Final Report of an

EVALUATION OF THE HEALTH SECTOR RESOURCE ALLOCATION MODEL

DENVER RESEARCH INSTITUTE
UNIVERSITY OF DENVER

FINAL Report of an

EVALUATION OF THE HEALTH SECTOR RESOURCE ALLOCATION MODEL

Prepared by:

Hugh C. Russell, Principal Investigator
Ronald P. Black, Project Director

Prepared for:

Abby Bloom, Senior Health Planning Officer
Bureau of Program and Policy Coordination
Agency for International Development
Washington, D. C. 20523

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TABLE OF CONTENTS

	Page
PREFACE	vii
1. EXECUTIVE SUMMARY	ix
Introduction	ix
Conclusions	ix
Recommendations	ix
2. THE EVALUATION PROJECT	1
Purposes of this Evaluation	1
Criteria for Evaluation	1
Role of the University of Michigan	2
Sources of Evaluative Data	3
Data Analysis and Reporting	4
Skills of the Evaluation Team	5
The Final Report	5
3. AID'S HEALTH SECTOR POLICY	7
4. THE HEALTH SECTOR RESOURCE ALLOCATION MODEL	11
5. APPLICATIONS OF THE MODEL IN LDCs	15
Introduction	15
Applications in Egypt	15
Applications in Indonesia	17
6. TECHNICAL CHARACTERISTICS OF THE MODEL	19
Level of Scientific Rigor	19
Validity of Input Data	20
Validity of Relationships	22
Treating Time as an Independent Variable	23
Impact of Extraneous Variables	24
Problems of Economics and Mathematics	25
7. SOURCES OF INPUT DATA	27
Planning Without Information	27
Government Information Too Aggregated	27
Systematic Information is Increasing	28
Deficiencies in Cost Information	29
Data on Private Health Resources	29

2

TABLE OF CONTENTS (Continued)

		Page
8.	IMPACT OF THE MODEL ON HEALTH SECTOR MANAGEMENT	31
	Impact on National Public Health Plans	31
	LDC Approaches to Health Planning	31
	Combating Traditional Methods of Making Resource Decisions	32
	Introducing Econometrics to National Health Planning	33
	Planning with Medical Practitioners	34
	National-Provincial Linkages for Health Planning	35
	Research Impacts of the Model	35
	Model's Potential as a Tool for Monitoring	36
9.	TRAINING POTENTIAL OFFERED BY THE MODEL	39
	Needs for Training	39
	Purpose of Training	39
	Training Effects of Planning with the Model	41
	Packaging the Model for Training Purposes	41
10.	LOCUS OF DEPLOYMENT	43
	Provincial Deployment of the Model	43
	Deployment of the Training Capability	43
11.	IMPROVING COST-EFFECTIVENESS OF HEALTH PROGRAMS	45
	Strong Emphasis on Financial Viability	45
	Better Management and Administrative Systems	45
	More Systematic Assessment of Alternatives	45
	Consideration of Long-Term Costs	46
	Developing Financing Mechanisms	46
12.	A COMPARISON OF THE MODEL TO OTHER MECHANISMS FOR TECHNOLOGY TRANSFER IN HEALTH MANAGEMENT	47
	Introduction	47
	General Mechanisms for Transferring Health Management Skills	47
	The Literature on Technology Transfer in the Health Sector	48
	Most Significant Factors Influencing the Effectiveness of Technology Transfer	48
	The Environment for Improving Health Management Skills	50
	A Comparison of Six Different Approaches to Training Public Health Planners in LDCs	50
13.	A NEW PHASE OF MODEL DEVELOPMENT	55

3

TABLE OF CONTENTS (Continued)

	Page
14. CONCLUSIONS AND RECOMMENDATIONS	57
Conclusions	57
Research and Development Recommendations	57
Planning and Research Recommendations	59
Training and Packaging Recommendations	60
Pilot Project Recommendation	61
BIBLIOGRAPHY	63

APPENDIX A: COPY OF THE UNIVERSITY OF MICHIGAN GRANT (1979) AND AMENDMENT

APPENDIX B: STATEMENT OF WORK

APPENDIX C: LIST OF DISCRIMINATORS

APPENDIX D: LIST OF INFORMANTS

APPENDIX E: REPORT ON SURVEY OF UNIVERSITY OF MICHIGAN LDC HEALTH PLANNING AND ECONOMIC DEVELOPMENT ALUMNI

APPENDIX F: SUMMARY OF GHANIAN ADAPTATIONS OF THE MODEL

PREFACE

This report comprises the final product in fulfillment of all obligations required by a contract between the University of Denver, Denver Research Institute, and the United States Agency for International Development, Office of Policy and Program Coordination, numbered OTR-0082-C-00-2316-00. It is offered with grateful acknowledgment of a few people without whose assistance it could never have been completed.

Abby Bloom and Ann Van Dusen provided encouragement, support, coordination and an articulate statement of need for this study. William Reinke, Professor and Acting Director, Department of International Health, School of Hygiene and Public Health, Johns Hopkins University, provided input and oversight on all public health technology imbued in this study. Robert Grosse, Professor and Grantee for the original model development grant, School of Public Health, University of Michigan, provided unmitigated access to all project files and staff. AID/Mission personnel in Cairo and Jakarta generously provided insight and ideas to further the evaluation. Egyptian and Indonesian hosts not only provided important evaluative information, but also made the acquisition of it particularly hospitable for the foreign evaluators in their countries.

To all these and other important people involved in this project we offer our heartfelt thanks.

Hugh C. Russell
Ronald P. Black

April 20, 1983

1. EXECUTIVE SUMMARY

Introduction

This document reports the results of a project designed to evaluate the potential usefulness of a computerized national health planning model which was developed by the School of Public Health, at the University of Michigan. Unlike the traditional epidemiological approach to planning, this Model introduces an econometric planning strategy.

Conducted by the Denver Research Institute (October, 1982-May, 1983), this evaluation focused on the Model's potential utility in furthering the AID's health sector goals and policies. More detail on the purpose and methods of this evaluation are provided in Chapter 2. Below are the primary conclusions and recommendations of this project. More detail on them is provided in the body of the report and, particularly, Chapter 14.

Conclusions

This project derived a variety of conclusions, the principal ones of which were:

1. The University of Michigan has successfully developed the technology necessary for this Model.

2. The Model does have a vital role to play in furthering AID's health sector policies.

3. The Model's greatest potential for immediate impact on LDC health planning lies in its use as a tool for training LDC health planners to think of health sector problems and opportunities in resource allocation terms.

4. Its long-range potential as a planning tool depends on the capability of LDC health managers to deal with quantitative and econometric dimensions and concepts. The technology of the Model itself is in place.

Recommendations

This project derived a variety of recommendations, the principal ones of which were:

1. The University of Michigan Model development team should continue upgrading the technology to accommodate extraneous variables, time-phased variables, and optimization.

2. The Model should be adapted for use on a variety of hardware, and in a variety of computer languages.

3. AID missions should use the Model to stimulate LDCs to upgrade health sector data and information management systems.

4. The Model should be deployed as a planning tool at both national and lower levels of government.

5. The Model should be packaged in a core technology transfer curriculum for public health planning, to be delivered in LDCs.

6. The Institute for National Planning, and the Ministry of Health of the Government of Egypt should be considered for a collaborative pilot project to develop and test the aforementioned technology transfer package.

1

2. THE EVALUATION PROJECT

Purposes of this Evaluation

This evaluation was undertaken with two purposes in mind:

> To evaluate the potential usefulness of [the Model] . . . as one instrument for implementation of AID's emerging health policy; and,
>
> To recommend the most useful applications of [the Model] . . for increasing the effectiveness of health programs through improved program design and management. (See Statement of Work, APPENDIX B.)

It is significant to note that the first purpose translates into an evaluation of the practical utility of the Model based on criteria derived from AID's latest health sector policy. This is policy which was not in effect at the time that Model development resources were originally granted to the University of Michigan.

This purpose is a far cry from an evaluation based on the original objectives of Model research, AID's 1979 purposes in providing grant support to the University of Michigan, or the performance of the grantee over the past three years. We took this approach in order to increase the probability that AID can find a way to utilize the results of research activity which has received a sizable financial commitment. In effect we are applying evaluation research in a formative manner; i.e., to enhance accomplishment of AID's current health sector objectives (in contrast to a summative approach which would only detail the degree of success in accomplishing past ones).

The second purpose is really dependent on the outcomes of evaluation associated with the first one. Interpreted it means: if we discover that the Model has some potential utility in light of AID's current health policy, then what particular applications would maximize that potential?

Fulfilling this second purpose requires a lot of information, not only about the Model, but also about the capabilities of possible users in LDCs, and other available mechanisms for accomplishing the same purpose.

Criteria for Evaluation

The main purpose of this evaluation places heavy emphasis on "AID's health policy"--at least as much emphasis as on the Model itself.

8

The emphasis on policy, however, is not evaluative so much as descriptive. That is, what characteristics of AID-supported health interventions are required by current policy? In other words, the first step in this evaluation is to derive criteria for evaluating the usefulness of the Model, from AID policy documents, discussions with AID officials, and other supporting documentation.

The criteria were generated primarily from four policy documents which are cited in the BIBLIOGRAPHY of this report. (50, 52, 53, and 54) However, they were supported by in-depth interviews with 15 AID and academic specialists who have experience and knowledge, both with health sector policy, and the Model. Finally, over 50 books, articles, reports, memoranda, letters and telegrams also played a role in deriving priorities among evaluation criteria.

An original list of over 200 possible criteria for evaluating the utility of the Model was reduced (through content analysis) to 80 evaluation questions, called "discriminators." They clustered in seven categories of evaluative information:

-- Technical characteristics of the Model

-- Input requirements of the Model

-- Impact of the Model on health sector management

-- Research capabilities offered by the Model

-- Health sector needs and program priorities

-- Training potential offered by the Model

-- Requirements for effective deployment of the Model

All 80 discriminators were forwarded for criticism and clearance, on November 8, 1982, to our AID/PPC Project Officer, our health planning technical consultant, and the director of Model development research at the University of Michigan. The discriminators appear in APPENDIX C.

Role of the University of Michigan

Model developers at the University of Michigan were kept fully informed and up-to-date throughout the conduct of this evaluation. Further, they were relied upon for documentary evidence and numerous consultations which contributed to all phases of evaluation activity.

In evaluating the wisdom of this approach, it has to be remembered that the purposes of this project were to focus on the Model, as an entity unto itself. Further, there exists no better expertise on the technical characteristics and idiosyncracies of the Model than at the Univer-

sity of Michigan where it was developed. Thirdly, any biases introduced by these collaborators about the qualities of the Model were counterbalanced by those derived from a variety of other sources. Finally, any hope of deploying the Model, in any useful form, will depend ultimately on the degree of cooperation and collaboration between AID and the Model's developers.

In other words, the evaluation team felt that more was to be gained in the short term for this evaluation, and the long term for the future of the Model as an instrument of AID's health policy, through an open and facilitative relationship with the University. It only remains to be added that the Model's developers reflected this same attitude. Further, they provided unmitigated access to their files, libraries and consulting time, in the interests of this evaluation project.

Sources of Evaluative Data

The basic methodology for this evaluation was qualitative assessment derived from unstructured, in-depth interviews with the widest possible variety of people who had any knowledge or experience with the Model and public health management in LDCs. Data sources included the following kinds of people:

- -- AID/stateside health sector officials
- -- AID/mission health sector officials
- -- AID/mission evaluation specialists
- -- U.S. and LDC academic health planning theorists and teachers
- -- U.S. and LDC epidemiologists
- -- U.S. and LDC health economists
- -- LDC ministry of health planners and program managers
- -- LDC ministry of planning officials
- -- LDC ministry of finance officials
- -- LDC regional health program managers
- -- LDC local health facility managers
- -- LDC health practitioners
- -- LDC social and management scientists and researchers

A list of our informants may be seen in APPENDIX D.

Interviews were conducted by the Principal Investigator and Director of this project (coauthors of this report, respectively). Rigorous standards for interviewing procedures were applied. For example, prior to each interview, the interviewers determined which discriminators from the list of 80 were most appropriate for the particular informants. All informants were told the purposes of the interviews, and asked if they objected to the interviewer's taking notes.

Copious notes were used to capture each informant's ideas and particularly expressive words or phrases. At the conclusion of each day, the interviewers reviewed that day's notes and filled in gaps or expanded on particularly cryptic passages. The interviewers used these notes to write a fuller and more cohesive summary of each interview. At the conclusion of interviews in each LDC, the interviewers wrote a summary statement about the role of the Model there, and its potential as a tool for public health management. Interview notes and summaries were provided to the Principal Investigator for content analysis, interpretation and reporting.

Data Analysis and Reporting

This final report came from an integration of diverse data sources on the questions at hand. Well over 60 interviews transpired in Egypt and Indonesia. Over 20 transpired at AID/Washington and the University of Michigan. Over 30 telegrams, letters and summary reports were examined in project files at AID/PPC and the University of Michigan. Questionnaire data from 37 LDC health managers who studied at the University of Michigan were analyzed and integrated (an interim report of these appears in APPENDIX E). Sixty-two other major documents (cited in the BIBLIOGRAPHY) were read for their insight on the evaluation questions.

Pulling all this material together into a cogent and cohesive evaluation report was completed by the Principal Investigator in four steps: (1) content analysis, (2) draft report, (3) technical consultation, and (4) final report. The methods of content analysis were used to integrate salient data from diverse sources. Quite obviously the categories of evaluative information derived from this process resemble the seven categories of discriminators, because the discriminators served as a springboard for interviews. However, the categories of evaluative information in the final report were not prescribed by the discriminators. The methods of content analysis permitted those categories to emerge from the data.

A draft report of the evaluative information was circulated for criticism and technical input, on March 8, 1982, among the AID/PPC Project Officer, our health planning technical consultant, the project Director and the director of Model development at the University of Michigan. Returned to the Principal Investigator, their comments contributed to development of the final report.

Skills of the Evaluation Team

The project Director and Principal Investigator bring to this project skills in economic development and technology transfer, policy analysis, technology assessment, program evaluation and research. Given the nature of this evaluation enterprise, it was deemed necessary to augment these capabilities with the special expertise of a consultant in international public health planning. For this purpose we turned to the Acting Director, Department of International Health, School of Hygiene and Public Health, at Johns Hopkins University. He brought to this task additional knowledge and personal experience with the health management infrastructures in both Egypt and Indonesia.

This expert was consulted at a number of critical junctures in the project. He provided preliminary research design ideas, critically reviewed our final design and evaluation criteria, consulted during a two-day post mortem of the Indonesia interview experience (prior to the Egyptian interviews), directed technical questions to the Model's developers in Michigan, criticized the draft report, and handled innumerable technical queries from the other two members of the evaluation team.

The Final Report

This report commences with a brief "Executive Summary" of our conclusions and recommendations. Then, this methodological section is followed by one which describes the most salient characteristics of AID's health sector policy. This provides the context in which the Model was evaluated. It is followed by a brief descriptive piece on the Model itself, what it is and how it works. It serves as a primer on the Model so that we all approach the evaluation with the same understanding of what is being evaluated.

The Model was developed at the University of Michigan, Ann Arbor, but the greatest sources of evaluative data were Indonesians and Egyptians who are familiar with the Model and health planning constraints in their respective countries. Hence, the next section of the report simply describes the extent and nature of Model applications in these two countries. Finally, the sixth section of the report commences the evaluative portion. It focuses on the technical characteristics of the Model. Chapters 7 and 8 deal with evaluation of data input requirements and the impact of the Model where it has been applied to health management.

The next section presents discussion of one of our principal conclusions--that the Model is best suited as an instrument for increasing the capability of LDC health planners to consider health economic issues. The tenth section presents deployment issues.

The eleventh section brings the discussion back to the relationship between the Model and AID's health sector policy. It focuses on AID's principal priority of improving cost effectiveness of health programs, and discusses the Model's potential utility in reaching that goal. The next section examines the relative merits of five other extant mechanisms for improving public health management in LDCs. They are reviewed in comparison to the Model's potential.

The thirteenth section addresses our view of priorities for adapting the Model to AID's new policy directions. Nothing new is presented in the fourteenth section--it simply pulls together the conclusions and recommendations we have made throughout the body of the report. Finally, we conclude with a variety of appendices and a bibliography of the major documents consulted on the project.

13

3. AID'S HEALTH SECTOR POLICY

Priorities for AID assistance in the health sector are changing from those which characterized the late 1970s and early 1980s. The emphasis on primary health care (PHC) systems has not changed. In fact, diverse PHC projects around the world have proved the value of that particular approach. Instead, AID is currently shifting the aspects of PHC which it is promoting and supporting.

After a few years of experience with PHC projects, AID affirmed its commitment to this approach to public health (in LDCs) in a policy statement published in March of 1980:

> AID strongly encourages governments to concentrate on achieving high coverage of low-income people with low-cost, locally available basic health care services rather than through support and promotion of high-technology, mainly curative systems, which reach principally the urban and affluent [population]. (53)

At that time, AID assistance was primarily focused on construction and rehabilitation of PHC facilities, acquisition and distribution of key commodities for PHC operations, and some training. Also, resources were expanded in the development of materials for training of PHC workers and public education on subjects like oral rehydration and family planning. Others were used to stimulate local manufacture of hardware.

Attention to PHC management development, i.e. development of the capability to plan, implement, and evaluate PHC programs, was limited to two facets of "planning": intersectoral program development, and limited training in program design and evaluation. For the most part, health planning was promoted through financing training of LDC officials in MPH programs at U.S. universities.

By 1982, AID began to recognize the need to shift emphases from facilities construction and commodities distribution to subtler influences on program success:

> ...the most critical deficiency in health care delivery in LDCs today is not absence of buildings or equipment, per se, but rather the weaknesses and inefficiencies of overlapping health systems that are unable to deliver and sustain basic health services to the bulk of the population. (54)

Policymakers began to consider shifting priorities to mechanisms which would be effective in promoting a selective primary health care

approach, with strong emphasis on management and financial viability--specifically, better management and administrative systems for PHC projects, greater private sector involvement, more systematic assessments of alternative health care options, careful consideration of long-term economic costs, and development of appropriate financing mechanisms to ensure some user support for the health care system.

In August, 1982, publication of an AID-funded evaluation of 52 PHC projects from around the world, by the American Public Health Association, reinforced the trend in AID's evolving health sector policy. (62) It detailed a number of pertinent obstacles to the success of PHC projects: centralized administration of PHC projects, inadequate community health worker supervision, weak management capabilities, underestimated project costs, vague project plans, overly complex evaluation and information systems, inflated project targets, and unrealistic project schedules. Problems with facilities and commodities related largely to drug distribution. By far the majority of problems with the 52 PHC projects dealt with management infrastructure. This analysis led the APHA to recommend large increases of AID resources for training of mid- and high level PHC managers in all aspects of management and administration, and more rigorous financial analysis of PHC opportunities and constraints at all levels of health management in LDCs.

By the commencement of this health planning model evaluation, October, 1982, AID circulated, among the missions, a draft version of a new health sector policy. It did not change the basic objective of AID in the health sector, viz "...to help developing countries become self-sufficient in providing broad access to cost effective preventive and curative health services directed at the primary causes of mortality and morbidity in LDCs." (50) Nor did it shift emphasis away from the PHC mode of service delivery. But it did shift resource priorities away from construction and commodities, and onto management infrastructure development:

> AID's health program assistance will concentrate in future years on:
>
> -- Improving the cost effectiveness of health programs through improved program design and management;
>
> -- Promoting self-financing of health programs; and
>
> -- Increasing biomedical research and field testing in LDC settings. (50)

Through ten years of support and observation of PHC projects AID observed that many of LDC governments' problems with health sector resources and policies originate with inadequate information and analysis of national health needs and capabilities to satisfy them. LDC health infrastructures ignored issues such as demand for health services, costs, revenue generation, and coordination of services.

15

> Without capable institutions to provide information and analysis on the appropriate mix of health services and on optimal resource allocations in the health sector, progress in improving health conditions in LDCs will be slow, and costly inefficiencies will proliferate. (50)

AID's new strategy will focus on analysis of health services demand costs and effectiveness--and transferring these analytical capabilities to LDC health managers. The new policy asserts that the first step for critical health planning in LDCs is identification of health problems which contribute most to mortality and morbidity in each locale of the country. The second step is identification of the health interventions which are most efficient and effective in dealing with priority health problems.

Therefore, AID's evolving focus on health will require more epidemiological expertise for diagnosis of disease patterns and problems, expertise in conducting comprehensive inventories of available health resources in the public and private sectors, improved economic and financial analysis, expertise in analyzing health service demand and utilization rates, and expertise in planning and administering basic, applied, and operations research in health.

