Sanitation and others with ENISFAY);

- Formation of the research team that will undertake this project;

- Elaboration of research instruments;

- Assuring the sociopolitical acceptability of the project;

- Testing the instruments; and

- Administering the instruments.

Research techniques:

- Evaluation of the 275 nurses, midwives, and birth attendants;

- Questionnaire by mail to nurses to be evaluated, and users (administrators, physicians, patients);

- Personal interviews;

- Study of records at the ENISFAY, and survey of the activities of graduates in the field;

- Processing by hand, and analysis of data;

- Analysis of training and utilization, and of outside factors (i.e., factors related to working conditions) that may influence them.

Data analysis will be carried out by members of the research team with the help of calculators.

- Elaborating the results;

- Synthesis of the various elements involved;

- Discussion of the results in the face of all available documents (decrees, resolutions, national plan, programs, etc.);

- Conclusions; and

- Specific recommendations: how to modify the training, utilization, and working conditions to improve the quality of nursing care.

VIII. Schedule of the various phases of the project: (A detailed planning schedule was submitted)

Stages of the project:

(1) Basic research as well as formation of the research team2 months

(2) Preparation of the instruments, and simultaneous verification of the sociopolitical acceptance of the project, and elaboration of the in-the-field activity2 months

(3) Launching of the research project6 months

- mailing of the questionnaire

- assignment of a team to evaluate

training at the ENISFAY and performance in the field.

(4) Processing and analysis of data
.....9 months

(5) Publication and seminar
.....2 months

Members of the project's technical team:

UCHS director or one representative qualified in training and research:

- 1 UCHS professor, qualified for this purpose;

- 1 ENISFAY professor, equally qualified;

- 1 member of the Ministry of Health study section (statistician).

Knowledge acquired from this research will be applied to the training of medical students and CESSI (Centre d'Enseignement Supérieur en Soins Infirmiers) students. Professors who belong to the various examining juries will also contribute to spreading this knowledge throughout the university.

This project was followed by a preliminary budget.

* * *

The reporter of the anglophone group, Mr Simon Awasum, presented another research project, equally detailed, on the evaluation of the utilization of physicians in the country. The

importance of this project is underlined by the fact that several African countries are introducing, or preparing to introduce, systems of medical education comparable to that of the UCHS.

One of the reasons for selecting this project was that in some regions, an inappropriate distribution of medical doctors had led to their being insufficiently utilized. Among the objectives: to verify whether the descriptions of specific tasks assigned to doctors correspond to the situations these physicians have to face in the field.

The completion of this project would make it possible to suggest modifications to the UCHS curriculum, and would also serve as a useful indicator for similar projects being undertaken in other countries of the region.

The objective of the workshop was achieved. In a fixed time limit, and following a preestablished program, participants were introduced to operational research techniques and learned the "rules of the game" that permitted them to elaborate and prepare two projects. Only some details that could not be worked out within time limitation were missing; otherwise, the programs could become operational.

In Conclusion . . .

Dr T. C. Nchinda

Ladies, Gentlemen,

We have come to the end of six days of intensive work. Has this working seminar been too difficult? We hope, at any rate, that it was worth your while.

What have we learned?

To begin with, we have exposed you to methods and techniques that may have been foreign to you — such as the “nominal group method,” that makes it possible to tackle complex problems and to come up with potential solutions or with research priorities. This method has led you along a rigorous path to the selection of a project that takes priority over a large number of candidates.

One advantage of this method is that it calls upon the participation of all members of a group; it is simple, democratic, yet not without pitfalls — particularly when it comes to selecting a group of people whose experience must be relevant to a particular area of interest.

Then you were exposed to the methods of operational research — perhaps in too brief a fashion, but could this be avoided if we were to tackle a practical exercise? This form of research enables us, thanks to a scientific approach, to undertake complex problems by placing them in the framework of a coherent system, with well-defined objectives and constraints. It enables us to determine priorities and to make decisions that will help us reach these objectives. Operational research, if one knows how to use it, will thus lead either to a specific solution in answer to a specific problem, or else contribute to designing a method through which an entire category of problems can be solved.