AID assistance for promoting the design of economically and financially viable health programs will include projects like the following:

- -- Analysis of budget flows in the health sector
- -- Demonstration programs to determine the comparative costs of alternative health approaches
- -- Training for health planners and middle and local level statisticians and information specialists
- -- Strengthening the health planning capacity of regional institutions
- -- Technical assistance in operations-oriented epidemiological assessments, special studies, surveys and analyses
- -- Technical assistance in economic analyses
- -- Assistance in the acquisition of commodities associated with health program planning and design functions
- -- Technical assistance for operations research to determine costs and impacts of alternative health interventions
- -- Training for middle and high level managers in all these technical areas, and training of trainers (50)

This is the health sector policy context in which the Health Sector Resource Allocation Model (Model) is evaluated. The Statement of Work for this evaluation (APPENDIX B) specifies that we evaluate the potential usefulness of the Model, "...as one instrument for implementation of AID's emerging health policy; and...recommend the most useful applications of [the Model] for increasing the effectiveness of health programs through improved program design and management."

Therefore, the evaluation team sought evidence of the Model's capability for facilitating the kinds of activities and projects which will be assisted by AID resources in future years--as itemized above. At the outset it has to be observed that the policy context is ripe for kinds of planning assistance which the modeling project promised to deliver. It is certainly more appropriate than it was when earlier emphases were on facilities construction and commodities.

It remains, however, to assess the Model's efficacy and identify the most effective role for it, if any, in light of AID's evolving health sector policy.

17

4. THE HEALTH SECTOR RESOURCE ALLOCATION MODEL

> *The purpose of the...research activity is to make it possible to give reasonable and documented answers to health sector policy-makers when they ask questions about the likely effects on health status of particular shifts or increases in resource allocations among programs. (17)*

For purposes of this project, a "model" is a method of representing a complex set of relationships in a simplified manner. In this case the relationships to be simplified are among three classes of variables:

- -- Population at risk and their rate of utilization of health services;
- -- Diseases and their attack rates; and
- -- Health program alternatives, their effects on health, and their costs.

Quite obviously the range of relationships among these three classes of variables is large and complicated. For example, various diseases have attack rates which differ for various ages of the population. Various health programs influence diseases differentially. Various ages of the population respond differentially to health interventions. Actually, among all these variables, costs of health programs are the easiest to understand; at least they are less variable. Costs are ascribed to the materiel and services which comprise a health program. They include fixed, variable, one-time and recurrent costs.

To allocate national resources for health, planners have to understand how all these variables relate to each other. First, they have to develop a disease profile for their country. This lists the prominent diseases, their attack rates for each age group of the population and the average yearly losses to this disease (days of disability and deaths).

Then figures have to be generated which tell the variety of treatments sought by the afflicted population, the percentage of the population seeking each one, and the relative treatment effectiveness. All of this work is time-consuming.

Once the relevant rates have been derived, and existing mortality and disability (by age-class and disease) calculated, hand-calculating health status changes effected by one intervention on a single disease takes from four to eight hours. The effects on 10 diseases of a single intervention require from 30-40 hours.

Therefore, a method is needed to simplify and speed the process of calculating the relationships among these variables. Mathematics and computer operations make such a method possible. The University of Michigan computerized Model can run health effects calculations for 30 diseases, at various budget levels, for numerous interventions, or combinations of them, in a matter of seconds. If it provides any validity at all, then it has to be considered an improvement over the virtually impossible process which faces planners who try to do this without such tools.

The Health Sector Resource Allocation Model is designed to help national health planners in LDCs analyze the relative merits of various resource allocation strategies in the health sector. It helps them anticipate the most probable costs and health effects of a variety of health program strategies. It is not a decision model (known in modeling circles as an optimization model), i.e., it does not tell planners which among a variety of strategies is best While theoretically possible, such an optimization model is impracticable because of the much wider range of factors required to make it work (like political pressures and personal predilections of the country's leaders). The Model aims at "...rough predictions of consequences of alternative policies." (17)

The Model is actually comprised of two major operations development of input coefficients, and computer-generated outputs. On the input side planners must develop numerical values ("coefficients") for disease attack rates per age group in the population, treatment rates and expected effects of treatment. Numbers must also be developed which represent the costs of health program components.

Data for these estimates come from a variety of sources. Any nationally aggregated data (frequently collected by the Ministry of Health in an LDC) can be a source of some of these calculations, and they can also be used as external criteria of validity for estimates derived in some other manner. Other sources include epidemiological studies, small-area surveys, special studies and research projects. But the most common source of these estimates are judgments of experts, epidemiologists, environmental health scientists, medical care analysts, health officers, medical practitioners and economists. Their estimates can be developed through a variety of consensus-building techniques.*

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*It is at this point that some methodological purists call foul--indicating that expert judgment is no substitute for scientifically derived facts. That is a useful argument when planners have the luxury of a choice. But faced with a paucity of scientifically derived data, even the consensus of experts must be considered a luxury, and the level of effort to obtain such consensus (time and costs) is far less than that required to implement scientific researches.

Computer calculations based on these input coefficients follow rules detailed in a set of mathematical formulas. They comprise the symbolic representation of relationships among all three classes of health planning variables. The Model incorporates simple additive formulas, i.e., mathematical formulations which assume that the net effect of a health intervention strategy is equivalent to the sum of effects of its individual components. Similarly, the total costs of a health strategy are equivalent to the sum of the costs of its component parts. From those two outputs a cost-effectiveness ratio can be developed for any particular health strategy.

The Model actually derives three special outputs from those two simple calculations. First, tables of expenditures show probable health effects of program alternatives funded at a variety of budget levels. Second, a graphical presentation shows the particular combination of program alternatives which will probably be most effective in reducing mortality and disability days, at static budget levels. Finally, a special calculation can be used to show which outputs are most sensitive to the validity of assumptions made during the input process. This serves as a warning to planners to: (1) be as certain as possible of those particular input coefficients, (2) accept those particular outputs with caution, and (3) focus available research resources in those areas in order to improve the validity and reliability of input coefficients. When the ranking of the preferred program is sensitive to changes of the input assumptions, then research to improve the accuracy of these inputs is indicated. Where ranking is insensitive to changes in assumed input values, within a reasonable range, greater precision is less important. (1)

Finally, a word about operation of the Model. It was developed on a large research mainframe computer at the University of Michigan. The operating language there is Fortran IV. However, that kind of hardware and software capability is not a prerequisite to its use. The Model is currently being used on a portable microcomputer (Osbourne I) in Indonesia, with BASIC as the operating language. The greatest level of effort in implementing the Model is the development of coefficients as input. As we will discuss, this is generally because these data are rarely available in valid or reliable form in LDCs. They therefore require a combination of surveys, documentary research, expert consultation, group consensus development and data analysis. All of these capabilities, however, are available in LDCs.

5. APPLICATIONS OF THE MODEL IN LDCs

Introduction

Ultimately, the value of the Model for furthering AID goals has to be tested in LDCs. The University of Michigan development grant mandated pilot work in Pakistan, Ghana, Indonesia and Egypt. But international political events precluded the Pakistan applications. Some of the most innovative research with the Model was commenced in Ghana before political machinations there curtailed further work. The Ghanian efforts are described in APPENDIX F. They do not comprise a significant component of this evaluation. What remained for our scrutiny was University of Michigan work in Egypt and Indonesia. These efforts are briefly described below.

Applications in Egypt

The bottom line is that the Model has never been applied by Dr. Grosse or his Michigan associates in Egypt. This finding appears to fly in the face of assumptions held by AID officials in Washington and Cairo. It is a confusion which jeopardizes some real potential for productive applications of the Model, to further AID health sector goals, in Egypt.

A number of Egyptians have studied national health planning at the University of Michigan. There, the curriculum revolves around pedagogical applications of the Model. Significantly, one of those students, Dr. Helmy El Burmawy, Director General for Planning, Ministry of Health, became quite proficient with the Model. Further, he became, through this experience, quite supportive of the modeling purpose and approach. If Egypt ever needs a local champion of this technology, it would have to be he.

Further, many AID/Cairo officers are very familiar with Dr. Grosse and members of his research team. Most of them are also at least aware of his interests in modeling, though only one officer has an intimate knowledge of the technology. The unfortunate finding was that most Mission officials who are familiar with the Michigan team's purported capabilities reflect considerable ambivalence about their value for health planning in Egypt. This attitude was conditioned by a number of events and interactions, none of which involved modeling, *per se*.

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In the late 1970s, the Mission commenced a Health Sector Assessment in Egypt. It was designed to guide the Mission in its health sector policies and program support for the foreseeable future. At the encouragement of Mission officials, Dr. Grosse proposed to pilot the Health Sector Resource Allocation Model in Egypt. But a number of factors like costs and Mission priorities precluded acceptance of that proposal. Instead Mission personnel asked Dr. Grosse to conduct a smaller study of financial flows in health, particularly in the private sector. This project did not involve modeling technology.

An amendment to Dr. Grosse's original grant for development of the Model authorized more funds (some dollars and some "soft currency") for the financial flows study. This may be one source of the confusion about Model applications in Egypt. In fact, the Modeling grant was amended to obligate funds for the financial flows study, but the study had nothing to do with the Model development process.

Ultimately, the Michigan team completed the financial flows study--unfortunately after its principal Mission protagonists had rotated out of that Post. Further, various communication breakdowns between the University team and the Mission throughout the conduct of that study, plus timing and coordination errors between the financial flows study and the Mission's larger Health Sector Assessment, inhibited good rapport and credibility between those two organizations. An intervening factor may be considerable "burn out" among Mission personnel on the whole health assessment question--a condition precipitated by the sheer level of effort required by the Health Sector Assessment.

This was the context in which we interviewed Mission personnel. about possible applications of the Model to health sector planning in Egypt. We now feel that any efforts to work there with the Model should be preceded by a fresh presentation of what the Model is, what it can do, and what purposes can be served by further research in Egypt. We would discourage any attempts to apply the Model there as long as ambivalence toward the University of Michigan dominates Mission attitudes.

It was interesting to observe that such ambivalence is not shared by the Egyptians to whom we talked. This is, in part, because a number of them have studied with Dr. Grosse at the University of Michigan, and they have seen what the modeling technology has to offer. It is also because a number of them were involved in data development and analysis for the financial flows study. This is not to suggest that they are all in agreement with the study outcomes--in fact, a number of them disagree with portions of the final report. However, the majority who have any awareness of the modeling technology, feel it has a role in Egypt for upgrading the planning and cost effectiveness of health sector programs. This is why we feel that it is important for the Mission and the Michigan team to develop a new basis for rapport.

37

Applications in Indonesia

The original Michigan grant provided mandate and resources to conduct some exploratory modeling activity in Indonesia. Later, an "add on" authorized more work there. None of the modeling activity in Indonesia required special financial arrangements with the Mission.

The original grant provided funds sufficient for the modeling team to develop coefficients from health status and service utilization data. These data were generated by a household survey, conducted by the Center for Health Services Research and Development, in Kabupaten Tulungagung. It led to a report which received wide circulation in the Indonesian health management community, and which still serves as the best primer on the Model: "A Health Development Model: Application to Rural Java."

Additional work has been completed by Dr. Berlian T. P. Siagian of the National Institute of Health Research and Development. Dr. Siagian studied health planning at the University of Michigan and received stipend from the School of Public Health to complete pilot applications of the Model in Indonesia. Focusing on data from the Bogor area, he reported results of this activity in the form of a dissertation, in June, 1982.

Another significant application of the Model technology was completed by Mr. Robert Tilden, once a doctoral student at Michigan, and currently Country Director in Indonesia for Helen Keller International. Working with Dr. Hapsara, Head of the Bureau of Planning, Ministry of Health, Tilden assessed the resource implications of four alternative health program strategies, phased to the year 2000. Their report has also received wide distribution and the Bureau of Planning frequently uses it to showcase the new technologies available in the Ministry: "Resource Requirements and Health Impact of Select Health Care Packages in Indonesia Between 1981 and 2000."

These modeling activities have generated other interests in modeling, in Indonesia. Dr. Budiono of the Center for Health Services Research and Development examined costs and effects of two alternative approaches for organizing, staffing and promoting an immunization program (without the aid of the Model). The Office of Health, in the Mission, is examining the possibility of applying the Model on behalf of another proposed immunization program. Dr. Anhari Achadi, Vice Dean, School of Public Health, University of Indonesia, has begun consideration of a resource allocation course in the public health curriculum. It would use the Model primarily as a teaching device. Other interests are evolving at the present time.

6. TECHNICAL CHARACTERISTICS OF THE MODEL

Level of Scientific Rigor

> *Part of the plan for practical use of functional models to inform public decisions is that input data be as current and accurate as possible. Ideally, this would be derived from an ongoing sample survey to monitor rates and numbers relevant to the Model. Few applications of the Model, to date, are based on quantitative data from such a survey. But the estimates generated are felt to be the best approximation attainable, as a starting point. (27)*

The Model was designed to process planning data without (1) the prerequisite for scientifically rigorous health surveys, or (2) external criteria for the validity of assumptions made about relationships between health program alternatives and their effects on the population. This was necessary because neither exist in LDCs. (This is not to say that rigorous data are undesirable or that the Model could not operate with them.)

Instead, the approach operates on input data derived from model life tables, studies done on similar populations, and special techniques developed for estimating demographics and health measures from incomplete data. Critical assumptions about the relationships between health programs and their effects are derived from data generated by other studies and discussions with physicians, public health administrators, and epidemiologists.

This is the arena in which the modeling activity is most vulnerable to methodological criticisms. Critics have already leveled the charge that partial, or invalid, input data leads to inaccurate results of highly questionable value. (Systems analysts long ago coined an acronym for this condition--GIGO: garbage in, garbage out.) Methodological purists are, therefore, likely to be disappointed in the outcomes of this modeling activity because the validity of input data is not assured by rigorous epidemiological and costs surveys.

We hasten to emphasize that their initial disappointment is in the unavailability of quality data for health planning in LDCs--a disappointment with which any dedicated development specialist would sympathize. However, a few critics go one step farther in charging that the modeling activity should not have been attempted unless and until sufficient data is available in LDCs. This assumption separates the purists from the pragmatists.

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Among methodological pragmatists associated with this effort, we found none who were either naive about the quality of health planning data available in LDCs, or about the desirability of relying on the best information available. Indeed, from the outset, the Michigan team asserted that (1) high quality data were largely unavailable in LDCs, (2) modeling activity would rely on the highest quality data available, (3) every effort would be made to improve the quality of input data within the limits of resources and techniques, and (4) special analyses of modeling outputs would be used to temper planners' reliance on results which were most sensitive to the quality of input data.

In sum, an evaluation of this modeling effort is not designed to determine whether the results of modeling in any LDC are valid, per se. Practical data limitations in LDCs mitigate the wisdom of spending resources on that evaluation question. Instead, the current evaluation focuses on the question of whether (and if so, how) LDC health managers' deliberations and decisions are enhanced through the application of this modeling technology--more specifically, by the integration of information on the relative resource requirements of various health program and policy alternatives. We are evaluating an assumption which is a priori to development of the Model.

> While the objective may sound unrealistic, given the pervasive ignorance of many critical data and relationships, we believe that improved information may be derived from the piecing together of much of what is already known. Many useful control totals do exist, or can be generated from demographic techniques which do not depend on either complete registrations or scientifically designed sample surveys. (17)

Validity of Input Data

> *Numbers are necessary in the elaboration of any health plan, but they should be used with a judicious consideration of the degree to which they can mislead, as well as inform. (10)*

That was said by Dr. J. Jarrett Clinton in 1978, and it never fit any application better than it does the Health Resource Allocation Model. Numbers are "misleading" in that they seem so definitive. There is little room for ambiguity in a number.

The Model relies upon, manipulates and generates numbers. The question then arises whether the meanings, interpretations and implications ascribed to them are as definitive as the numbers themselves. The answer is unequivocally negative. Therein lies the problem. A naive user may put more stock in the Model than is justified by the quality of the information and assumptions which were converted into numbers.

But wherein lies the error: in the user's assumptions about the value of numbers, or in the Model which relies on them? We assert the former, and not the Model. From the outset, Model developers warned about the problems of invalidity of input data and hence, outputs as well. In the report of applications in Java, Grosse wrote that data about the effects on health of alternative interventions "...are controversial at best," even in developed countries. In LDCs national mortality and morbidity rates are incomplete and frequently biased since they derive largely from hospitals in the urban setting. (27)

Therefore, the Model was designed to help planners *analyze* trade-offs among the costs and effects of health interventions--not *generate* optimum health intervention strategies. That is a distinction which deserves reinforcement in all explanations and applications of the technology. It means that the choices among health strategies, the ultimate discriminations, the final decisions, must remain the responsibility of planners who bring far more variables to bear on the question, than can the Model.

Sources from the Ministries of Health, AID and the World Health Organization are unanimous in their low estimates of the validity of the kinds of health data required by the Model. Experience with the Model in Indonesia demonstrated that cost data are the key uncertainty because Model output rankings are most sensitive to them. Questions of data validity notwithstanding, the goal of the Model technology, viz., to provide an analytical tool for integrating resource considerations in national health planning, remains desirable.

In the face of insufficient data, of questionable validity, the Model is designed to accommodate "negotiated data." Negotiated data is derived by any of a number of consensus-building techniques. It relies on the principle of agreement--i.e., if we don't know what is real, at least we can agree on a best guess. If the guesses are contributed by experts, i.e., people who are in the best position to know what is real, then validity may be fairly high. Further, the more experts who agree, the higher the probable validity. Tilden commented about the Java study that negotiated data were derived by a modified DELPHI technique. He added that he was more confident of those figures than he was of some which were derived by a government household health survey completed in 1980.

In our estimation, the use of experts to negotiate data is a legitimate technique so long as adequate controls guarantee equal opportunity for influence on consensus by each expert's opinion. A variety of sophisticated methodologies for consensus-building exist, among which DELPHI is well known.

The Director of Planning in the Ministry of Health, Egypt, pointed out that his planners would have little difficulty deriving agreement about the effects of disease, in terms of deaths and days of disability. However, less initial agreement would be discovered about the effects on health of various interventions. It is possible that in any single application of the Model, external criteria for the validity of input coefficients may not exist. But they should be sought. The Michigan team recommends seeking such validation of even negotiated data. It can be found in the results of related surveys, special studies, aggregated data maintained by the Ministry of Health, or even results of studies and standards developed in other countries.

Finally, the Model was designed to handle problems of validity in three ways. There are built-in mechanisms which permit users to assess the validity of coefficients. For example, two separate methods of calculating the same coefficient better turn up the same result, or the validity of input data for each method becomes suspect. Secondly, sensitivity tests of the stability of output rankings (called "robustness" in methodological jargon) exposes those input variables about which users should be most concerned. Thirdly, the Model is flexible, i.e., any dimensions may be changed and improved as better data become available.

In sum, the validity of input data is always in jeopardy. But that does not mitigate the value of the Model as a tool for beginning to understand the relationships between health resources and program impacts. It does, however, require that those who would promote the Model ensure that new users not only recognize this fact, but also learn the skills for dealing with it.

Validity of Relationships

A similar question has to do with the validity of computer-generated relationships between dependent and independent variables. An example would be variation in the effects on health of a particular intervention strategy implemented at various levels of funding. We have already pointed out the questionable validity of input data on effects of various interventions. Quite obviously, the Model's output cannot be any more valid than the input.

But they are not less valid either. Most of them adhere to internationally accepted norms. Many of them originate on the input side with conclusions from reviews of the literature, survey information, nationally aggregated control totals, and expert opinion. In one case the effects of various nutrition interventions were initially estimated by experts. Subsequent experimentation supported the validity of their estimates.

The key to this issue, like the previous one, is reasonableness. Validity cannot be assured because the Model operates in a highly uncertain world where knowledge of complex relationships is in its infancy. Consequently assumptions about the relationships between dependent and independent variables must be weighed against the disciplined intuition of careful users.

Above all, it is important to realize that nothing inherent in the process of computer data manipulation increases the validity of health variables or the relationships among them. These analytical processes are simply ways to recombine data in order to permit consideration of previously misunderstood relationships The validity of those relationships depends on the users' assurances of validity of input dimensions (during coefficient development) and attempts to seek validation of outputs through experimentation and other means.

The Model does reflect existing relationships with sufficient sensitivity that significant changes are discernable. The validity of those relationships is by no means assured. It must be assessed by users in every case. One of the purposes of the Model is to help planners determine how to spread health resources. Key to this purpose is the assumption that health resources have some impact on the effects of health interventions--that there is some cause and effect relationship between health expenditures and health effects. That is the heart of the Model. It permits the user to assess that relationship.

Further, the Model's rigor elevates this relationship to a causal, rather than strictly associative, level. The Model cannot prove the validity of that relationship; it is only a computing algorithm. Only continued systematic observation of these variables in operation will ever prove, or disprove, the validity of their relationship.

Treating Time as an Independent Variable

Planners have to deal with time variables as both resources and constraints. Strategic planners operate with long-range futures. They need to assess the probable impact of health policies and programs many years after they are implemented. Therefore, the Model needs to provide the capability to treat time as an independent variable. This would permit health planners to evaluate the long-range effects and probable costs of particular health strategies for each year of a given period, e.g., ten years. It would permit them to estimate probable changes in attack rates per cohort group as the effects of intervention strategies are felt, over time. It would permit them to estimate the budgetary impacts of recurring costs and compare them to the increasing effects on health.

29

Planners seek answers to the following kinds of questions: If training is initiated for 100 sanitarians per year, what will be the costs and sanitation effects on health of the population five, ten or 15 years from now? What will be the effects of attrition on this expectation? At what time will the training program have to be enlarged, or decreased, in order to maintain sufficient sanitation standards, at least cost?

Right now the Model does not have this capability. Further, little opportunity has arisen for its developers to experiment with it.* Field tests in Indonesia focused only on current health alternatives with anticipated impacts projected no more than five years hence. The future impacts were calculated by hand. (49) Research needs to continue on this particular capability.

Impact of Extraneous Variables

A variety of factors can influence the health of a population, and not all of them are directly manipulated by planned health interventions. For example, economic or environmental anomalies can intervene on the health effects of planned interventions. These are called extraneous variables because they are not directly manipulated, or otherwise accommodated, in the planned intervention strategy.

The question therefore arises whether the Model can incorporate hypothetical fluctuations in extraneous variables. At the moment, the answer is no. Preliminary research leading to this capability has been done and reported. (14, 15) However, the Model does not yet have the computational capability. The Model does not permit testing the impact on health costs or effects of changes in other sectors. Like the questions of validity, these factors would have to be weighed by the disciplined judgment of the users.

It must be added that the theory, technology and relevant research is available to add this computational capability to the Model. It only remains to (1) develop some level of satisfaction with the Model's current capability, (2) assess the need for expanding that capability to include extraneous variables, and (3) implement the programming activity necessary for addition of this capability to the Model. We recommend it be accomplished soon in order to increase the Model's practical utility to LDC planners.

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*Some preliminary attempts to adapt the Model for this purpose were completed at a time when the Michigan developers were seeking applications in Ghana. A summary description of that work appears in APPENDIX F.

Problems of Economics and Mathematics

The Model was developed by specialists with strong economic skills. Its purpose is to stimulate health planners to incorporate economic considerations in their planning. We observed that the majority of health planners in LDC ministries have medical backgrounds. Further, those with advanced public health training most often focused on epidemiology, more than economics.

This does present a problem insofar as health economists are few and far between in LDCs. However, it does not mitigate the value of the Model, per se. On the contrary, it reinforces the Model's value as a mechanism for sensitizing planners with non-economic backgrounds about the importance of econometric strategies in health planning.

Planners in both Indonesia and Egypt also reflected some discomfort with the quantitative and mathematical characteristics of the Model. Again, they were only manifesting their own non-quantitative backgrounds. We do not feel that this, in any way, mitigates the value of the Model.

However, it does have significant implications for the manner in which the Model is applied. For example, we would recommend that those who would be trained to operate the Model be selected for their general statistical and quantitative orientation to planning, and secondly, that the Model be modified to provide a variety of output displays. Some of them would be tables of data in quantitative form. Others, however, should depict relationships more graphically. Still others should be more amenable to verbal presentation. Thirdly, we recommend that senior planning officials who will deliberate on the output be oriented to the quantitative character of the Model, but they should not be expected to manipulate the mathematics as fluently as operator-statisticians. Instead, they should be trained to interpret and understand the planning implications of Model outputs. They should be trained to present the most meaningful results of modeling activity to politically oriented (certainly non-quantitative) decision-makers at the highest levels of government.

7. SOURCES OF INPUT DATA

Planning Without Information

> *Experience indicates that the upward flow of financial information, from field operations to higher echelons of decision-making, is either disrupted at some layer within the governorate health office, or not required by the administrative superstructure, the Ministry of Health itself. This disruption probably reflects the fact that the kind of planning that the Ministry of Health engages in does not require precise financial information and particularly cost data. (17)*

The paucity of information used for health planning in LDCs is particularly striking in the financial area. But it also applies to more traditional information needs like demographics, health practices, disease patterns, and the like. The Health Resources Allocation Model depends upon quality information for its utility and effectiveness. In settings where systematic surveys and information systems are not available, negotiated data have been tried and proved useful. That notwithstanding, the Model will achieve maximum utility and cost-effectiveness only when quality data become readily available through routine, systematic information gathering and management systems. This deficiency is not sufficient to postpone further development and deployment of the Model. Quite the contrary, the Model can be a very useful tool for sensitizing LDC health planners to the need for various types and qualities of data and information systems. But it does mean that resources have to be expended to compensate in a variety of ways. It also suggests that AID would do well to encourage and facilitate LDC government policy development in support of information management for public health planning.

Government Information Too Aggregated

The Model requires disaggregated data. For example the population at risk is divided into six cohort groups (by age . This is a positive characteristic of the Model; it increases its predictive capability and its capability to discriminate among a variety of health intervention strategies. Unfortunately, however, most government health data is too aggregated. For example, data on health risks usually deal with the population as a whole (rates per 1000 people). The same is true about data on interventions. In Egypt it proved impossible to segregate financial data from family planning and Bilharzia control programs. This is because both are managed at Ministry of Health headquarters, in the governorates, and the financial accounts are combined with similar information on other central administrative functions. (2)

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In order for the Model to be effective disaggregated data must be generated in some fashion. Some may come from other sources, like other donor organizations; special studies may have been completed by consultants, universities, or the World Health Organization, and, of course, negotiated data is the ultimate fall-back position.

Aggregated data have been demonstrated to play a useful role in this modeling activity, as a source for "control totals" against which data derived in disaggregated form may be compared for the sake of validity checks. But, reliable sources of disaggregated data must be found for the Model to realize its greatest potential.

Systematic Information is Increasing

In both Egypt and Indonesia we discovered interest in the systematic gathering and management of health-related information about the populations. The Ministry of Health in Egypt, for example, has recently published the first report of a nationwide health profile assessment. (37) It includes a sample survey, epidemiological study; a health examination survey; and a health facilities inventory (census). The GOE is considering routine updating and periodic renewal of such health assessments. However, the level of effort involved may stem that interest. In Egypt the government has also recently published a final report on a study of urban health needs. (39) It too will play a major role in health planning. However, if the mechanisms organized to generate these data are not institutionalized through a minimum of information policy and program development, it is unlikely that systematic information and data will become available for routine planning tasks.

Similar developments are taking place in Indonesia. A variety of data and information systems were discovered there. The government recently completed a household health survey which may be recycled every five years. They also operate a variety of information systems in the health sector: Hospital Recording and Reporting System (diseases, utilization rates, deaths and disabilities), Health Centers Reporting and Recording System (same as for hospitals), Health Manpower Information System (supply, demand and employment), and Family Planning Information System (births, nutrition, contraception usage). In both countries decennial censuses provide some useful data and could be designed to provide more. But again, there is considerable need for information policies and program management commencing with the Ministry of Health and filtering down to the local level of health operations.

Quite obviously, the advent of health data gathering and information systems like these in Egypt and Indonesia augur well for the potential of a highly information-dependent analytical tool like the Model. In fact, applications of the Model in Indonesia and in Michigan with LDC planning students increased planners' awareness of the need for better

data. We recommend that the Model's potential utility for health planning be used in support of AID efforts to stimulate health information policies and programs in LDCs.

Deficiencies in Cost Information

Cost data is the weakest in the health sector. That provides a considerable handicap for users of the Model because analysis of resource absorption is the major contribution it makes to health planning. The problem in Egypt starts at the facility level where no expenditure accounting takes place. Expenditure accounting commences at the governorate level, and there we encounter the problems of too much data aggregation.

Indeed, cost data for any single intervention program cannot now be disaggregated from the total health budget in Egypt. The Egyptian family planning program functions without a separate budget Egyptian officials acknowledge that they cannot disaggregate family planning expenditures from the comprehensive health budget. As one ex-official and financial analyst commented, "...this cannot be dismissed as a trivial administrative matter....To do so would be to ignore the critical role of budgeting in making it possible for public agencies to obtain greater efficiency in their use of governmental resources." (53)

It also places considerable burden on Model users to get creative in developing cost coefficients for input to the Model. Currently, Model support documentation does very little to tell users how to overcome data and information weaknesses like these. We recommend that some effort be made to develop, test, and standardize some relatively simple procedures by which LDC users of the Model could compensate for cost data deficiencies. Some cost standards (or rules for developing them), programmed instructions, checklists and procedures for developing the cost coefficients would strengthen the Model package considerably.

Data on Private Health Resources

Data on health resources in the private sector are rarely available in LDCs. The first place to look would be in the Ministry of Finance which might collect some data through its licensing authorities. Government tax data are usually of little value. The World Health Organization and the World Bank may have completed some studies of private sector resources in some LDCs. Otherwise ad hoc studies must be sought.

Methodologies and interest in examining patterns of expenditure in the private and public sectors are increasing. After all, private sector resources contribute to the national resource base for health care. Again, the Model may be a useful mechanism for increasing that interest among LDC health planners, and for stimulating initial studies. Further, it would be useful for monitoring resource flows in the private sector.

8. IMPACT OF THE MODEL ON HEALTH SECTOR MANAGEMENT

Impact on National Public Health Plans

Indonesia is the place to look for real Model impacts on national public health plans because it really was not applied in any other country.* A number of observations can be made about the Model's impact there. For example, it had the enlightening impact of simulating for health planners the long-term costs of intervention strategies due to recurrent charges. This awareness reportedly caused them to reexamine a proposal to put volunteer village health workers on a salary program. (49)

A 1979 report on applications of the Model to data from East Java contributed to the Ministry of Health's recent emphasis on nutrition programs. (27) In general the Model has effected an increased awareness of the costs of health programs. This has reportedly resulted in Indonesia's allocation of resources to "cheaper" intervention strategies which had once been shelved in favor of some which had higher prestige value, as well as higher costs (like hospitals). Such interventions as immunization and village health care programs have shown large increases in resource allocations since the Model focused on them.

In 1981, Tilden hand-calculated long-range projections for program priorities to the year 2000. These results have been used extensively by Ministry of Health officials, including reproduction and reissue of output tables, and presentations at international health planning conferences. (49)

LDC Approaches to Health Planning

In both Egypt and Indonesia we observed characteristics of health planning which are probably fairly typical of LDCs elsewhere. They are raised here because they provide a picture of the planning context in which the Model must operate.

Top-level government planners propose health resource allocations on the basis of two criteria: (1) incremental increases, and (2) validity by impression. These terms were coined by Egypt's Director General for Planning, Ministry of Health. By incremental increases he meant that planners assume each budget item should receive an increase in allocation, each year. In other words, there is very little consideration of the continued need for the item, its relative performance over the past budget year, or its priority in light of competing needs for the same resources. The size of the incremental increase is largely determined by the "best judgment" of the planner, that is, validity by impression. In other words, the decision is not made on the basis of

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*As Chapter 5 reported, Model applications in Pakistan and Ghana were prematurely terminated, and it never operated at all in Egypt.

Previous Page Blank 34

cost analyses, much less considerations of cost-effectiveness. Of course there are exceptions to these observations--but they are few.

A former senior finance officer of the Ministry of Finance analyzed Egypt's budgeting processes in the health sector. He identified another problematic characteristic of health planning in LDCs, viz., health planning is largely undertaken on a short-term basis without any formal funding commitment at a national level. Without a funding commitment, little attention is paid to the health planning process. But even with financial resources, planning has little meaningful impact when conducted primarily in the short term. (52)

Finally, a Director of the National Institute for Planning in Egypt pointed out one last characteristic of health planning which influences the relative efficacy of the Model. He indicated that there is very little top-level appreciation of the social and economic impacts of health planning decisions. By "appreciation" he meant basic understanding. He mentioned that the National Institute for Planning has, therefore, organized a division which will provide training in the social and economic impacts of research and policy for senior government bureaucrats.

We mention these characteristics of the environment for health planning because we feel that they are fairly typical of LDCs, and that they are the context in which the Health Resource Allocation Model is supposed to aid health plans and planners. What impacts the Model can possibly have under these conditions is another question.

The answer was surprising to us. We learned that the Model can have a variety of positive effects on planners, if not on plans. We can surmise that improved planners would eventually generate improved plans.

Combating Traditional Methods of Making Resource Decisions

The First Undersecretary of the Ministry of Health, Egypt, pointed out that Model users have to combat political, cultural and traditional decision-making methods if they expect the Model to impact national health plans. He said the real question is, "...how far various political levels are willing to go in adopting scientific approaches to health planning and management."

An official of the Inspectorate General of the Ministry of Health in Indonesia had a related experience. Trained on the Model at the University of Michigan, this official recently developed a cost analysis of alternatives for a water supply project. The work was reported to regional officials who made their final selection "...based on the prestige motive, not costs!" But, he added, "...at least we got a compromise so that their decision was closer to the outcomes of our study than it would have been if we had not presented our cost analysis."

From these comments and experiences we gain two insights into the Model. The first is that it is unwise to evaluate the Model solely on the basis of its impact on national health plans. We must also examine its impact on the technical approach and methods of health planners. For most of them the Model presents a revolutionary technology--not only in its integration of econometrics in health planning, but also in its quantitative approach to all health variables.

Secondly, the technology of the Model is probably so foreign to the skills, interests or predilections of senior health officials that it should probably not be presented or discussed, per se, while users are seeking decisions based on its results. The highest level health resource decision-makers need not understand what went into the output calculations, much less what the model is or how it works. They do need to understand, on the other hand, the meaning and significance of the principal results from the Model's application and the accompanying hypotheses. Clouding the issue with technology that is totally foreign to these decision-makers can only mitigate the effectiveness of the Model's results in influencing their resource decisions.

Introducing Econometrics to National Health Planning

In some respects, the concept of economics in health planning is not new to the LDC planners we met. Their current planning activities are targeted on financial decisions. Further, they are bombarded by financial realities which make it very difficult to deny that economics must play some role in health planning.

The Director of Planning in Egypt described their economic pressures very clearly. He said that the rate of increase in costs and demands for health services, owing to inflation and population growth, is exceeding the Ministry's ability to pay for them. As an example he said that ten years ago it cost the equivalent of $6,150 to build the structure and support needed for one hospital bed. Today it costs the equivalent of $77,000. He added that in order to provide two beds per 1000 population, (by the year 2000) the Ministry needs to increase beds at a rate of 2005 per year at an annual cost of $154,385,000. He concluded that all of this provides "increased pressure" on planners and higher level decision-makers to consider economic criteria in health planning.

In other respects the Model presents a very new view on the relationships of economics to health problems and interventions. Health planners are generally not familiar with displays which show the impact on health of financial resources.

We suspect that that condition prevails in most LDCs so that it is not a question of whether it is appropriate to consider economics, but one of how such considerations should be integrated into more typical approaches to health planning. For a donor agency it is a technology transfer problem. That is certainly the attitude of the Egyptian director of health planning. He, too, was trained on the Model at the University

of Michigan. He states unequivocally that the Ministry of Health is interested in incorporating economic analyses in health planning. Therefore, he is cooperating with the school of public health, at the national university, to develop "economic seminars" for a health planning curriculum. This introduces the idea of a role for the Model as a device for technology transfer, if not national health planning.

Planning With Medical Practitioners

We observed in both countries that most of the decision-makers and planners in the ministries were originally trained as medical practitioners. They bring to their bureaucratic tasks considerable compassion and interest in medical problems of the population and the medical technologies designed to deal with them. As one informant in Indonesia said, "Medical managers in the Ministry of Health are not interested in resource allocation processes or decisions; they are interested in primary health care models."

This is another manifestation of a problem in technology transfer. What is a role for the Model in teaching and motivating these officials to shift their approach to health planning from compassion to analysis--from intuition to quantification?

Since 1975, the University of Michigan, School of Public Health, Department of Health Planning and Administration, has trained 107 mid-level foreign health planning officials from 37 LDCs. Most of them worked with the Model. In 1981-1982, the Department surveyed these alumni for some general reactions to their training at Michigan (this was conducted for purposes of an internal assessment of curriculum priorities). Data from this survey was made available to this Model evaluation team. APPENDIX E presents our brief overview of the results. The main point we want to make here is that fully half of them (50 percent) claimed that the econometric approach to public health planning was the "main value" of their experience at the University. In other words, the Model did have some impact on these bureaucrats, most of whom were originally trained as medical practitioners.

This conclusion was confirmed throughout our discussions in Egypt and Indonesia. Almost all informants said the principal value of the Model was its effect of sensitizing users to errors in their assumptions about health dimensions. Dr. Grosse summarized eight years of working with these people: "Use of the Model to develop health priorities reveals major misconceptions these officials have about (1) the incidence of disease in their own countries, (2) the real effects of various interventions, and (3) their own peoples' utilization rates for treatment services."

National-Provincial Linkages for Health Planning

Most of the resources and mandate for health planning reside at the national level in the Ministry of Health, to the extent that they exist at all. Health resource decisions are virtually dictated by top Ministry planners. to provincial level Ministry adminstrators. Further, as noted earlier, this activity takes place in a vacuum of meaningful, disaggregated health data.

On the other hand, facility level data on disease attack rates, treatment utilization rates, and costs are usually combined (if they are collected at all) at the provincial level. Therefore, the Model's deployment as a tool for planning must encompass both levels--facilities for data but the Ministry for analysis and plans.

Another reason to use the Model at this level is that the provinces frequently vary considerably in their health-related problems and resources. Predominant diseases vary, populations and demographics vary, health services vary, and this is to say nothing of possible cultural differences.

Application of the Model at the national level has a tendency to reduce its capability to discriminate meaningful differences in the cost-effectiveness of health intervention alterratives in the various provinces. Therefore, we recommend that the Model be packaged for deployment, at least down to the provincial level in LDCs. If that structure is in place, then it would have additional value deployed at the national level. Not only would the Model then begin to generate provincially appropriate health planning alternatives, but it would also begin to create a common vocabulary and data base--a common decision-making process, but not common decisions--between provincial and national offices of the Ministry of Health.

Research Impacts of the Model

The Model appears to generate considerable interest in health planning research and development activity. One Indonesian planner pointed out that derivation of the coefficients for a particular country usually requires considerable research activity. It may take the form of documentary research, consultation or surveys. Usually it requires all three. But the point is that the research activity itself goes a long way toward educating and motivating Model users to implement the new technology, to seek opportunities for improving data and information systems, and to track vital health planning variables.

An official of the national planning institute in Egypt indicated that he would like to have access to the Model so that two of his staff health economists could research a variety of health planning questions. He pointed out that each ranking of alternative health intervention strategies, by the Model, is really a list of hypotheses which remain to be

tested. Further, as they are tested, the capabilities of the Model to aid planning can be strengthened. In other words, there is a mutually facilitative relationship between use of the Model for planning purposes and research on health planning issues. Each can serve to improve the quality and results of the other. This suggests possible deployment of the Model in an organization which has research, as well as planning capability.

Dr. Grosse has recommended that the Model be used in Indonesia as an instrument for financial research and development. He suggested that it would be invaluable as a tool for formulating appropriate cost analyses, developing cost-estimating relationships, designing systems and procedures for reporting and estimating costs of health interventions.

The Model's principal value as a tool for research is its capability for pinpointing major areas of uncertainty among the health variables. This permits policymakers and planners to focus research and other efforts to reduce them.

Model's Potential as a Tool for Monitoring

Up to this point we have discussed the Model's impact as a tool for planning the allocation of health resources. Additionally we noted that it apparently has considerable impact as a tool for transferring the technology of econometrics to LDC health sectors. The question remains whether it would also be useful for the processes of monitoring and controlling the expenditure of health resources.

The answer has to be a qualified yes. If the Model is useful as a long-range planning tool, then its principal value is its capability to predict the degree of association among health variables (future) on the basis of observed (past) values. Since there is a degree of risk in any predictive activity, the Model also pinpoints, or directs, health managers' attentions to those health variables which must be monitored and controlled most closely, i.e., those which have the greatest influence on the effects of health interventions.