In the early stages we reviewed the identification of objectives and of variables that will come into play, whether controllable variables (personnel, material, etc.) or uncontrollable ones (weather conditions, seasonal diseases).

We have also learned through experience to use the model as a logical tool for including both the objectives and the variables into an operational framework. The logical matrix you have used to develop your research subject has given you the opportunity to deal with a “model.” It was, perhaps, a difficult one, which we could have replaced by a simpler one, such as RAGPIE. We have deliberately tried not to overwhelm you with complex mathematical calculations although these are, in some cases, unavoidable.

You have also faced the demanding (and sometimes frustrating) task of elaborating a research project, and we have listened to your reports. You have realized that your work was not limited to outlining a system and identifying the persons who will have to make decisions; you also had to define your objectives with precision, list the existing constraints, and elaborate your research instruments so that they are at the same time realistic, reliable, sensitive, and specific. In so doing, you had to examine various sampling techniques. The elaboration of a budget was the last — but certainly not the least — of your concerns.

Time limitations have not permitted us to discuss operational research teaching requirements at the UCHS. But I am certain that you are aware of the importance of operational research and of its inseparable companion, evaluation; these are tools that should be available to every one who completes his studies at the UCHS.

I shall prolong your agony only briefly, to thank you for your active and attentive participation, without which this seminar would have been a failure. I should like to thank also our friends of the International Development Research Centre for their contribution to this meeting and the assistance provided by their organization.

A handwritten signature in black ink, appearing to read "K. Johns". The signature is written in a cursive style with a long horizontal line extending to the right from the end of the name.

Bibliography

General Background

- Arnold, M. *Evaluation: a feedback model*. In Blum, H., Notes on Comprehensive Planning for Health. Berkeley, Calif., School of Public Health, 1968.
- Babbie, E. *Survey research methods*. Belmont, Calif., Wadsworth Publishing Co. Inc., 1973.
- Bryant, J. *International trends toward the harmonization of health services*. Washington, D.C., The National Council for International Health, Apr 1973.
- Campbell, D. T., and Stanley, J. C. *Experimental and quasi-experimental designs for research*. Chicago, Ill., Rand McNally College Publishing Co., 1963. 84p.
- De Landsheere, G. *Introduction à la recherche en éducation*. Paris, Armand Colin-Bourrelrier. 3rd edition.
- Deniston, O. *Evaluation of program effectiveness*. Public Health Reports, 83(4), Apr 1968.
- Densen, P. *Introduction to the theme: health care, health research, and health policy*. International Journal of Health Services, 3(1), 1974.
- Donabedian, A. *A guide to medical care administration, volume II: Medical care appraisal — quality and utilization*. Washington, D.C., American Public Health Association, 1969. 221p.
- Elinson, J. *Introduction to the theme: sociomedical health indicators*. International Journal of Health Services, 6(3), 1976.
- Flook, E. E., and Sanazaro, P. J. (eds.). *Health services research and R. & D. in perspective*. Ann Arbor, Mich., Health Administration Press, University of Michigan, 1973. 311p.
- Grundy, F., and Reinke, W. A. *Health practice research and formalized managerial methods*. Geneva, Public Health Papers No. 51, World Health Organization, 1973. 193p.
- Isaac, S., and Michael, W. B. *Handbook in research and evaluation for education and the behavioral sciences*. San Diego, Calif., Edits Publishers, 1971. 186p.
- King, I. M., and Reinke, W. A. *Manual on the research process*. In Final Report of the Fifth Regional Seminar on Nursing. Manila, Philippines, WHO Regional Office for the Western Pacific, 1969. 63p.
- O'Barr, W., Spain, D., and Tessler, M. *The history and conduct of survey research in Africa*. In O'Barr, W., et al., *Survey Research in Africa: Its Applications and Limits*. Evanston, Ill., Northwestern University Press, 1973.
- Reinke, W. A., and Williams, K. N. (eds.). *Health planning: qualitative aspects and quantitative techniques*. Baltimore, Md., The Johns Hopkins University, 1972. 350p.
- Sackett, D., and Baskin. *Références d'évaluation des soins de santé*. Hamilton, Ontario, McMaster University, Mar 1976. 3rd edition.
- Schulberg, H., et al. (ed.). *Program evaluation in the health fields*. New York, Behavioral Publications, Inc., 1969.
- Selltiz, C., Jahoda, M. J., Deutsch, M., and Cook, S. W. *Research methods in social relations*. New York, Holt, Rinehart and Winston, 1959. 622p.
- Suchman, E. A. *Evaluation research: principles and practice in public service and social action programs*. New York, Russell Sage Foundation, 1967. 186p.
- Wolf, H. K., and Pant, P. R. *A handbook for social science research and thesis writing*. Kirtipur, Nepal, Institute of Business Administration, Commerce