Secondly, as the program of resource expenditure is underway, the Model should be loaded with real expenditure rates, health utilization rates, observed intervention effects, etc., so that the predictions may be tested, verified and adjusted as indicated. Monitoring of these rates is not a planning activity, per se. But it is a vital first step if the Model is to be used to verify, or alter, the planned expectations of health managers. In effect, the Model is used to monitor the resource allocation plan, and adjust it as required.

In 1982, an Indonesian Ministry of Health official published his doctoral dissertation which was based on work with the Model in the Bogor District of West Java. He used the Model to monitor utilization and demand

for health care services. These data were ostensibly used by the Ministry to develop the health plan for this district. (46)

The Model can be used in this same manner to monitor data related to any particular set of health interventions. It can be used to assess income levels and community expenditure patterns for health care in a number of areas of priority importance to AID: hospital services and commodities, health post or dispensary services and commodities, family planning services and commodities, drugs, health provider salaries, water supply and sanitation services, transportation for health workers, and supervision for PHC facilities.

The important thing to remember is that the Model does not actually measure these rates. That must be accomplished by other mechanisms. The Model serves as a filing and analytical system for these monitoring data. It helps program monitors understand what is meaningful about these values. It can be applied to any health intervention service or commodity as long as it is one for which managers can derive data on utilization rates, health effects and costs. It is a tool to apply to such health service priorities as: growth monitoring and nutrition education, prenatal screening, training of mothers in rehydration, family planning information and services, basic immunization of infants and children, and emergency treatment of injuries. All of them are principal components of AID's new health policy.

9. TRAINING POTENTIAL OFFERED BY THE MODEL

Needs for Training

> *Almost all elements of planning are lacking. There is lack of awareness about health needs, limited availability of trained personnel, insufficient budget to experiment with innovative planning exercises, lack of organized data, and the uncertainties of political climates. (46)*

An Indonesian official said this about the environment for health planning in his Ministry. It is a condition which obtains in most LDCs, to a greater or lesser degree. It raises the question whether a management tool as sophisticated, and foreign, as the Model really has a chance to impact health planning significantly in these countries.

The answer generated by our visits to Egypt and Indonesia has to be, "Yes, eventually." But, strangely enough, we think that impact will come quicker in most cases if the Model is deployed initially, not so much as a tool for planning, but as a tool for training health planners. One way of looking at it is that the best planning tool in the world will not have a significant impact if users are not familiar with, and confident of, the technologies embodied in it. The Model's director of development made a similar observation in commenting about the training value of the Model in curriculum at Michigan: "No one wants their decisions prescribed by a process which is not intuitively meaningful to them."

Another way of looking at it was phrased by a director in the Institute for National Planning, Egypt: "Training has to be a first priority since adequate planning cannot be done without the skills." He added that priorities for planning training in his institute were skills in identifying data needs and developing systems to generate them, quantitative approaches to planning, and integrating financial analyses in health planning. Quite obviously, those are knowledge areas which lie at the heart of the Model.

As a planning tool the Model has a vital role in determining public health goals, policies and programs. But an earlier priority for the Model may be in training and motivating health planners to base their plans on empirical observations and to integrate cost data.

Purpose of Training

We recommend that the Model be "packaged" to facilitate training for the purpose of increasing LDC public health planners' awareness and skills in: (1) identifying data needs and developing information systems

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for fulfilling them, (2) applying quantitative techniques to planning, and (3) integrating financial analyses in planning.

Dr. Clinton identified nine elements of the health planning process: identify health problems for which planning is necessary, develop information necessary for planning, analyze opportunities and constraints, design and specify programs to overcome problems, develop criteria for selecting policy or program alternatives, develop standards for effectiveness of selected alternatives, assess timing, implement the policy or program, and evaluate, review and revise. (10) This would be an excellent framework in which to develop the Model for training purposes. It has a role to play in facilitating each of these nine planning operations.

The training should be aimed at a couple of different levels of personnel. At the technical-operational level, users need to understand not only why the Model is useful, but also how to make it perform. They must become proficient in all phases of Model operations. They must be able to adapt it for their own needs. Frequently this will mean redesigning Model outputs or even adding subroutines. This is the most intimate level of operation. Trainees for this level would be statisticians or other quantitatively oriented personnel.

At a higher level, training should fully familiarize planning directors with the purposes, processes, products and potentials of the Model, in the context of the health planning process. They should be able to recognize the value of the tool for each planning operation. They need not, however, be able to write subroutines or engage in the quantitative manipulations for which they can rely on the technicians trained for this purpose.

Above all, planners at this second level need to be able to understand the meaning and significance of Model outputs for the planning resource questions facing the nation. These people must also be trained to present those results to higher level, non-quantitative, resource decision-makers. Therefore, their training should include analysis and interpretation of Model outputs, and presentation of results and conclusions via a variety of techniques.

An officer in the Institute for National Planning, Egypt, said he wished to develop training in planning for government ministers and deputy ministers. He complained that their decisions are too often conditioned by political pressures or personal whims and fancies. While we agree with his observation, we disagree with his conclusion. Political pressures will always intrude on the rational process of decision-making in government. And there are those who would say that that is appropriate. As for personal predilections, there is a chance that they may not intrude if the decision-makers are provided with sounder bases for their judgments. It is certain that such top level officials will never have

42

the interest or attention span required to understand the Model, much less operate it. So we recommend that these technologies be transferred to officials at lower, more operational, levels of government. Then we would expect the decisions of senior officials to improve via the application of these technologies by their subordinates.

Training Effects of Planning With the Model

The Model provides a systematic way to select and structure information so that the best policy and program alternatives may be considered--despite qualitative deficiencies in the information itself. Therein lies the value of the Model as a tool for training health planners in LDCS. By applying what they know to the Model, planners discover their data needs, their own misconceptions, and the impact of these deficiencies on public health. The experience of LDC health planners at the University of Michigan has been profound, for both students and faculty. Model users come away from the experience with a heightened awareness of data needs and motivation to develop systems that fulfill them.

If the Model has this impact, in the training context, and it is never used for actual planning purposes, we feel that it would have to be considered a major success. However, one of our Egyptian informants added the observation that "...if the training is successful, it will create a need for planning technology, like the Model. Further, now the users will be qualified to adapt it to their particular purposes." In effect, the Model, properly packaged, becomes its own transfer agent.

Packaging the Model for Training Purposes

It is our intent to provide some guidelines for packaging the Model for training. They originate from our evaluative observation of the Model in Indonesia, plus the environment for health planning in both countries. They represent only a few principles which should be adopted in preparing the Model for deployment as a training tool.

At the outset, everything we saw and heard in Egypt and Indonesia suggests that the package be delivered in-country, rather than in the U.S. This is primarily because health planners with these skills are scarce in all LDCs. A program in the U.S. simply cannot train enough of them quickly enough.

Furthermore, a far greater quantity of more pertinent data for trainees to use in working with the Model is available in-country. This means that their training can be more directly relevant to their job activity--thereby ensuring a smoother technology transfer when they leave the training environment and return to the job.

Finally, both Egyptians and Indonesians who have been trained on the Model in the U.S. suggested that future trainees would benefit from the influence of "an indigenous project champion." This is reference to the subtle but pervasive influence on training effectiveness of a leader, or mentor. While in the U.S., most of these trainees transferred that role to Grosse. To this day they speak most fondly and respectfully of him. But they would benefit more by having that same role embodied in an official of their own government who could perpetuate the role beyond the training setting and into the workplace.

In both countries the Model is known as the "Michigan Model" or the "Grosse Model." Part of that character is a remnant of the trainees' need to continue identifying with Prof. Grosse (the Model's developer) and their experience at Michigan. But part of it may also be a function of labeling which has been reinforced by AID and the University of Michigan representatives who continue to work with these countries.

The point is that this label detracts, to some degree, from the significance of the Model--a technique for integrating economic analyses in public health planning. Further, we discovered a couple of officials in both countries who felt uncomfortable with these labels. Suffice it to say that we recommend packaging the Model with a label which takes the onus off "Grosse," "Michigan," and "Model," and puts it on "resource allocation," "econometrics," "financial analyses," "quantitative health planning," or a combination of these or other descriptors.

In both countries we sought to discern whether health planners were sufficiently sophisticated to learn health planning via the Model. We came away with no doubts about this at all. The Model does present requirements for skills which are relatively new to audiences in LDCs. However, to paraphrase the words of one of our informants in Egypt, the trainability of the Model is not related to its level of sophistication, but to how it is presented. "The training package must be designed in a manner which allows Egyptians to absorb it." It is not a question of the sophistication of the trainees, or the Model; it is a question of the sophistication of the training package. Our informant was adamant, and we agree, that the training must be "sensitively delivered" and "totally adapted" to the particular LDC audience. This includes the language in which it is delivered, anecdotes, materials, applications, exercises, problems and examples. That suggests development of a core training package which is deployed through indigenous training or research and development institutes. We will talk more about that in the next section.

We recommend the incorporation of microcomputers in the training package. But they should be used as analytical tools--not presentation devices. All emphases should be on the planning questions being asked, the planning data being developed, and the analyses being conducted. The computer technology itself should not detract in any way from the purposes and processes of this approach to public health planning in LDCs.

10. LOCUS OF DEPLOYMENT

Provincial Deployment of the Model

> *There is no clear cut health care policy or formal health long-term plan to serve as a guideline. (26)*

In Egypt (and we suspect some other LDCs) there is a question of where the planning skills would be most usefully focused. As discussed earlier, the information and data bases are inadequate for long-range planning at the national level. That suggests that the locus of deployment should be closer to the operational level in the health sector. Quite obviously it is not appropriate for facilities, but what about an intermediate level--like the provincial or governorate office of the Ministry of Health. For better or worse, planning information and data normally begin to be available at this level. Facilities report their figures to statistical clerks in the provincial office. They, in turn, begin to aggregate data from all their facilities for a report to the national office. That statistical clerk, in the provincial office, becomes a critical juncture at which to access the data and information which are needed for health planning purposes. Also, the computing power of the Model makes it reasonable to think about incorporating regional eccentricities into national planning through regional deployment of the Model.

Dr. Geofrey Ferster of WHO and consultant to the Planning Bureau, Indonesian Ministry of Health, also argues for deployment at a lower level. In fact, he suggests deploying the Model for planning purposes "...at the lowest macro-level at which data can be collected and analyzed and at which resource planning makes sense." However, he warns, there is currently no planning mandate, or resources, for a provincial level effort. That is a condition which requires coordination of this deployment strategy with national level planning directors in the ministries of health.

The Director General for Health Services Delivery in Indonesia added some other powerful reasons for deployment at this level. It relates to differences between subcultures which are frequently distributed on a provincial basis in LDCs. He said, "We are not one nation, one people; we are one nation of 27 provinces and at least as many separate peoples." He emphasized that critical differences which impact health problems include: cultures, power structures, autonomies, capabilities, needs for health, resources and histories. This line of reasoning would argue for provincial deployment of the capability even if all the health planning were done at the national level.

Deployment of the Training Capability

The question remains where the capability to train planners with the Model should be deployed. We do feel that the Model would play a useful role as part of a health planning curriculum in the university

setting. However, we do not feel that it should be limited to that setting. We recommend that it also be deployed in a government institute which: (1) has a training capability and mandate (or can obtain it), (2) has a research and development orientation with strong quantitative capability, and (3) has interest in the Model for its own research and planning purposes, as well as the training responsibility.

Deployed in a government agency like this, the training is more likely to reach government bureaucrats who do not have the opportunity to benefit from a university curriculum. Such an institute must have a training capability. However, we also recommend research and development capability because experience has shown that the Model's users frequently generate the need to research various health dimensions before they can proceed with modeling. Furthermore, the research background of the institute would support the quantitative orientation of the Model. It would also provide a fertile ground in which the Model could be adapted and further developed for maximum utility to the country.

An example of such an institute in Egypt would be the Institute for National Planning. This is a relatively autonomous institute which examines the plans of ministries at the request of cabinet-level officials, researches planning questions in any sector, and provides training and consulting services in planning and research. It has strong quantitative capability with the largest research mainframe computer in the country. The institute's primary activity is training planners for all the ministries, its second priority is research on planning issues, and its third is consulting and technical assistance.

A possible home for the training package in Indonesia could be found in the Health Services Research Center in Surubaya. They have all the requisite capabilities as well as staff members who are familiar with the Model. Another possibility would be a new institute which has been proposed for the Ministry of Health. Called the Health Systems Analysis Institute, it will be designed to conduct research and provide training and consultation on health management systems.

The Institute for National Planning, in Egypt, has already manifested interest in providing a home for the Model--to be used as a training and research tool. Of course, that is a prerequisite to its deployment anywhere. The Indonesian institutes, on the other hand, have not mentioned their interest in such a proposal. We mention them here to characterize the type of organization in which we think the training package could be most effectively deployed in LDCs.

11. IMPROVING COST-EFFECTIVENESS OF HEALTH PROGRAMS

This is the first priority of AID's new health sector policy for the mid-1980s. Each section below details our evaluation of a role for the Model in facilitating achievement of this policy.

Strong Emphasis on Financial Viability

AID's health sector policy will direct new resources to problems associated with the financial side of health projects. There could not be a more advantageous relationship between the goal of AID and the capabilities of the Model. It is useful for planning financial resources for health. It is also a powerful tool for training LDC planners to think of health sector problems and opportunities in resource allocation terms, thereby increasing their own capability to improve the financial viability of health programs.

Better Management and Administrative Systems

The APHA evaluation of 52 PHC projects led to the observation that they are poorly managed at all levels of government. Further, administrative systems like financial monitoring and control, and program evaluation, are either nonexistent or overly complex.

The Model provides a vehicle for (1) sensitizing health managers to the needs for simple and efficient information systems, (2) developing a monitoring capability for health needs and resources, and (3) assessing the resource value of health intervention effects.

More Systematic Assessment of Alternatives

AID's health sector policy recognizes the sporadic, illogical and unsystematic bases on which health resource allocation decisions are currently made in LDCs. It directs more resources to changing that characteristic in the foreseeable future.

The Model is one potentially useful tool for accomplishing more systematic assessment of health care options. But, whether or not it survives as a tool for assessing options and planning in the health sector, it can most assuredly have a great impact on increasing LDC health managers' interests in, and skills for, systematic decision-making.

That has to be the first priority--motivation and skill development. When that is accomplished, chances are good LDC planners will adapt the training tool to their planning needs.

Consideration of Long-Term Costs

The earlier discussion of recurring costs for health programs in Indonesia reflects the intent of this AID policy. Too many LDCs are capitalizing health projects they cannot afford to maintain.

Currently, the Model has very little long-term predictive capability. But that can be readily developed. We think, however, that the first priority remains orienting and training of LDC planners in systematic resource analysis and allocation. If and when that is accomplished, there will undoubtedly develop more justification for adaptation and expansion of the Model's planning capabilities.

Developing Financing Mechanisms

This is a program design task in which the Model may be useful as an analytical tool. Without doubt, it can help determine the level of financial support required by alternative health care interventions. Further, with a little adjustment it could project those requirements into the long-range future--thereby apprising financial planners of the size of their task. This is one of the research uses for the Model. It could be implemented if the Model were deployed in an organization which has a research and financial planning capability and mandate.

12. A COMPARISON OF THE MODEL TO OTHER MECHANISMS FOR TECHNOLOGY TRANSFER IN HEALTH MANAGEMENT

Introduction

While not the major thrust, this project afforded some limited opportunity to examine the Model in the context of other extant mechanisms for transferring health sector planning technology to LDCs. At the outset, we wish to emphasize that this small review does not represent a full analysis of the literature, or examination of the majority of health management training programs and materials available to LDCs. In fact, it is comprised of a review of only five specific approaches to health planning training for LDC managers. However, they and the Model are analyzed in a much broader context and understanding of the technology transfer process, as represented by over a decade of experience at DRI and a comprehensive literature review for AID (completed March 1983).

General Mechanisms for Transferring Health Management Skills

We observed a number of mechanisms being used within AID projects for transferring management skills. These included academic training, consultancy services, workshops for management trainees and trainers, and the provision of management tools in the form of hardware and software. Which of these mechanisms is the best? There is no pat answer. The preferable mechanism depends upon the objectives of training, the technology to be transferred and the characteristics of the trainees.

Management consultancy can be used to help top level officials identify key problem areas and develop skills to overcome them. It is expensive in terms of cost per person trained. Academic training provides a broad theoretical basis upon which a person can build. The objective is long range. It too, can be very expensive. Short courses and workshops are good for providing large numbers of trainees guided exposure and practice with the new technologies, at considerably less cost per participant than the previous two approaches. But the instruction is less adapted to an individual trainee's needs. On-the-job training in a developed country is effective because the trainee is surrounded by persons who are expert in the requisite skill. However, the management skills learned may not be directly transferable to the LDC setting.

The needs in an LDC are normally for a judicious mix of these technology transfer mechanisms.

The Literature on Technology Transfer in the Health Sector

Our thorough review of the technology transfer literature in a variety of sectors revealed some findings from experiences with health technologies. These are excerpted from a fuller report to AID/PPC (see ADDENDUM to the Bibliography).

Health technology transfer literature concentrates on three major areas: family planning technologies, the use of technology to improve the physical environment (sanitation and water systems), and on primary health care and disease eradication. The term technology includes the use of medical engineering devices and the transfer of knowledge in the use of such devices. There is far less literature, if not technology transfer experience, in the health management arena.

Striking examples of technology transfer have occurred in fertility control, where contraceptive technologies, family planning expertise, and information campaign strategies have been transferred. As a result, fertility is declining in most LDCs. While the use of fertility planning technologies can and do substantially lower birth rates, their availability and acceptability vary. Technology transfer lessons learned include the observation that delivery systems may be inadequate or culturally inappropriate, thus making family planning services effectively unavailable. Also, without adequate follow-up to the transfer process, people may become dissatisfied and discontinue controls.

The literature also reflects that it is useful to introduce continually improved and new technologies which enhance family planning effectiveness and efficiency. Sensitivity to, and knowledge of, the role of socio-cultural factors that motivate people to adopt family planning is critical. Multifaceted programs that address social, economic, and health needs along with delivery of family planning services are those most likely to be successful. These lessons learned in the field, provide insight into more effective technology transfer generally.

The literature on water supply, sanitation, and waste disposal systems in developing countries has also acknowledged substantial possibilities for improvement of conditions through the transfer of technologies. But very little material exists on attempts to transfer health management technologies to LDCs.

Most Significant Factors Influencing the Effectiveness of Technology Transfer

We reviewed technology transfer literature on cases in health, education, and communications; construction and building materials; private

voluntary organizations; and agriculture. It led to some generalizations about what makes technology transfer effective. This project was reported more fully in the AID/PPC document cited above.

Research led to delineation of six factors which have great impact on the effectiveness of any technology transfer capability. They are: interpersonal relations, technology champion, interest groups, information availability, management capabilities, and research and development capabilities.

Many attempts to transfer technology internationally have failed as a result of the transferor's inability to establish effective interpersonal relations with the acquirer. We even discovered some remnants of this problem during our examination of the Model's applications in Indonesia. The significance of the human atmosphere surrounding technology transfer cannot be underestimated.

Technology acquisitions frequently involve uncertainties which provide barriers to success. Shepherding a technology through this process often requires someone with a personal commitment to the venture's ultimate success--a "technology champion" who is willing to push ahead in the face of ambiguities, and even resistance. Such a champion is most effective if he or she represents the LDC to which the technology is being transferred.

In the public sector, interest groups assume an important role in supporting, or in resisting, acquisitions of technology. Donor agency project officers, while intellectually aware of the significance of interest groups, have often been remiss in ignoring the likely reactions of these groups or their impacts on project success.

LDC entrepreneurs seldom make a thorough search for the optimum technology because of: (1) the complexity of, and uncertainties with, technology acquisition; (2) inadequate access to information; (3) insufficient information management skills; and (4) insufficient time and money. There are two ways by which a donor may assist LDCs in overcoming these transfer problems: improve the acquirer's skills in obtaining access to, and evaluating, information pertinent to the field of interest; and simply making information more available.

Many LDC technology acquisitions founder as a result of insufficient management skills of the acquirer, the transferor, or of intermediate institutions. This intervening variable is dependent on the human qualities of participants in the technology transfer process, not the technology being transferred.

LDC institutions for research and development have a high potential for effective assistance to local industry, entrepreneurs, and government agencies in acquiring technology. The building and strengthening of local R&D institutions creates indigenous capabilities to acquire new

technologies, almost by definition. It increases the country's ability to acquire, evaluate, and implement new information. This capability will continue to serve the country long after donor programs have ceased. Hence R&D institutions in LDCs are particularly effective channels for deployment of technology transfer mechanisms.

The Environment for Improving Health Management Skills

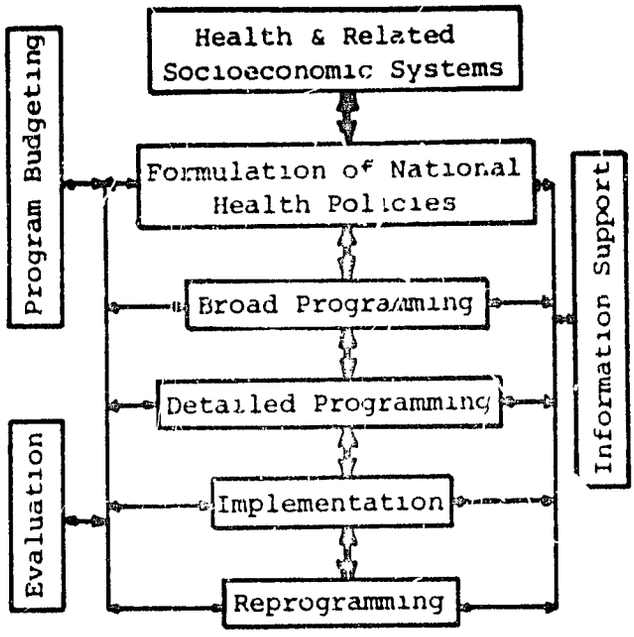
An Inspector General of an LDC ministry of health recently observed that interest in management fluctuated in his country. A resurgence of interest often accompanied a visit by a health expert. The Inspector General reflected on the basis for this lack of constancy in the pursuit of better health management:

> One reason is that health administrators are MDs, not managers. Economists work their way to the top of corporations through mastery of the art of management. Hotel employees get to run great hotels as a result of honing their management skills. But the road to wealth for doctors is not through management but through private practice. At schools of public health, MDs teach and administer their programs in the morning. In the early afternoon they go to their private medical practice to make their primary income. Professors have no time for research in health management. An MD in government service adds nothing to his or her rank by obtaining an MPH Degree. There is little incentive for MDs to learn about management or to develop their management skills.
>
> In my country, our former colonists did not encourage the development of managerial capabilities. Therefore, to some extent, the country as a whole has had to pull itself up from a low level of management understanding.

The Inspector General paints a picture which we have discovered represents the environment for health management in many LDCs. This is the environment into which we have been discussing introduction of a health management tool (as opposed to a diagnostic or treatment innovation). The Inspector General's comments beg a serious question about the receptivity of the environment to this particular management tool.

A Comparison of Six Different Approaches to Training Public Health Planners in LDCs

In 1981 the World Health Organization began publishing a series of monographs which outline the "managerial process for national health development." (55-61) It is based on a standard conceptualization of the management process:



The WHO is publishing a volume of "guiding principles" for each component of this process. As with all the other approaches discussed in this section, the WHO guides focus on management--one of the most deficient technologies in the LDC public health sector. Further, the volume on "broad programming" does discuss the value and need for considering costs and effects of various health strategies during the health program planning process:

> Broad programming is also concerned with estimating the consequences of the programme in terms of population coverage, population reduction in the incidence of disease, and/or desirability in the population and cost. As there are manpower and financial constraints at each phase of the plan, alternative lines of action and mixes of interventions and time patterns of implementation may need to be considered to make reasonably certain of achieving the maximum effect.

Unfortunately, however, the volumes do not tell LDC readers how to do these things. Herein lies the series' greatest weakness: it is prescriptive with too few practical suggestions. Further, its treatment of budgeting, in the volume on "programme budgeting," prescribes principles for allocating resources among selected program priorities. None of the volumes sufficiently treat the relative merits of cost criteria for weighing the desirability and effects of health program alternatives, i.e., before program priorities have been decided. In other words, the Model offers a technology untreated by the WHO guidelines.

In September, 1981, the Association of University Programs in Health Administration (AUPHA) published a series of "health management problem-solving modules." (2-8) Developed under contract to AID,

these "modules" were designed to help LDC health program managers "determine areas of managerial weakness," and "improve managerial processes or structures." There are seven volumes to the series, each dealing with a different health management problem area: (1) options analysis and implementation, (2) organizational design, (3) community and external relations, (4) materials and facilities management, (5) personnel and human resources management, (6) patient services management, and (7) financial management.

All volumes of this project offer a stepwise progession of questions, answers to which will, ostensibly, isolate health management problem areas. They are designed as diagnostic devices. We have seen no data on attempts to apply the results of this work; it may have proved to be very useful to health managers in LDC ministries and facilities.

However, our impression is that it presents a very superficial overview of generic techniques for problem solving without significant adaptation to the practical constraints or real information requirements of managers in the health sector, in LDCs. It appears to be well-grounded in Western social-psychological theories of problem solving behavior without sufficient comprehension and integration of health program management realities in LDCs.

An example would be an additive model that is offered for calculating the relative merits of alternative solutions to given management problems. In many respects, the model parallels the logic inherent in the University of Michigan's Health Resource Allocation Model. The AUPHA formula states:

The value of an alternative solution	=	Degree of difference the solution makes in the problem	X	Degree of cost to implement the solution
	X	Degree of management control provided by the solution		

Unfortunately, however, the AUPHA model is not applied in any meaningful way. The publication recommends that health managers ascribe numerical values to the factors via a five-step, interval level scale--based on their best judgment of each factor. Such a scale remains a theoretical construct of little or no practical utility to an LDC public health manager at any level in the infrastructure. How much more useful it would have been if the AUPHA had applied meaningful values to the factors, like real costs rather than a 1-through-5 scaled abstraction called "degree of cost."

The Health Resource Allocation Model draws on additive relationships which are very similar to that proposed by the AUPHA for problem assessment.

However, unlike the AUPHA material, it requires the application of real, practical data, to the extent that they can be derived.

In 1980, Ronald W. O'Connor published a book which represents another attempt to improve health management in LDCs. ((39)) It is a detailed case study of attempts to improve a national, rural health care system in Afghanistan. As such, it presents "lessons learned" for application in any other LDC where they are appropriate. In a descriptive vein O'Connor contributes to a general understanding of the role of financial management in the health sector·

> ...cost elements experienced or projected for each of the programs were developed as they evolved; no synthesis of all Ministry commitments was attempted until [two years after the workplan was implemented]. Practical and political imperatives swamped planning theory, and program implementation proceded largely unencumbered by forecasts of financial feasibility.

O'Connor contributes some useful management concepts by distinguishing between financial data-producing systems, and financial information systems. Further, he derives four functions for both of them: (1) revenue generation, (2) cash flow management, (3) budgetary control, and (4) planning data production. He adds that cash flow management and budgetary control are the two most common functions manifest in the financial systems of LDC health sector management.

Finally, O'Connor prescribes some improvements in financial management in the health sector. He recommends training of personnel for financial planning, development of improved records and reporting systems, and development of ministry of health capabilities to analyze financial data.

The value of O'Connor's approach to improving health sector management lies in his careful development of prescriptions, from management theory and guidelines whose validity is supported by empirical observations Both the WHO and AUPHA works are deficient in their empirical underpinnings (though it is easiest to assume that the WHO guidelines are based on that organization's vast experiences in Third World health infrastructures). The WHO material is too prescriptive; the AUPHA, too theoretical.

As mechanisms for technology transfer, all three of these works show strengths and weaknesses. Quite obviously, they all need to be "packaged" in some kind of program so that they may benefit from the six factors which influence the effectiveness of technology transfer strategies (discussed earlier). They need to be presented by a "technology champion" who represents the audience on whom they are targeted. They should probably be promulgated by LDC organizations which have a research and development capability and can appeal to the vital interest groups for support (like health practitioners, health instructors, administrators and bureaucrats).

The O'Connor work has by far the greatest interpersonal appeal--touched as it is in Afghan experiences with which other LDC health managers can immediately identify. But all three lack heuristic qualities. They leave readers with the enlightened awareness of deficiencies in LDC health management systems, and knowledge about improvements that should be made. But they do not transfer the skills for making them.

Two other programs of considerably more heuristic value are offered by Johns Hopkins University, School of Hygiene and Public Health, the Department of International Health; and the University of Michigan, School of Public Health, Department of Health Planning and Administration. The Johns Hopkins Program, "Comprehensive Health Planning," is 16 weeks in duration. That at the University of Michigan, "Health Planning and Economic Development," is 12 months in duration and leads to a Masters of Public Health degree. Both are targeted on LDC health managers; both focus on the purpose, role and methods of planning as a health management tool.

Obviously, the Johns Hopkins program covers the topic in less detail, and with less practice than is afforded by the longer Michigan program. It is also likely that Michigan emphasizes more economics, and Johns Hopkins, more epidemiology Both draw on texts and teaching materials developed by their own respective faculty. Johns Hopkins published the first comprehensive volume in this field. *Health Planning: Qualitative Aspects and Quantitative Techniques*. Much of the Michigan curriculum hinges on students' study and use of the Model.

We have not attempted any comparative evaluation of these two programs. At this point we would have to conclude that both are satisfying vital needs for health management technology in LDCs. But, we would also have to observe that they are extremely expensive (per trainee), they impact very few managers from a particular LDC, at a time, and they force participants to shoulder the major burden for transferring these new technologies from the United States where they learned them, to their own countries where those "environmental conditions" about which the Inspector General spoke earlier are vastly different.

In light of these five approaches to increasing health management capabilities in LDCs, we feel that the Model has great potential. It is highly portable and therefore amenable to workshop settings in LDCs rather than in the U.S. But it needs an indigenous champion in each LDC, and it would help to have a home in an institute with R&D capability. We think that, properly packaged, the Model could far exceed the effectiveness of all five other approaches described here. We recommend the level of effort required to so package it.

13. A NEW PHASE OF MODEL DEVELOPMENT

In sum, we observe that the Model is ready for a new, and most appropriate, phase of development as a tool for health sector planning in LDCs. Basic, theoretical and experimental research and development has progressed to a point where deployment and application are feasible. Further developmental research on the Model is desirable, e.g., working on the Model's capability for time-phasing and optimization. But deployment now is also practicable.

We recommend a pilot development project in one LDC. It should focus on converting the Model into a generic training package which could be deployed in any LDC. The package should be tested and revised during this phase. Secondly, the Model should also be piloted as a research tool deployed in a health sector research and development organization. We would encourage this pilot activity to test the idea of deploying the Model as a training and research tool in the same organization.

Another critical aspect of this phase of Model development should be coordination with Ministry of Health officials in development and promulgation of policies which will facilitate improved planning, administration and management systems (of which the Model could be considered one). This work should coincide with development and testing of the Model for training and research. When all three of these activities are completed, the LDC adaptation phase of Model development will be concluded. Then the whole project will be ready for implementation in the pilot LDC and deployment in other LDCs.

One other observation deserves mention. We think Egypt would be an excellent site for the next phase of development work. There are three reasons: (1) AID/Mission program priorities, capabilities of officers and resources; (2) interest in the Ministry of Health; and (3) interest in the Institute for National Planning.

The Mission has had considerable experience with Dr. Grosse and various members of the Michigan team. As mentioned earlier, none of this experience relates to the Model or its capabilities. However, the Mission also has one health officer who received training on the Model at Michigan. And we talked to others who are interested in the Model's potential.

More significantly, the Mission has recently spent considerable effort and resources gathering health sector planning data, supporting GOE surveys of health needs, and basically gearing up to press for major GOE reforms in health sector policy and program strategies. The Model could be an invaluable component of this continuing effort. It represents the level of technology which is needed by the GOE, it is ready for deployment, it is highly deployable, the Mission has capability in the Model technology, and the GOE has interest and capability in the Model.

The Director General for Planning, Ministry of Health, was also trained on the Model at Michigan. He has more in-depth knowledge of, interest in, and appreciation for the Model than does anyone else in Egypt. He has discussed quantitative and financial planning with his Minister and they have recently agreed to begin to develop some capability in the Ministry. This provides an excellent opportunity for the Mission to commence a policy revision effort in support of improved health sector management information and data systems. The Director General has indicated his strong interest in working with the Model and cooperating with any other organizations in the process.

Finally, the Director of the Social and Cultural Planning Center, Institute for National Planning, is very anxious to incorporate the Model in the Institute's training, research and consulting capacity. This Institute is relatively autonomous. It operates in conjunction with the Ministry of Planning. But its services are solicited directly by cabinet level officials, and they are provided directly to all ministries which seek them.

The Director is a medical doctor, health planner, quantitative behavioral researcher and trainer. Further, he enjoys high regard in both the GOE and the Mission. Recently he founded the Experimental Center for Training of Researchers in the Institute. Now he is also pulling together a number of very credible experts, like himself, into a private sector consulting operation. This latter organization (the Sinai Consulting Group) may eventually provide an opportunity to assess the Model's applications in the private sector.

Both of these gentlemen, in the Ministry of Health and the Institute for National Planning, are familiar with each others' capabilities and interested in collaborating on the adaptation phase of Model development.

14. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

AID's health sector policy will direct new resources to problems associated with the financial planning and management side of health projects in LDCs. There could not be a more advantageous relationship between the goal of AID in so doing, and the capabilities of the Model. It is useful for planning financial resources for health. It is also a powerful tool for training LDC planners to think of health sector problems and opportunities in resource allocation terms, thereby increasing their own capability to improve the financial viability of health programs.

Throughout this evaluation, we learned that the success of the Model as a tool for health planning was less a matter of the modeling technologies developed by the University of Michigan, and more a matter of planning data availability in LDCs. We have to conclude that most of the health planning data which is routinely collected in LDCs is far too aggregated and of questionable validity to be directly applicable to Model computations. The Model usually requires generation of new data for input purposes.

One of the greatest capabilities of the Model is to sensitize LDC health managers to the need for many types and qualities of planning data. The Model has a significant role to play in teaching and motivating LDC officials to shift their health planning approach from compassion to analysis--from intuition to quantification.

Another factor which has significant impact on the Model's efficacy as a planning tool is the capability of LDC users to think about health alternatives in economic, as well as epidemiological, terms. The Model forces planners to consider the impact of health interventions on financial resources and to seek the optimum payoff for public health, and financial resources. Regardless of planning, that is a tremendous heuristic benefit of the Model--and one which should be considered for packaging and deployment in LDCs.

Finally, the data requirements of the Model force LDC users to research health planning information. Ultimately, this research activity has the impact of encouraging health planners to seek opportunities for improving health data and information systems, and to track vital health planning variables.

Research and Development Recommendations

The University of Michigan has completed much of the work it set out to accomplish, an econometric public health planning model is ready

to deploy for various uses in LDCs. However, the heavy investment in Model research and development to date would pay off more handsomely if more work refined the Model in some particular ways. In particular, work commenced in applications for Ghana needs to be completed. APPENDIX F provided some background on DYNPLN which modeled morbidity and mortality rates over time, with a changing population and changing service utilization patterns. More research and development activity needs to enhance the Model's capability to treat time, and time-phased dimensions of health, as independent variables.

The Ghanian work also commenced research and development of a dynamic optimizing model. It focused on facilities construction and manpower requirements to meet a GOG schedule for development of hospitals. Regardless of the merits (or demerits) of hospitals as a tool for improving public health, the optimizing capability of the Model is essential. By the time LDC health planners are acclimated to quantitative planning and computer modeling, the optimizing capability will be in great demand. We recommend continued research and development activity in this arena as well.

In Chapter 6 we discussed the need for research and development which would permit incorporation of particularly interactive extraneous variables in the Model's calculations of projected costs and effects of health interventions. Some preliminary work has been completed but the computational algorithms need to be developed and tested. We recommend the research and development necessary to increase the Model's capability in handling extraneous variables.

At various points in the evaluation report we noted that the Model has potential for at least three levels of sophistication among audiences in LDCs. The most sophisticated level, operators and statisticians, must know how to write programs and compile and analyze statistical information. A range of technical skills are necessary for them to be successful with the Model. At an intermediate level, perhaps planning directors and the like, statistics are not a requisite skill for efficacy with the Model. But these people must know how to interpret Model outputs. At the least sophisticated level, perhaps cabinet level officials, minimal skill is required for reading graphical presentations of Model outputs. For each level of sophistication, the Model needs to generate a particular kind of output display. Research and development work, therefore, needs to adapt the output subroutines for different target audiences. At least three modes must be developed: graphs, numerical tables and verbal summaries.

Later we will be summarizing a variety of recommendations for "packaging" the Model for deployment in LDCs. One significant aspect of packaging for LDCs has to be adapting the library of computer programs for use on a variety of hardware, in a variety of computer languages. It is quite conceivable that LDC users will want to adapt the Model for large

mainframes which operate on FORTRAN, as well as microcomputers like the portable Osbourne I, which operates on BASIC. We recommend that programs, listings and users' manuals be developed for a variety of hardware and software applications in LDCs.

Planning and Research Recommendations

The original intent of the research and development grant to the University of Michigan was to develop a tool for health planning in LDCs. As reported earlier, we think that great strides have been made in that direction. In fact, we feel that the Model, as it stands right now, is more capable for integrating resource flows in consideration of health planning than are most of the LDC planners who would be inclined to use it. Hence, our principal recommendation will be to use the Model as an instrument for increasing planners' skills--technology transfer if you will--instead of as a tool for planning. In the meantime, Model developers can complete some of the requisite research and development tasks which remain. By the time LDC planners have acquired the skills necessary for quantitative and econometric health planning, the Model will be available for adaptation, by them, as a tool for planning.

Another aspect of the LDC environment for planning, which intervenes in the Model's efficacy as a tool for planning, is the paucity of valid, reliable, disaggregated quantitative data on health dimensions. Model developers have come a long way toward applying various methods for "negotiating" input data. But in order to realize the fullest potential of a planning Model as sophisticated as this one, LDCs will have to upgrade their health planning information and data management infrastructure. We have already seen that deploying the Model right now as a tool for planning or technology transfer increases LDC planners' awareness of the need for particular types and qualities of data. We recommend that the Model be used, in part, to reinforce this awareness. With it AID missions can stimulate LDCs to develop minimum information policies, programs and management systems to support public health.

We observed that while health planning decisions are usually made at the highest levels of government in most LDCs, disaggregated data required for quantitative planning are most readily available at lower levels of government. We therefore recommend deployment of the Model (as a planning tool) at two levels of government simultaneously. In another sense, the Model may be seen as an opportunity for stimulating closer functional ties and coordination between national level decision-making, and provincial or local level information and data gathering.

Training and Packaging Recommendations

We must conclude that the Model's impact on health planning in LDCs will be sooner felt if it is deployed initially, not so much as a tool for planning, but as a tool for training health planners to think in quantitative and econometric terms. We must emphasize that this is not because of any deficiencies in the Model, or oversights by its developers. Rather, it is a reflection on the state-of-the-art among LDC health planners. Further, use of the Model as a training tool, at the University of Michigan over the past few years, has proved its value for technology transfer purposes.

We recommend that considerable effort be made to develop a core technology transfer package for upgrading the skills and motivation of LDC public health planners. The Model should be the heart of the package. But it should also include units on quantitative decision methods, operations research, data and information requirements, economics of health, demography and public health statistics.

Each subject should be offered in a self-instructional format which may be adapted for greater, or lesser, degrees of mediated instruction. This will permit the widest variety of training applications in LDCs. It will be amenable for inclusion in a university public health curriculum, short in-service training workshops in a government agency, or self-study on a free-time basis.

The Model should be packaged for use on microcomputers, at least for training purposes. The package should include computer listings and operating instructions. But it should also include detailed instruction on a variety of methods for generating requisite input data. These instructions should help LDC health planners compensate for current planning data deficiencies. The training package should offer cost standards or methods for generating them. It should provide procedures for developing cost coefficients for health interventions.

The core package should provide instruction for data analysis and interpretation of results. We recommend that the package be adaptable for instruction at three levels of sophistication: the statistician-operators, the health planners, and the national level decision-makers. Therefore it must provide instruction on the analysis and interpretation of statistical tests and tables of numbers, graphical displays and verbal summaries.

Finally, we recommend that the whole package be developed for adaptation and delivery in LDCs, rather than in the United States. Further, it should be deliverable by qualified LDC instructors with whatever technical support they may require from outside their country.

62

Pilot Project Recommendation

In Chapter 13 of this report we reflected on the unique opportunity for piloting such a health planning technology transfer package in Egypt. The opportunity is provided by the unique alignment of two agencies of the Government, and two leaders in these agencies. The Institute for National Planning has a planning and training mandate with outreach to all ministries of government. Further, the Social and Cultural Planning Centre within the Institute is headed by a very sophisticated researcher, trainer and medical practitioner. He knows about the Model and its capabilities. He is charged with the responsibility for upgrading the skills of government health planners (among others), and he is anxious to use the Model in this charge. The Centre also draws on the skills of sociologists, epidemiologists, and two health economists. One of its researchers recently completed a doctoral dissertation at the Sorbonne on a technical review and comparison of computerized (and non-computerized) health planning models.