and Public Administration, Tribhuvan University Research Division, 1975.

Operational Research

Andersen, S. *Operations research in public health*. Public Health Reports 79, 1964, 297–305.

Baily, G. V. J., Savic, D., Gothi, G. D., Naidu, V. B., and Nair, S. S. *Potential yield of pulmonary tuberculosis cases by direct microscopy in a district of South India*. Bulletin WHO, 37, 1967, 875–892.

Flagle, C. D., and Young, J. P. *Application of operations research and industrial engineering to problems of health services, hospitals and public health*. Journal of Industrial Engineering, 17, 1966, 609–614.

Reinke, W. A. *The role of operations research in population planning*. Operations Research, 18, 1970, 1099–1111.

Sampling

Shonin, M. *Sampling*. New York, Simon and Schuster, 1960.

Instrument Design

Van de Ven, A., and Delbecq, A. *The nominal group as a research instrument for exploratory health studies*. American Journal of Public Health, Mar 1972.

Webb, E., et al. *Unobtrusive measures: nonreactive research in the social sciences*. Chicago, Ill., Rand McNally College Publishing Co., 1966.

Data Analysis

Abdellah, F. G., and Levine, E. *Work-sampling applied to the study of nursing personnel*. Nursing Research 3, 1954, 11–16.

Brown, F., et al. *Statistical concepts: a basic program*. New York, Harper and Daw, 1965.

Copplestone, J. F. *Planning an epidemiological field survey*. WHO Chronicle, 29, 1975, 219–223.

Dempsey, J. *The use of life table in expressing follow-up data*. Perspectives in Maternal and Child Health. Johns Hopkins University, 5, Nov 1971.

Department of International Health, The Johns Hopkins University. *The functional analysis of health needs and services*. New Delhi, Asia Publishing House, 1976, 292p.

Hashimoto, M. *A study on operation of environmental sanitation work at health center level*. Bull. Inst. Publ. Health (Japan), 8, 1959, 208–213.

Huff, D. *How to lie with statistics*. New York, W. W. Norton and Co., Inc., 1954.

Reid, M. *A study of the activities of auxiliary nurse-midwives in Haryana, Punjab and Gujarat states (India)*. WHO-SEARO Publication, SEA/NURS/130, 1969, 74p.

Roghmann, K. J., and Haggerty, R. J. *Measuring the use of health services by household interviews: a comparison of procedures used in three child health surveys*. International Journal of Epidemiology, 3, 1974, 71–81.

U.S. Public Health Service, National Center for Health Statistics. *Health survey procedure: concepts, questionnaire development, and definitions in the health interview survey*. Washington, D.C., Public Health Service Publication, No. 1000, Series 1, No. 2, 1964. 66p.

Various Tools and Techniques

(a) Health Manpower Studies

Baker, T., and Perlman, M. *Health manpower in a developing economy*. Baltimore, Md., The Johns Hopkins Press, 1967.