Additionally, the Ministry of Health in Egypt has a planning unit headed by a Director-General who received his MPH at the University of Michigan, on the Model. He is working hard to generate interest in adding this technology to the university curriculum (in Egypt) for public health managers. He is the kind of individual who would make an ideal "technology champion" for development and pilot testing of this health planning package.

We recommend developing and deploying this technology transfer package in Egypt, using these two individuals in a collaborative capacity--the Director-General for health planning as the technology champion and chief liaison with the GOE, and the Director of the Social and Cultural Centre as the principal training design and testing coordinator. The core package should be developed and adapted for testing through delivery at the Institute for National Planning. But the pilot project must also integrate evaluation, not only of the effects of individual package components, but also of the latent effects of training. Finally, the project should include revision of the core package based on the pilot training at the Institute. Ultimately it should be developed for easy adaptation and use in a variety of LDCs.

BIBLIOGRAPHY

1. American Public Health Association, *Primary Health Care: Progress and Problems*. Washington, D. C.: August, 1982.

2. Association of University Programs in Health Administration, "Community and External Relations", Health Management Appraisal Methods Program. Washington, D. C.: September, 1981.

3. _____, "Financial Management," *ibid.*

4. _____, "Materials and Facilities Management," *ibid.*

5. _____, "Options Analysis and Implementation," *ibid.*

6. _____, "Organizational Design," *ibid.*

7. _____, "Patient Services Management," *ibid.*

8. _____, "Personnel and Human Resources Management," *ibid.*

9. Berman, Edward B., and Sharon Greenwood, "Dynamic Optimizing Model: Application to Ghana," School of Public Health, University of Michigan. Ann Arbor: 1980.

10. Clinton, J. Jarrett, M. D., *Health Population and Nutrition Systems in LDCs: A Handbook*, USAID. Washington, D. C.· January 31, 1978.

11. Davidson, R. Gwatkin, Janet R. Wilcox and Joe D. Wray, "Can Health and Nutrition Interventions Make a Difference?", Overseas Development Council. Washington, D. C.: 1980.

12. Dievler, Anne, and Robert N. Grosse, "Education and Health Development," Third Annual Symposium of the International Association for the Advancement of Appropriate Technology for Developing Countries. November 20-22, 1981.

13. Eckstein, Robert, "Exercise in Developing A Model for Industrial Wastewater Treatment Cost Estimates," School of Public Health, University of Michigan. Ann Arbor: August, 1982.

14. _____, "How to Build a Data File on the Ontel Terminal for Free," Undated MS, *ibid.*

15. _____, "User's Manual for Cost Effectiveness Model (MICHMODEL)," School of Public Health, University of Michigan. Ann Arbor: October 22, 1982.

16. Greenwood, Sharon, and Robert Eckstein, "Exercise in Cost Effectiveness Analysis," School of Public Health, University of Michigan. Ann Arbor: August, 1982.

Previous Page Blank

17. Grosse, Robert N., "Estimating the Costs and Effectiveness of Health Sector Policy Alternatives in Developing Countries: An Unsolicited Proposal," School of Public Health, University of Michigan. Ann Arbor: October 31, 1978.

18. _____, "Estimating the Costs and Effectiveness of Health Sector Policy Alternatives in Developing Countries: Progress Report, School of Public Health, University of Michigan. Ann Arbor: June, 1980.

19. _____, "Estimating the Costs and Effectiveness of Health Sector Policy Alternatives in Developing Countries: Progress Report, School of Public Health, University of Michigan. Ann Arbor: February, 1981.

20. _____, "Interrelation Between Health and Population: Observations Derived from Field Experiences," *Social Science and Medicine*. Volume 14-C, 99-120; 1980.

21. _____, Letter to John S. Blackton, Director of Sectoral Analysis, USAID/Cairo: April 16, 1982.

22. _____, "Outline for Second MPNHD Workshop." Harbin, China: September 1-22, 1982.

23. _____, "Proposal to Develop Health and Family Planning Services Research and Policy Analysis Within the Ministry of Health," for the Ministry of Health/Egypt; School of Public Health, University of Michigan. Ann Arbor: June 17, 1982.

24. _____, "Report of Professor R. N. Grosse," Second MPNHD Workshop. Harbin, China: September, 1982.

25. _____, and Barbara H. Perry, "Correlates of Life Expectancy in Less Developed Countries," *Health Policy and Education*. Volume 2, 275-304; 1982.

26. _____, Demetrius J. Plessas and Helmy M. ElBermawy, *Public and Private Health Care Expenditures in Egypt*, School of Public Health, University of Michigan. Ann Arbor: June, 1982.

27. _____, Jan L. deVries, Robert L. Tilden, Anne Dievler and Suzanne Rie Day, "A Health Development Model Application to Rural Java," Draft Final Report for USAID/Washington, Bureau for Program and Policy Coordination. Washington, D. C.: October, 1979.

28. _____, Jan L. deVries, Robert Tilden and Anne Dievler, "AID Progress Report on Estimating the Costs and Effectiveness of Health Sector Policy Alternatives in Developing Countries," School of Public Health, University of Michigan. Ann Arbor: January, 1980.

29. Hassouna, Wafik A., *Final Report of the Health Sector Assessment Study: Executive Summary*, Experimental Center for Training and Evaluation of Social Programs, National Institute for Planning. Cairo: December 15, 1982.

30. _____, *The Health Services Researcher*, Health Services Research Group, Institute of National Planning. Cairo: Volumes, Numbers and Dates as follows:

Volume	No.	Date
I	1	1980
II	1	1981
II	2	1981
II	3	1981

31. _____, "Training for Improving Health Services in Urban Areas of Egypt: Preliminary Proposal" submitted to USAID/Cairo by the Sinai Consultation Group. Cairo: January, 1983.

32. Heiby, James R., Gayl D. Ness, Barbara L. K. Pillsbury, "AID's Role in Indonesian Family Planning: A Case Study with General Lessons for Foreign Assistance," USAID/Bureau for Asia. Washington, D. C.: December 1979.

33. Jacobs, Joseph, "Project Evaluation Summary: Training Developing Country Health Planners," USAID. Washington, D. C.: December 14, 1977.

34. McCleary, Boyd T., Robert N. Grosse and Robert Eckstein, "Programme Cost Analysis Exercise," School of Public Health, University of Michigan. Ann Arbor: August, 1982.

35. Mahmoud, Abdel Moneim, "Second Population Project: Precis," Ministry of Health. Cairo: 1978.

36. Ministry of Health, *Egyptian Experience in Primary Health Care*. Cairo: 1978.

37. _____, *Health Interview Survey: Results of the First Cycle*, Health Profiles of Egypt; Publication No. 16. Cairo: July, 1982.

38. _____, *Newsletter of the Health Resources Unit*. Cairo: Numbers, Dates and Titles follow:

No.	Date	Title
3	5/80	Toward A National Health Information System
11	1/81	Abstracts and Research Information
12	2/81	Abstracts and Research Information
13	3/81	Articles and Abstracts
14	4/81	Abstracts from the Available Literature at HRIU
20	10/81	Selected Articles from the Library of the HRIU
28	6/82	Abstracts from the Health Planning Reports
29	7/82	Abstracts from the Health Planning Reports

39. O'Connor, Ronald W., ed., *Managing Health Systems in Developing Areas: Experiences from Afghanistan*, Lexington Books. Lexington, Massachusetts: 1980

40. School of Public Health, "Curriculum: Health Planning and Economic Development," University of Michigan. Ann Arbor: 1983.

41. _____, "Estimating the Costs and Effectiveness of Health Sector Policy Alternatives in Developing Countries," an Unsolicited Proposal to the U S. Agency for International Development. Washington, D. C.: October 31, 1978.

42. _____, "HPED Alumni Questionnaires," School of Public Health, University of Michigan. Ann Arbor: 1982.

43. _____, "Health Planning and Economic Development: Student Roster," Department of Health Planning and Administration, University of Michigan. Ann Arbor: October, 1982.

44. _____, Untitled notebook on research in primary health care completed at the University of Michigan (HPA 601). Ann Arbor: undated.

45. Shuval, Hillel I., Robert L. Tilden, Barbara H. Perry and Robert N. Grosse, "The Effect of Water Supply and Sanitation Investments on Health Status: A Threshold-Saturation Theory," *Bulletin of the World Health Organization;* Volume 59, Number 2, Pages 243-248: 1981.

46. Siagian, Berlian T. P., "The Application of the Additive Models for Health Care Development in the Regency of Kendari, and Kolaka, Southeast Sulawesi, Indonesia," School of Public Health, University of Michigan. Ann Arbor: 1982.

47. Stanfield, L. E., "Letter to Dr. Robert N. Grosse," re: Grant No. AID /OTR-G-1740, USAID/Office of Contract Management. Washington, D. C.: May 15, 1979.

48. Taylor, Irving A., "Evaluation Report: Training of LDC Health Planners," USAID/PPC. Washington, D. C.: November-December, 1977.

49. Tilden, Robert, "Resource Requirements and Health Impact of Select Health Care Packages in Indonesia Between 1981 and 2000," Unversity of Michigan. Jakarta: December 10, 1981.

50. U. S. Agency for International Development, "AID's Health Policy (DRAFT)," AID/PPC. Washington, D. C.: October 15, 1982.

51. _____, Telegram to Barbara Turner, No. 23175BC. Cairo: November 31, 1981.

52. _____, "Domestic Water and Sanitation: AID Policy Paper." Washington, D. C.: May, 1982.

53. _____. "Health Sector Policy Paper." Washington, D. C.: March, 1980.

54. _____, "Rethinking AID's Health Sector Assistance." Washington, D. C.: April 12, 1982.

55. World Health Organization, *Broad Programming as a Part of the Managerial Process for National Health Development: Guiding Principles.* Geneva: December, 1981.

56. _____, *Detailed Programming as a Part of the Managerial Process for National Health Development: Guiding Principles.* Geneva: December, 1981.

57. _____, *Global Strategy for Health for All by the Year 2000.* Geneva: 1981.

58. _____, *Health Programme Evaluation: Guiding Principles.* Geneva: 1981.

59. _____, *Managerial Process for National Health Development: Guiding Principles.* Geneva: 1981.

60. _____, *Programme Budgeting as a Part of the Managerial Process for National Health Development: Guiding Principles (DRAFT).* Geneva: October, 1982.

61. _____, *Programme Implementation as a Part of the Managerial Process for National Health Development: Guiding Principles.* Geneva: December, 1981.

ADDENDUM

62. Black, Ronald P., W. Murray Todd and Melinda Ca n, *The International Transfer and Acquisition of Technology.* Under Contract No. OTR-0092-C-00-2280-00 for U.S.A.I.D. Washington, D. C.: February, 1983.

APPENDIX A

COPY OF THE UNIVERSITY OF MICHIGAN GRANT (1979) AND AMENDMENT

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON D.C. 20523

Mr. Robert N. Grosse
School of Public Health
Department of Health Planning
and Administration
The University of Michigan
Ann Arbor, Michigan 48109

Subject: Grant No. AID/otr-G-1740

Dear Mr. Grosse

Pursuant to the authority contained in the Foreign Assistance Act of 1961, as amended, the Agency for International Development (hereinafter referred to as "AID" or "Grantor") hereby grants to the University of Michigan (hereinafter referred to as the Grantee) the sum of $150,000 to provide support for the first year of the three year research program entitled "Estimating the Costs and Effectiveness of Health Sector Policy Alternatives in Developing Countries" as more fully described in the attachment to this Grant entitled "Program Description" and your proposal dated October 31, 1978. The estimated completion date of this program is May 15, 1982.

This Grant is effective and obligation is made of the date of this letter and shall apply to commitments made by the Grantee in furtherance of program objectives during the period May 15, 1979 through May 14, 1980. The total estimated cost of this Grant is $509,000, of which $150,000 is obligated by this document; subject to the availability of funds and the mutual agreement of the parties to proceed with the program. AID may make additional sums available up to an aggregate of $509,000 for this program. Unless such additional sums are made available, AID shall not be liable to reimburse the Grantee for any costs in excess of the obligated amount.

This Grant is made to the Grantee on condition that the funds will be administered in accordance with the terms and conditions as set forth in Attachment A entitled "Program Description," and Attachment B entitled "Standard Provisions," which have been agreed to by your organization.

10

Please sign the Statement of Assurance of Compliance, enclosed herein, and the original and seven (7) copies of this letter to acknowledge your acceptance of the conditions under which these funds have been granted.

Please return the Statement of Assurance of Compliance and the original and six (6) copies of this Grant to the Office of Contract Management.

Sincerely yours,

L.E. Stanfield
Grant Officer
Chief, OTR Branch
Central Operations Division
Office of Contract Management

Attachments:

1. Program Description
2. Standard Provisions
3. Statement of Assurance of Compliance

ACCEPTED

THE UNIVERSITY OF MICHIGAN

BY J F. BRINKERHOFF, VICE PRESIDENT AND CHIEF FINANCIAL OFFICER

TITLE

DATE. JUN 11 1979

71

FISCAL DATA

Appropriation No. : 72-1191021.6

Allotment No. : 946-30-099-00-20-91

PIO/T No. : 930-0082-309/332

Total Grant Amount : $509,000 ($150,000 is obligated by this document)

AID Technical Office. Bureau for Programs and Policy Coordination PPC/PDPR

Program Description

A. Purpose

The purpose of this Grant is to support a continuation and expansion of the Grantee's participation as a member of an interdisciplinary team of health planners by examining and estimating the costs and effectiveness of health sector policy alternatives.

B. Specific Objective

The specific objective of this Grant is to design and implement a method to develop information and techniques to enhance the capability of governments of LDCs to conduct health sector planning at regional and national levels.

C. Implementation

The Grantee will implement the program as more fully described in their proposal dated October 31, 1978, entitled "Estimating the Costs and Effectiveness of Health Sector Policy Alternatives in Developing Countries" which is hereby incorporated as part of this grant by reference. The Grantee will provide reasonable estimates of the effectiveness of alternative health care programs and combinations of programs in terms of health status indicators such as age-specific morbidity, mortality and disability days, and the budgetary costs of such programs. The programs being considered include various means of organizing medical care, combined with alternative preventive programs of immunizations, water supply and sanitation, nutrition, chemical prophylaxis and vector control and family planning.

The research activities include the completion of an operational model for calculating costs and effects, collection and examination of existing studies and reports to yield a first approximation of coefficients and aggregated effects on health status, the employment of quantitative estimates based upon judgements of experienced epidemiologists and public health workers, sensitivity analysis to determine priorities for field research, and the employment of cost analysis, survey research and laboratory back-up to improve the reliability of data. This is to be done in collaboration with designated health officials, particularly health planners.

As the objectives are to develop tools to be used by ministries in less developed countries and to provide technical services to help Ministries of Health apply these tools, collaborators in the research include researchers and planning officials from these countries. The research will also generate information that will enhance A.I.D.'s capacity to identify priorities among health care programs.

D. Reporting

1. As the objectives of this activity are to develop appropriate tools to be used by ministries in several less developed countries (to be selected) and to provide technical services to help selected Ministries of Health apply these tools, it is recognized that project outputs are difficult to specify in advance, and will vary by country. The Grantee shall submit all trip reports, copies of studies and reports collected on health status, and the results of various analyses of the interaction among determinants of health status to AID/PPC/PDPR, Washington, D.C., 20523.
2. Annual status reports detailing activities and progress in each country selected, including assessments by the grantee of the effectiveness of alternative health planning tools developed in collaboration with selected Ministries of Health, will be submitted to AID/PPC/PDPR.
3. At the completion of this grant, the Grantee shall submit twenty-two (22) copies of the final report, which will provide full account of the health planning methodology and related information on health programs and health status developed for three or four less developed countries. Twenty (20) copies will be sent to AID/PPC/PDPR; two (2) will be sent to the AID reference Center.
4. The Grantee shall submit to the Grant Officer, AID/W, one copy of a final fiscal report indicating all expenses incurred under this grant, no later than the completion date of this Grant.

E. Budget

The total estimated costs of this Grant is as follows, of which $150,000 is hereby obligated:

Line Items	5-15-79 5-15-80 1st Year	Projected 5-16-80 5-15-81	Projected 5-16-81 5-15-82	Total
1. Salaries & Fringe Benefits	$ 61,200	$ 66,096	$ 71,383	$198,679
2. Consultants	13,250	21,125	18,500	52,875
3. Travel & Per Diem	19,262	28,800	24,480	72,542
4. Other Direct Costs	11,000	13,000	13,882	37,882
Total Estimated Costs	$104,712	$129,021	$128,245	$361,978
5. Overhead	45,288	48,911	52,823	147,022
Grand Total	$150,000	$177,932	$181,068	$509,000

The Grantee may not exceed the total amount obligated for any one fiscal year. Adjustments among the line items are unrestricted.

F. Special Provision

1. The following Standard Provisions (Attachment 2) are deleted in their entirety:

Provision 7B: Payment - Periodic Advance

Provision 7C: Payment - Reimbursement

2. Standard Provision 10 "Procurement of Goods and Services Under $250,000" (Attachment 2) is deleted in its entirety and Standard Provision 10 (Appendix A to Attachment 2) is substituted in lieu thereof.

3. Standard Provision 28 - "Alterations in Standard Provisions" as shown in Appendix A to Attachment 2 is hereby incorporated and made a part of this Grant.

4. 5B Negotiated Overhead Rates - Educational Institutions

G. Negotiated Overhead Rate

Pursuant to the provisions of the clause of the General Provisions of the Grant entitled "Negotiated Overhead Rates - Predetermined," a rate or rates shall be established for each of the Grantee's accounting periods during the term of the Grant. The rate for the initial period shall be set forth below:

Rate	Base	Period
74%	Salaries & Wages plus fringe benefits	From: Effective Date of Grant To: Until Amended

MODIFICATION OF GRANT

Best Available Document

A. H.

1. Amendment No.	2. Effective Date	3. Grant No.	4. Effective Date
-	12-1-81	AID/OTR-G-1740	5-15-79

7. Grantee Name and Address,	6. Administered by-
Dr. Robert Grosse School of Public Health Dept. of Health Planning & Administration The University of Michigan Ann Arbor, Michigan 48109	Grant Officer Central Operations Division Office of Contract Management Agency for International Development Washington, D.C. 20523
PIO/T No. - 263-042-3-00157 Appropriation No. 72-1181027 Allotment Symbol NESA-80-232-63-K618 LE 142-50-263-00-69-30	5. Previous PIO/T's- 930-0082-3097332 930-0082-3007501 930-0082-3013200

The above numbered grant is hereby modified as follows:

Amount Obligated prior to this amendment	$486,932	
Amount obligated by this amendment USAID/CAIRO	$108,309	L.E. 59,200
TOTAL AMOUNT OBLIGATED	$595,241	L.E. 59,200

Grant Letter - Delete estimated completion date of "May 15, 1982" and substitute in lieu thereof the date "June 30, 1982".

Grant Letter - Second paragraph, second sentence, delete in its entirety and substitute in lieu thereof the following:

> "The total estimated cost of this Grant is $617,209 and L.E. 59,200 of which $595,241 and L.E. 59,200 is obligated."

Program Description - Specific Objectives - Add the following:

AID TECHNICAL OFFICE: PPC PDPR

This amendment is entered into pursuant to the authority of the Foreign Assistance 1961, as amended. Except as herein provided, all terms and conditions of the grant referenced in Block #3 remain unchanged and in full force and effect.

Grantee is required to sign this document and return copies to issuing office

GRANTEE

Robert N. Grosse

Name typed or printed,

TITLE: Chairman Dept. of Health Planning

UNITED STATES OF AMERICA
AGENCY FOR INTERNATIONAL DEVELOPMENT

BY: [signature]

A. E. Stanfield

Name typed or printed,

TITLE: Grant Officer

"The Grantee will prepare a report (i) that describes resource allocation in the Egyptian health sector and the related decision-making processes, and (ii) that analyzes selected questions pertaining thereto. The health sector is defined to include all activities relating to preventive and curative health and to family planning activities. The description of resource allocation will include real and financial stock and flow data for not less than the three most current years available. The report will cover both the public and private sectors.

The Grantee's interim report will be an important component of the USAID Health Sector Assessment scheduled to be conducted during the period November 1981 - April 1982. The report will also be utilized during the USAID Population Sector Assessment that is tentatively scheduled March 1982. It is, therefore, essential that the Grantee coordinate with the Assessment Teams through the USAID Office of Health and Office of Population."

B. Implementation - add the following:

"The Grantee's efforts will be divided into descriptive and analytical tasks by public and private sector and cover a health sector defined to include family planning activities.

Public Sector:

1. The Grantee will collect all key planning, budget, and expenditure data from the Ministry of Health, Ministry of Finance and such other sources as may be appropriate. Documents, including data appendices, will be translated into English and made part of the final report.

2. All programs being implemented and planned by the Ministry of Health will be described in terms of objectives and cost. Information on program impacts (e.g., number of beneficiaries) will be included, if available.

3. An organizational chart and an inventory of personnel and infrastructure (by governorate by urban-rural breakdown) of the Ministry of Health will be prepared.

4. The process of formulating, reviewing, and approving the Ministry of Health budget will be described. Procedures for amending or subsequently deviating from approved budget allocations will be described.

5. Positions within the Ministry of Health organization which make budgetary and program decisions will be identified. The role of governorate officials, both within and without the Ministry of Health, will be specifically addressed.

6. The relationship of the Ministry of Health to other government entities (e.g., Ministry of Finance) as they relate to the budget process will be described.

7. To the extent feasible, the information in items 1-6 above will also be prepared for other government ministries or public organizations that conduct major health sector activities.

8. Actual public sector expenditures will be compared with budget allocations to health for the most current three-year period. Data will be described by government ministry or public organization to the degree feasible, but at minimum for the Ministry of Health. Data will be described at two levels: (i) national aggregates by selected breakdowns, and (ii) detailed case studies of four governorates (Alexandria, Assiut, Beni Suef and one other governorate from the Delta). Data will be described as follows:

a. total national expenditures by government ministry or public organization broken down between current and capital expenditures by governorate (with urban-rural breakdown, if possible);

b. total national expenditures by allocation toward health sector objectives/programs (e.g., schistosomiasis eradication, oral rehydration, family planning, etc.) by governorate (with urban-rural breakdown, if possible). Breakdowns by program should be further disaggregated by current and capital expenditures. Within current and capital expenditures, an attempt should be made to distinguish between wage and other labor costs, purchases of goods and other services, etc. An attempt should also be made to disaggregate capital expenditures by domestic and foreign exchange content, by equipment and construction costs, etc.

Best Available Document

c. for governorate case studies, current expenditures by urban-rural breakdown by program activity by commodities and services purchased. Services by numbers and types of personnel (doctors, nurses, health care professionals, administrators, etc.) by type of health facility of assignment (e.g., health unit, health center, MCH clinic, university hospital, etc.) with details on total compensation package (wages, bonuses, incentive pay, overtime, employee benefits, plus any other form of compensation not identified above). Commodities by expenditures on drugs, supplies and other major current account categories by type of health facility in which consumed;

d. for governorate case studies, capital expenditures by urban-rural breakdown by program activity by investment component (e.g., construction and equipment) by type of health facility. Foreign exchange content of capital expenditures by source of finance, including names and amounts, by foreign donors;

e. for at least two of the governorate case studies, enumeration and case volume of the specific type of health service provided by type of urban-rural public health care facility utilized, by sex and age of patients, with related fees charged, if any.

9. While intended to be primarily descriptive, the report will analyze:

a. the degree of consistency between the Ministry of Health plan, budget, and actual expenditures;

b. trends in budget levels and the budgetary process (e.g., decentralization of decision-making);

c. The Egyptian Ministry of Health budget compared with budgets and budgeting for health in other developing countries, as well as the U.S.;

d. the adequacy/effect of incentives for Ministry of Health personnel;

e. the degree to which the Ministry of Health acts autonomously in making budgetary decisions;

f. the degree to which the health sector is affected by programs of ministries or public organizations besides the Ministry of Health;

g. the degree the present structure of the health sector, in financial and institutional terms, appears to be congruent with health sector goals;

Private Sector:

1. The Grantee will describe the private providers and consumers of health services in Egypt at the national level and for the four governorates identified earlier (for the same time periods selected for public sector data)

a. Total national health expenditures by governorate (with urban-rural breakdown, if possible) by type of health provider by type of health service (by case volume by average cost per case, if possible);

b. For governorate case studies, distribution of household expenditures on health, broken down between public and private sectors by source of service within the sectors (e.g., physician, nurse, pharmacist, daya, etc.), by type of service utilized (e.g., hospitalization, drugs, physician fees, etc.), by case volume, by average cost per case treated, by income class, by urban-rural distribution.

2. Data regarding satisfaction/dissatisfaction (or perceived quality differences) with alternative sources of health services, both public and private, will be presented.

3. The convergence/divergence between government reporting of health status and programs and consumer views of health problems will be presented.

4. The economics from the perspective of being a health service provider in the private sector (e.g., a doctor, pharmacist, daya, etc.), will be investigated. Incomes of doctors, pharmacists, etc., will be disaggregated by source of income (private patients, government related earnings, etc.) by urban-rural distribution, by age of the health provider, by location M.D. degree was earned (Egypt or abroad). Average fees by type of health provider by type of health service, by urban-rural location will also be examined.

5. Although the primary intent of the report is descriptive, it will: a) assess the impact of present incentive systems (public and private) facing the health provider in terms of how they affect allocation of time between public and private sectors and the relative quality of service delivered, and b) suggest a strategy for the government's relationship to the private health sector."

D. Reporting

Add the following:

" 5. Interim Report due March 15, 1982.

6. Final report due June 30, 1982."

E. Budget

Delete in its entirety and substitute the following:

" E. Budget

The total estimated costs of this Grant is as follows, of which $595,241 ($486,932 AID/W and $108,309 USAID/CAIRO) and L.E. 59,200 is hereby obligated.

	Line Items	5-15-79 5-15-80 1st Year	5-16-80 5-15-81	5-16-81 6-30-82	Total	LE 12-1-81 6-30-82
1.	Salaries & Fringe Benefits	$61,200	$66,096	$121,183	$248,479	32,200
2.	Consultants	13,250	21,125	31,000	65,375	-0-
3.	Travel & Per Diem	19,262	28,800	27,730	75,792	20,147
4.	Other Direct Costs	11,000	13,000	16,882	40,382	6,353
	Total Estimated Costs	$104,712	$129,021	$196,795	$430,528	59,200
5.	Overhead	45,288	48,911	92,581	136,730	-0-
	Grand Total	$150,000	$177,932	$289,377	$617,309	L.E. 59,200

The Grantee may not exceed the total amount obligated for any one fiscal year. Adjustments among the line items are unrestricted."

Add the following

"F Relationships and Responsibilities

The Grantee will coordinate all activities with USAID/Cairo and the Ministry of Health, as well as other relevant ministries and the private sector in implementing the efforts of this amendment."

82

APPENDIX B

STATEMENT OF WORK

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON D C 20523

ORIGINAL

COST REIMBURSEMENT CONTRACT WITH AN EDUCATIONAL INSTITUTION

K.M.

gotiated Pursuant to the Foreign Assistance Act 1961, as Amended, and Executive Order 11223	Contract Number OTR-0082 C-00-2516-00
ntract Type ost Reimbursement - No Fee	Amount Obligated $ 55,112
untry of Performance ited States, Egypt, Indonesia	Total Estimated Contract Cost $ 55,112
ntract For Assessing Technology for Est. Costs nd Effectiveness of Health Sector Alter.	Project Number 930 082
ntracting Office (name and address) OTR Branch entral Operations Division ffice of Contract Management gency for International Development ashington, D. C. 20523	Contractor (name, street, city, state, zip code) University of Denver (Colorado Seminary) University Park Denver, Colorado 80208
dministration By (if other than Contracting Office)	
gnizant Scientific/Technical Office (name, office symbol, dress) PPC/PDPR/TR gency for International Development ashington, D. C. 20523	Effective Date September 29, 1982 — Estimated Completion Date January 31, 1983
is is a Consulting Services Contract (AIDPR 7-4 804-50) [X] YES [ ] NO	Accounting and Appropriation Data PIO/T Number 930 0082-3025207
	Appropriation Number 72.1121021.8
	Budget Plan Code FDAA-82-13010-CG-11
is is a Contract for Studies and/or Reports (AIDPR 7-4 804-50) [X] YES [ ] NO	IRS Employer Identification Number (248-30-099-00-20-21) 84-0404231
yment Will Be Made By M/PAD gency for International Development ashington, D. C. 20523	Dun & Bradstreet Number N/A
	Type of Advance ("X" appropriate box) [ ] FRLC [ ] PERIODIC [X] NONE AUTHORIZED

The United States of America, hereinafter called the Government, represented by the Contracting Officer executing this Contract, and the Contractor, an educational institution chartered by the State of Colorado *with its principal office in* Denver, Colorado, *agree that the Contractor shall perform all the services set forth in the attached Schedule, for the consideration stated therein. The rights and obligations of the parties to this contract shall be subject to and governed by the Schedule and the General Provisions. To the extent of any inconsistency between the Schedule and the General Provisions and any specifications or other provisions which are made a part of this contract, by reference or otherwise, the Schedule or the General Provisions shall control. To the extent of any inconsistency between the Schedule and the General Provisions, the Schedule shall control.*

(Fill in appropriate spaces)

This Contract consists of this Cover Page, the Schedule of 6 *pages, including the Table of Contents, the General Provisions form AID 1420-23C, dated* 10-81 *),* Additional General Provisions (form AID 1420-23D dated 10-81, and the Alterations in Contract Attachments, dated June, 1982.

e of Contractor VERSITY OF DENVER (COLORADO SEMINARY)	UNITED STATES OF AMERICA AGENCY FOR INTERNATIONAL DEVELOPMENT
(signature of authorized individual)	By (signature of Contracting Officer)
ed or Printed Name io I. Davis	Typed or Printed Name L. E. STANFIELD
Treasurer & Manager of Business Affairs	Contracting Officer
	Date

SCHEDULE

COST REIMBURSEMENT CONTRACT WITH AN EDUCATIONAL INSTITUTION

Contract No. OTR-0082-C-00-2316-00

TABLE OF CONTENTS

SCHEDULE

The Schedule, on pages 1 through 6, consists of this Table of Contents and the following Articles:

ARTICLE I - STATEMENT OF WORK

ARTICLE II - KEY PERSONNEL

ARTICLE III - TECHNICAL DIRECTIONS

ARTICLE IV - PERIOD OF CONTRACT SERVICES

ARTICLE V - ESTIMATED CONTRACT COST AND FINANCING

ARTICLE VI - BUDGET

ARTICLE VII - NEGOTIATED OVERHEAD RATES

ARTICLE VIII - REPORTS

ARTICLE IX - ALTERATIONS IN CONTRACT

GENERAL PROVISIONS

The General Provisions applicable to this Contract consist of Form AID 1420-23C entitled "General Provisions-Cost Reimbursement Contract with an Educational Institution," dated 10/81, which includes provisions 1 through 41; Additional General Provisions-Cost Reimbursement Contract with an Educational Institution" dated 10/81 which includes provisions 1 through 21; and the Alterations in Contract Attachments, dated June 1982.

95

ARTICLE I - STATEMENT OF WORK

A. OBJECTIVE:

The purpose of this contract is two-fold: first, to evaluate the progress made under the research grant with the University of Michigan entitled "Estimating the Costs and Effectiveness of Health Sector Policy Alternatives in Developing Countries" (No. OTR-G-1740); and, second, to assess the relevance and applicability of the model developed under the grant for other LDC settings.

B. SCOPE OF WORK:

The Contractor shall evaluate the health model and prepare a report that assesses:

- the performance of the Contractor and AID in the implementation of the grant; and
- the utility of the model in designing health sector approaches in LDCs.

The report shall emphasize the appropriateness of the model as an econometric tool in the development of LDC health policy. Approximately one-third of the evaluation shall address the implementation of the Michigan project, and the balance of the effort shall be devoted to a broader assessment of the Michigan systems model as a technology for designing health sector strategies in LDCs.

Specifically, the Contractor shall:

1. Review and assess the activities carried out by the University of Michigan under the project, "Estimating the Costs and Effectiveness of Health Sector Policy Alternatives in Developing Countries.

2. Assess the usefulness of the model from the point of view of a) AID/W staff; b) AID mission personnel in the countries where the model was applied; and c) Ministry of Health staff in the countries concerned.

3. Assess the broader utility of the approach to developing countries.

4. Prepare recommendations, as appropriate, for the adaptation of the model to increase its usefulness in other LDCs.

5. Present the evaluation findings to the University of Michigan, PPC, and other AID staff.

86

6. Prepare a report that summarizes the results of 1-4 above in accordance with Article VIII.

The Contractor shall undertake domestic and international travel for the purposes of a) consulting with the University of Michigan prior to visits to Indonesia and Egypt. The purpose of this travel will be consultation with University of Michigan staff and document review. The Contractor shall also review findings of the field visit to Indonesia with staff at the University of Michigan. b) Consulting with AID/W staff (including the project manager) to discuss project methodology and to present draft report, and c) assessing the resource allocation model on site in Indonesia and Egypt.

ARTICLE II - KEY PERSONNEL

A. The Key personnel which the Contractor shall furnish for the performance of this contract are as follows:

Key personnel: Ronald P. Black (FS-1 salary ceiling waived)
Project Leader

Hugh C. Russell
Senior Associate

B. The personnel specified above are considered to be essential to the work being performed hereunder. Prior to making any change in the key personnel, the Contractor shall notify the Contracting Officer reasonably in advance and shall submit justification (including proposed substitutions) in sufficient detail to permit evaluation of the impact on the program. The listing of key personnel may, with the consent of the contracting parties, be amended from time to time during the course of the contract to either add or delete personnel, as appropriate.

C. (1) The Contractor shall obtain AID's approval to change the project leader or senior associate, or to continue the research work during a continuous period in excess of one month without the participation of either the approved project leader or senior associate.

(2) The Contractor shall consult with AID if the project leader or senior associate plans to, or becomes aware that he/she will, devote substantially less effort to the work than anticipated. If AID determines that the reduction of effort would be so substantial as to impair the successful prosecution of the research, AID may request a change of project leader, terminate the research effort or make any other appropriate modification.

71

ARTICLE III - TECHNICAL DIRECTIONS

Performance of the work hereunder shall be subject to the technical directions of the cognizant AID Scientific/Technical Office indicated on the Cover Page. As used herein, "Technical Directions" are directions to the Contractor which fill in details, suggest possible lines of inquiry, or, otherwise complete the general scope of the work. "Technical Directions" must be within the terms of this Contract and shall not change or modify the terms in any way.

ARTICLE IV - PERIOD OF CONTRACT SERVICES

The effective date of this contract is September 29, 1982, and the estimated completion date of work, including final report(s), under this contract is January 31, 1983.

ARTICLE V - ESTIMATED CONTRACT COST AND FINANCING

The Contractor will be reimbursed for the costs incurred by it in performing services hereunder in accordance with the applicable provisions of the Schedule and the General Provisions, subject to the following limitation made in respect thereto:

The total estimated cost of the Contract to the Government is $55,112. The total amount obligated is $55,112. See Article VI, BUDGET.

ARITCLE VI - BUDGET

Line Item No.		
1.	Direct Labor Costs	$ 21,617
2.	Travel and Allowances	13,388
3.	Other Direct Costs	1,661
4.	Overhead	9,647
5.	G&A	8,799
	Total Estimated Costs	$ 55,112

Total contract expenditures shall not exceed the total estimated contract cost. Within the grand total, the Contractor may adjust line item amounts as reasonably necessary for the performance of the work.

The Contractor also agrees to furnish data which the Contracting Officer may request on costs expended or accrued under the contract in support of the budget information provided herein.

ARTICLE VII - NEGOTIATED OVERHEAD RATES

Pursuant to the clause of the General Provisions of this contract entitled "Negotiated Overhead Rates - Predetermined," a rate or rates shall be established for each of the Contractor's accounting periods during the term of the contract. The rates for the initial period shall be as set forth below:

	Rate	Base	Period
Overhead On Campus	54%	(a)	From: 7/1/82 To: 6/30/83
Off Campus	40%	(b)	From: 7/1/82 To: 6/30/83
General Administration	19%	(c)	From: 7/1/82 To: 6/30/83
Fringe Benefits	20.5%	(d)	From: 7/1/82 To: 6/30/83

Base:

(a) Direct Salaries and Wages, including fringe benefits, but excluding overtime premiums and overseas salary differential.

(b) Direct Salaries and Wages, including fringe benefits, but excluding overtime premiums and overseas salary differential of employees performing work off campus for more than sixty (60) consecutive days.

(c) Modified Total Costs (MTC) excluding equipment, individual subcontract costs in excess of $25,000, student aid, and total amount of each expendable item over $3,000.

(d) Total Salaries and Wages including holidays, vacations, sick leave, overtime and overseas differential.

ARTICLE VIII - REPORTS

A. The Contractor shall deliver the following reports to the technical office:

1. Outline for Project Methodology

The Contractor shall submit an outline for the assessment after consultation with AID/Washington personnel and University of Michigan staff and prior to undertaking international travel. The outline will be as mutually agreed upon by the Contractor and the AID project manager.

2. Draft Report

The Contractor shall submit a draft report in three copies by December 15, 1982, prior to presentation of findings in AID/Washington.

3. Final Report

The Contractor shall submit a final report, in ten copies, incorporating AID comments on the draft, three weeks after receipt of AID comments.

B. Two copies of each report shall be submitted to the Office of Development Information and Utilization, Bureau for Development Support, Agency of International Development, Washington, D.C. 20523. The title page of all reports forwarded shall include the contract number, project number, and project title as set forth on the cover page of the contract.

ARTICLE IX - ALTERATIONS IN CONTRACT

A. The clause entitled Patent Rights (March 1982) (OMB Circular A-124) is hereby incorporated into this Contract as Attachment A.

B. In accordance with paragraph (a) of Additional General Provisions No. 5 and No. 9, the Contracting Officer hereby gives the required approval for individuals required to work and/or travel outside the United States; provided, however, that concurrence with the assignment and/or travel of any and all such individuals is obtained in writing from the cognizant A.I.D. Scientific/Technical Office prior to their assignment and/or travel.

90

GENERAL SERVICES ADMINISTRATION

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQUEST NO.	5. PROJECT NO. (If applicable)
OTR-0082-C-00-2316-02	12/31/82	PPC/PDPR/HR Memo	

6. ISSUED BY	CODE	7. ADMINISTERED BY (If other than item 6)	CODE
OTR Branch Central Operations Division Office of Contract Management Agency for International Development Washington, D. C. 20523		Technical Office PPC/PDPR/HR	KAM

8. CONTRACTOR NAME AND ADDRESS (Street, city, county, state, and ZIP code)	CODE / FACILITY CODE	9. AMENDMENT OF SOLICITATION NO. / DATED (See block 9) / MODIFICATION OF CONTRACT/ORDER NO. / DATED (See block 11)
fbh University of Denver (Colorado Seminary) University Park Denver, Colorado 80208		☐ AMENDMENT OF SOLICITATION NO. ____ DATED ____ ☒ MODIFICATION OF CONTRACT/ORDER NO. OTR-0082-C-00-2316-00 DATED 9/29/82

THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in block 12. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offerors must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended, by one of the following methods:

(a) By signing and returning ____ copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If, by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided such telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

10. ACCOUNTING AND APPROPRIATION DATA (If required) PIO/T 930-0082-302307

Appropriation No. 72-1121021.8
Allotment No. FDAA-82-13010-CG-11 (248-30-099-00-20-21)

THIS BLOCK APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS

(a) ☐ This Change Order is issued pursuant to ____

The Changes set forth in block 12 are made to the above numbered contract/order.

(b) ☐ The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation data, etc.) set forth in block 12.

(c) ☒ This Supplemental Agreement is entered into pursuant to authority of The FAA of 1961, as amended, and E.O.'s 11223 and 12163

It modifies the above numbered contract as set forth in block 12.

DESCRIPTION OF AMENDMENT/MODIFICATION

ARTICLE I - STATEMENT OF WORK

Except for the last paragraph, delete the contents of the article and insert the following in lieu thereof:

A. Purpose

The purpose of this contract is twofold:

1. To evaluate the potential usefulness of progress made under Research Grant No. OTR-G-1740 (to the University of Michigan) entitled, "Estimating the Costs and Effectiveness of Health Sector Policy Alternatives in Developing Countries" (hereinafter called the "model"), as one instrument for implementation of A.I.D.'s emerging health policy; and,

Except as provided herein, all terms and conditions of the document referenced in block 8, as heretofore changed, remain unchanged and in full force and effect.

☐ CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT ☒ CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN Original and 6 COPIES TO ISSUING OFFICE

15A. NAME OF CONTRACTOR/OFFEROR	15B. UNITED STATES OF AMERICA
Francis L. Roberts (Signature of person authorized to sign)	BY ____ (Signature of Contracting Officer)

91

2. To recommend the most useful applications of work completed under this grant, for increasing the effectiveness of health programs through improved program design and management.