(b) Management

- Dempsey, J. *Viewing program evaluation as a component of the administrative process: the RAGPIE model*. Perspectives in Maternal and Child Health, Johns Hopkins University, No. 4, 1971.
- Goettee, D. *Program control through systems analysis*. Perspectives in Maternal and Child Health, Johns Hopkins University, No. 3, Jan 1971.
- Longest, B. *Management practices for the health professional*. Reston, Va., Reston Publishing Co., Inc., 1976.
- Merten, W. *PERT and planning for health programs*. Public Health Reports, 81(5), May 1966.

(c) Health Economics

- Sorkin, A. *Health economics in developing countries*. Lexington, Mass., Lexington Books, 1976.

Curriculum Design

- Mager, R. *Preparing instructional objectives*. Fearon, 1975.
- Mager, R. and Beach, K. *Developing vocational instruction*. Fearon, 1967.
- Mager, R., and Pipe, P. *Analyzing performance problems; or, you really oughta wanna*. Fearon, 1970.
- Segall, A., et al. *Systematic course design for the health fields*. New York, John Wiley and Sons, Inc., 1975.



List of Participants

University Center for Health Sciences (UCHS), Yaoundé

Professor G. L. Monekosso, *Director, UCHS*

Professor Dan N. Lantum, *Coordinator, Public Health Unit (PHU), Professor of Community Medicine*

Professor Gladys E. Martin, *Pediatrician, Community Medicine, PHU*

Professor Ethel E. Martens, *Specialist, Education for Health, PHU*

Dr A. Abondo, *Associate Professor of Histopathology, Biomedical Sciences Unit*

Professor Raoul Devoto, *Head of the World Health Organization project at UCHS*

Dr Lawrence K. Njikam, *Pharmacist, Coordinator of the Health Technicians Program*

Dr Johnson Jato, *Pharmacologist, Coordinator of the Technicians Program (Pharmaceutics)*

Mr Simon Awasum, *Head Laboratory Technologist, Coordinator of the Technicians Program (Laboratory Analysis)*

Mrs Miriam Jato, *Assigfstant, Education for Health, PHU*

Miss Nicole Vanderhaeghen, *Nurse, Assistant, Centre for Advanced Training in Nursing*

Professor Lazarre Noche Kaptue, *Hematologist, Coordinator of the Bio-*

medical Sciences Unit

Miss Jeanne F. Carrière, *Nurse, Public Health Education, PHU, Head of the CIDA project at UCHS*

Ministry of Public Health

Mrs Martine Jigpuep, *Office of Health Education*

Mrs Hélène Awasum, *Head, Faculty of Nursing*

Mrs Damaris Mounlom, *Director, National School of Nurses and Midwives of Yaoundé*

Mr Martin Toche, *Head of Health Card Services, Department of Research, Planning, and Statistics*

Mr Boniface Tongsi, *Head of Technical Studies in Programming and Planning*

Consultants

Dr T. C. Nchinda, *Organizer of the Yaoundé Seminar, Specialist in Community Medicine, Epidemiologist, PHU, UCHS*

Mrs Yolande Mousseau-Gershman, *Associate Director, Health Sciences Division, International Development Research Centre (IDRC)*

Dr Patrick Kelly, *Health Sciences Division Representative, IDRC Regional Office, Dakar, Senegal*

Mr Alexandre Dorozynski, *Associate Director, Publications Divison, IDRC*

Opposite: views of the Yaoundé seminar-workshop. Top, from left to right: Professor Nchinda, Professor Devoto, Mr Toche, Dr Njikam, Miss Carrière, Dr Jato, Dr Mousseau-Gershman. Centre, left: Dr Mousseau-Gershman, Professor Nchinda, Professor Devoto, Mr Toche, Dr Njikam. Middle, right: Mr Tongsi, Mrs Hélène Awasum. Bottom, left: Mrs Jigpuep. Bottom, right: Miss Carrière, Mrs Jato.