B. Scope of Work

The Contractor shall complete the scope of work in four phases of activity: familiarization, evaluation, discussion, and recommendation. Each phase shall include a specific set of activities:

1. Familiarization: The Contractor shall become familiar with:

a. A.I.D.'s current health policy development;

b. Applications of the model in Ghana, Egypt and Indonesia;

c. Use of the model as a vehicle for training LDC nationals in health sector planning, at the University of Michigan; and,

d. Use of the model as a vehicle for in-service training of LDC nationals during applications in Egypt and Indonesia.

2. Evaluation: The Contractor shall evaluate the model's:

a. Practicability for A.I.D. Mission personnel and LDC nationals;

b. Potential as a predictive model for health program planning;

c. Potential as a model for monitoring and controlling health service utilization and outcomes; and,

d. Potential as an instrument for training public health program managers.

3. Discussion: The Contractor shall provide written and oral commentary on:

a. Various mechanisms for transfering health program management technology to LDCs, based upon:

- the Contractor's professional experiences with technology transfer in LDCs; and,

- observations on health management human resource development programs at the University of Michigan and Johns Hopkins University, as well as Indonesia and Egypt.

b. Relative merits of the model (in comparison to other approaches) as a vehicle for training LDC health program managers to consider the costs and effects of health interventions when deciding among program alternatives.

4. Recommendation: The Contractor shall culminate all contract activities with a written report and oral briefings which include recommendations for:

a. Desirable objectives and approaches for human resource development in the health sector in LDCs (based on the Contractor's experiences and field observations made within the scope of this contract).

b. The optimal role for the model in designing and managing public health programs in LDCs; and,

c. Specific applications of the model as an instrument for public health management technology transfer in LDCs.

The Contractor shall present the results of all three phases of activity to the University of Michigan, PPC and other A.I.D. staff; and shall prepare a written report which summarizes the results of 1-3 (above) in accordance with Article VIII.

APPENDIX C

LIST OF DISCRIMINATORS

TECHNOLOGY ASSESSMENT DISCRIMINATORS

What follows are 80 items by which we will discriminate the merits and utility of the "model" in the context of A. I. D.'s emerging health sector policy. They do not, by any means, represent all the discriminators one could use in evaluating the model. They are not intended to be exhaustive

Instead, they are derived from three sources. The first, and most important one, is the October 15, 1982, DRAFT health sector policy paper. In effect, we turned A. I. D. health sector priorities into discriminators. The second source was over fifty documents (books, articles, reports, memoranda, letters, telegrams, etc.) relating to the modeling activity. The third source was 15 interviews with A. I. D. and academic specialists who have experience and knowledge about the model.

The 80 discriminators are organized into seven categories, as follows:

SCHEDULE A: Technical Characteristics of the Model

SCHEDULE B: Requirements for Effective Deployment of the Model

SCHEDULE C: Input Requirements for the Model

SCHEDULE D: Impact of the Model on Health Sector Management

SCHEDULE E: Health Sector Needs and Program Priorities

SCHEDULE F: Research Capabilities Offered by the Model

SCHEDULE G: Training Potential Offered by the Model

Each category of discriminators is preceded by a short paragraph which provides a summary of the kind of information we seek about the model through this line of questioning.

Together, all seven categories comprise a semistructured interview schedule. Interviewers will NOT be asking all informants, all 80 questions. Instead, they will use the interview schedule to guide their, more spontaneous, line of questioning. Initially the interviewer must ascertain the informants role, knowledge and experience with the modeling activity. Then the interviewer must select the highest priority interview schedules which pertain to that informant. The individual discriminators are stated in question form though the interviewer is encouraged to use more spontaneous language.

The 80 discriminators are numbered successively in order to make it easier for the interviewers to note the ones to which they acquired informants' responses. It is essential that the interviewers take comprehensive notes during each interview. Include informant's key words in quotation marks; note all main themes, even if they do not seem important at the time. Too much data can be thrown out later. Not enough jeopardizes the validity of the entire project.

Note the discriminator number to which the informant is responding, beside the notes on the informant's comment. At the end of each day, review each interview; recall each discriminator and discussion; fill in important gaps in the notes taken at the time of the interview. Be sure that it will be easy to recreate the interviews many weeks later, for data analysis. This may be completed by analysts who did not participate in the interview so the clarity of those notes is imperative. We do not have the luxury of double-teaming or collaboration in either data collection or analysis, on this project.

Review the 80 discriminators frequently during the period of interviews. Be certain that the interviews are providing reasoned responses to each one. As the interview period begins to draw to a close, make sure that each category of discriminators has been sufficiently covered. Seek interviews to fill in the gaps during the latter days of the interview period. For the most important discriminators (e.g., SCHEDULE D), be sure that interviews were completed with a variety of informants representing the full range of points of view.

SCHEDULE A

Technical Characteristics of the Model: These questions deal with underlying assumptions about: (1) the relationships among dependent and independent variables which are treated by the model; (2) the quantitative manner in which they are treated; and (3) the manner in which results of their treatment are interpreted. All of them are a priori to the model itself; i.e., they are assumptions made, either explicitly or implicitly, as a basis for the modeling activity. It remains for us to assess them by discovering how the model operates.

1 How credible are sources of input data on prevalent diagnoses, costs and expenditures of health program elements, and health effects?

2. How valid is the data, input to the model?

3. How is validity of input data determined? Are there any protocols for determining validity, inherent in the modeling process?

4. Does the model reflect valid relationships between health planning variables like health programs, health program effects, and their costs?

5. What is the empirical basis for assumptions about the relationships between health sector program alternatives and their effects on users?

6. Are the relationships discerned by the model causal, or associative?

7. Is the model sufficiently sensitive to variations in health planning variables, which effect significant variation in the relationships among them?

8. Does the model derive viable alternatives for action (or decision)?

9. Does the model provide comparison of the effectiveness, efficiency and cost of each alternative?

10. Does the model identify critical times for action or decision-making?

11. Are differences between settings (points in time) registered in a way which depicts qualitative differences in type of action (or decision) called for?

12. Can the model track health program effects apart from uncontrolled influences on them?

13. What are objections to the application of economics to public health planning? What are viable alternatives?

14. What are objections to the model's linearity (additive algorhythm)? What are viable alternatives?

SCHEDULE B

Requirements for Effective Deployment of the Model: These questions deal with the essential characteristics of the environment in which the model is deployed. In other words what environmental characteristics would maximise the utility of the model? Answers to these questions will help us determine the most desirable locus of modeling activity, e.g., stateside, regionally, missions or LDCs,; if LDCs, nationally, provincially, or locally; public sector or private, or both?

15. Are managers able to collect the required input information for the model?

16 How frequently are epidemiological and economic data on national health trends collected?

17. How frequently are epidemological and economic data on provincial or local health trends collected?

18. Are these data aggregated from actual utilization rates, and/or, compiled from periodic surveys?

19. Are LDC health managers able to process the required input information?

20. What scope and level of sophistication is needed in health management personnel who operate (input, analyze and report) the model? (20+)

21. At what level of government and the private sector are such people currently available in LDCs? (20+)

22. What kind of training (subjects and duration) are required for LDC health managers to be able to operate the model?

23. What is the level-of-effort necessary to train health managers to use the model?

24. Are people of sufficient sophistication currently posted in the mission?

25. What LDC health policies are necessary for maximising the utility of the model? (24+)

26. What institutional capabilities are necessary within a LDC to use the model for analysis of appropriate mix of health services and optional resource allocations? (23)

27. What institutional capability is necessary within missions to use the model for analysis of appropriate mix of health services and optional resource allocations?

28. What proportion of health managers in the Ministry of Health are health practitioners (doctors, nurses, community health workers, etc.)?

29. How amenable are LDC institutions, health managers and practitioners to use of the model? (20+) Why?

30. How amenable are mission personnel to use of the model? (20+) Why?

31. Could the model be deployed in the private sector and provided on a fee-for-service basis to the public sector?

32. What are objections to the level of effort required to use the model? What are viable alternatives?

SCHEDULE C

Input Requirements for the Model: These questions really assess two dimensions. What is necessary as input for the model before it is of minimal utility; and, what more is desirable to make the model most useful? These issues go to the heart of the question about practicability of the model. In the last analysis, we will probably be required to make a "judgment call" on the basis of what we see in Egypt and Indonesia -- because the discriminators on this issue are not perfectly clear. The Egypt-Indonesia comparison will be important because of differences in the input data sets used (Egypt=negotiated data; Indonesia= more systematic data collection techniques).

33. Does the model require results of country-specific epidemiological profiles? (16)

34. Does the model require results of culturally specific assessments of health-related practices? (16)

35. Is the model equally effective without either country-specific epidemiological profiles, or culturally specific health practice assessments?

36. Does the model accomodate information about private, as well as public, resources for health improvements? (20)

37. Does the model make it possible to discriminate between public and private resources?

38. Where are data on private resources most readily available?

39. How reliable are they?

40. Is the level-of-effort required to derive and process input data for the model, justified by the model's output?

SCHEDULE D

Impact of the Model on Health Sector Management: These questions deal with the output side of the model, for the most part. They provide opportunity to assess the efficacy of the model in light of A. I. D.'s emerging health sector policy emphasis on management and infrastructure development.

41. What is the greatest contribution of the model to date?

42. What is the greatest contribution of the model to health planning?

43. What health management decisions have been aided by the model?

44. What impact has the model had on the allocation of health resources?

45. What, in the modeling activity, is useful to health practitioners?

46. What, in the modeling activity, is useful for a particular PHC facility in a rural community?

47. What, in the modeling activity, is useful for provincial or national managers of PHC facilities throughout the area?

48. How do the results of the modeling activity compare to the judgments of people who would have had to make decisions if the model were not there?

49. How do results of the modeling activity compare to judgments of an expert like Ruth Poffer (India and Indonesia); in terms of level-of-effort, coverage of health issues, timing, costs, validity and credibility?

50. How many national government agencies were involved in the modeling project; what agencies were represented?

51. To what extent has the modeling activity involved people who do not have a particular health background, or health training?

52. What other health-related management information systems are currently used in the Ministry of Health and the A.I.D./mission?

53. What other management information systems are desired?

54. At what level of management (regional, national, provincial or local) does the model have the greatest contribution to health planning?

55. Is the model useful at the strategic level to assess national health resources? (23)

56. Is the model useful at the strategic level to assess national health needs? (23)

57. In what ways can the model strengthen the health planning capacity of regional institutions? (27)

58. What impact has the model had on the private sector?

59. Can the model help analyze budget flows in the health sector? At what level of activity (national, provincial, local)? (27)

60. Can the model help evaluate the impact of LDC health policies? (27)

61. Can the model help assess the efficiency of alternative health intervention packages? (16)

62. Can the model help evaluate costs and effectiveness of health systems, or components of health systems? (18)

63. Can the model compare demand and availability of health services? (20+)

64. Can the model be used to assess adequacy (demand and availability) of health services in the private and public sectors? (20+)

65. Can the model track (not only health services demand and costs, but also) revenue generation and coordination of health services? (23)

66. Would the model be a useful tool for monitoring health services utilization and resource absorbtion; and for analyzing utilization patterns and resource requirements?

67. Does the model track any management, supervisory, administrative, maintenance, repair or other logistics information associated with health management? (20+)

SCHEDULE E

Health Sector Needs and Program Priorities: These questions focus upon those few health sector program priorities emphasized by A. I. D.'s emerging health policy. In answering these questions, it will be useful to note contributions of the model to other health program elements as well. But it is vital to focus upon these few, if we are to evaluate the model's utility and role in the context of A. I. D. resource allocation criteria.

68. Can the model monitor demand for health services? (20)

69. Can the model help analyze income levels and community expenditure patterns for health care in these categories:

    -- hospital services and commodities;
    -- health post or dispensary services and commodities;
    -- family planning services and commodities;
    -- drugs;
    -- health provider salaries;
    -- water supply and sanitation services;
    -- transportation for health sorkers; and,
    -- supervision for PHC facilities? (29)

70. Can the model accomodate the following health service priorities:

    -- growth monitoring and nutrition education;
    -- prenatal screening;
    -- training of mothers in dehydration and treatment;
    -- family planning information and services;
    -- basic immunization of infants and children; and,
    -- emergency treatment of injuries? (17)

71. Does the model facilitate acquisition of information on private sector resources for health, private health services, and private health service utilization? (20+)

SCHEDULE F

Research Capabilities Offered by the Model: On the one hand, it is likely that the model provides great potential as an instrument for research on the management of public health programs. On the other, it is doubtful that we will discover much about these questions in either Egypt or Indonesia. It is more likely that the pilot experiences will only imply something of the value of the model as a tool for research. Therefore, we must be sensitive to these possibilities as we ask questions about the model's practical utility in both countries.

72. Can the model help identify those health problems which contribute most significantly to mortality and morbidity? (16)

73. How can the model enhance public health research in the country?

SCHEDULE G

Training Potential Offered by the Model: It has been said, by a variety of people that the greatest desirable impact of the model, to date, has been in teaching users "to ask the right questions." In this section of the evaluation, we intentionally seek evidence of the model's impact as a tool for training. It's possible that the potential for training health program managers is as significant an impact of the model as its utility for health program planning.

74. What were the most useful lessons learned through application of the modeling activity?

75. What did the modeling activity teach about the public health planning process?

76. What training activities are currently available for health managers?

77. How much collaboration is there between the Ministry of Health and the Ministry of Education on education and training of health practitioners and health managers?

78. How do School of Public Health (University) people feel about the model as a tool for training health managers?

79. What impact has modeling activity had on those LDC nationals who worked closely with it? How has it influenced their thinking and approach to health management problems?

80. What role could the model play for incountry, or regional, training of health managers, or training of trainers? (21+)

APPENDIX D

LIST OF INFORMANTS

Stateside Informants

1. Dr. Robert N. Grosse
   Department of Health Planning
   and Administration
   School of Public Health
   University of Michigan
   Ann Arbor, Michigan

2. Dr. Jan L. de Vries
   School of Public Health
   University of Michigan

3. Dr. Lawrence Brilliant
   School of Public Health
   University of Michigan

4. Ms. Abby Bloom
   Senior Health Planning Officer
   PPC/PDPR/HR
   USAID/Washington

5. Dr. Ann Van Dusen
   Director
   PPC/PDPR
   USAID/Washington

6. Dr. J. Jarrett Clinton
   Director
   Health, Population and Nutrition
   Bureau of Science and Technology
   USAID/Washington

7. Dr. George Curlin
   Chief
   Health, Population and Nutrition
   Asia Bureau
   USAID/Washington

8. Dr. Eugene Boostrum
   Health Planning Consultant
   USAID/Washington

9. Ms. Emily Leonard
   Public Health Advisor
   USAID/Washington

Egyptian Informants

1. Dr. Ramses Gomaa
   First Undersecretary
   Office Affairs Section
   Ministry of Health

2. Dr. Almotaz B. Mobarek
   First Undersecretary
   Basic Health Care and Families
   Ministry of Health

3. Dr. Helmy M El Bermawy
   Director General
   Health Planning
   Ministry of Health

4. Mr. Abdel Moneim Fouaad
   Director General
   Statistics and Information
   Ministry of Health

5. Mr. Mohamed El Molla
   Director General
   Follow-Up
   Ministry of Health

6. Dr. Ahmed Nagati
   Director
   Rural Health Project
   Ministry of Health

7. Dr. Shusham Bhatia
   Consultant
   Rural Health Project
   Ministry of Health

8. Dr. Abdel Moneim Mahmoud
   Director
   Second Population Project
   Ministry of Health

9. Dr. Fauzia Gadulla
   Director
   Torah Health Center
   Cairo

10. Dr. William Abdel-Malaak
    Director
    Family Planning Unit
    Assyout

11. Ms. Moshira El Shaffie
    Deputy Director
    Family Planning Project
    Ministry of Health

12. Mr. Galal Bahieldin
    Health Statistician
    Ministry of Health

13. Dr. Wafik A. Hassouna
    Director
    Social and Cultural Center, and
    Experimental Center for Training
    Researchers
    Institute for National Planning

14. Dr. Alfonse Azis Kadis
    Director
    International Trade Center
    Institute for National Planning

15. Dr. El Sayed A. Dohaia
    Director General
    Economic Planning Center
    Institute for National Planning

16. Dr. Ibrahim El Issawy
    Consultant
    Institute for National Planning

17. Professor Abdel Karim Alawhal
    Senior Expert in Sociology
    Institute for National Planning

18. Ms. Lotfalla Imam Saleh
    Health Economist
    Institute for National Planning

Egyptian Informants (Continued)

19. Dr. Medhat Abdel Aziz
    Health Planner
    Institute for National Planning

20. Ms. Mona Khorshid
    Health Economist
    Institute for National Planning

21. Dr. William Oldham
    Director
    Office of Health
    USAID/Cairo

22. Mr. Thomas E. Reese
    Director
    Office of Population
    USAID/Cairo

23. Mr. John Wiles
    Office of Health
    USAID/Cairo

24. Mr. Robert Rucker
    Program Office
    USAID/Cairo

25. Mr. Richard Fankel
    Program Office
    USAID/Cairo

26. Ms. Emily Baldwin
    Program Evaluator
    Program Office
    USAID/Cairo

27. Dr. James Jeffers
    Consultant
    University of Iowa
    USAID/Cairo

Indonesian Informants

1. Dr. Widodo Sutopo
   Director
   Health Services Research Center

2. Mr. Nazazi Soebagio
   Secretary
   Health Services Research Center

3. Mr. Robert L. Tilden
   Country Director/Indonesia
   Helen Keller International

4. Mr. Peter Hornby
   Consultant
   Planning Bureau
   Ministry of Health

5. Dr. L. Ratna Budiarso
   Program Director
   Indonesian Household Survey
   National Institute of Health
   Research and Development

6. Dr. Burhanuddin A. T.
   Director
   Office of Personnel
   Ministry of Health

7. Dr. Loedin
   Director
   National Institute of Health
   Research and Development

8. Mr. Sumengen
   Staff
   National Institute of Health
   Research and Development

9. Mr. Soemarlin
   Secretary
   National Institute of Health
   Research and Development

10. Dr. Anhari Achadi
    Vice Dean
    School of Public Health
    University of Indonesia

11. Dr. Does Sampurno
    Dean
    School of Public Health
    University of Indonesia

12. Mr. Puta Lava
    Deputy Director/Training
    Training and Education Center
    Ministry of Health

13. Dr. C. F. Wattimena
    Deputy Director/Programing and Planning
    Training and Education Center
    Ministry of Health

14. Dr. Soedarjanto
    Deputy Director/Planning and Budgeting
    Training and Education Center
    Ministry of Health

15. Ms. Stein
    Staff
    Training and Education Center
    Ministry of Health

16. Dr. Suharto Wirjowidagda
    Secretary
    Community Health
    Ministry of Health

17. Dr. Hapsara
    Chief
    Planning Bureau
    Ministry of Health

18. Dr. M. Bastaman
    Assistant Inspector
    Inspectorate General
    Ministry of Health

Indonesian Informants (Continued)

19. Mr. A. M. Meliala
Assistant Inspector
Inspectorate General
Ministry of Health

20. Dr. R. Soebekti
Director General
Community Health
Ministry of Health

21. Dr. Mohamad Isa
Director
Training and Education Center
Ministry of Health

22. Dr. Julie Sulianti Saroso
Consultant to the Minister
Ministry of Health

23. Dr. R. Henry Pardoko
Director General/Population
National Family Planning
Coordinating Board

24. Dr. W. Bahrawi
Inspector General
Ministry of Health

25. Dr. Budiono
Program Director
Cost Benefit Analysis
Health Services Research Center

26. Dr. Hardi Soeseflo
Health Services Research Center

27. Mrs. Titien Setiobudi
Health Services Research Center

28. Mr. Nicholas Studzinski
Office of Health
USAID/Jakarta

29. Dr. David H. Calder
Director
Office of Health
USAID/Jakarta

30. Dr. Emanuel Volgaropolous
School of Public Health
University of Hawaii

31. Dr. Geofrey Ferster
World Health Organization
Consultant to Planning Bureau
Ministry of Health

APPENDIX E

REPORT ON SURVEY OF UNIVERSITY OF MICHIGAN LDC HEALTH PLANNING AND ECONOMIC DEVELOPMENT ALUMNI

UNIVERSITY OF DENVER
An Independent University
University Park, Denver, Colorado 80208

Denver Research Institute

December 27, 1982

To: Dr. Ronald Black
Dr. Robert Grosse
Dr. William Reinke

Fm: Hugh C. Russell

Re: Analysis of Alumni Reactions to the University of Michigan Health Planning and Economic Development Curriculum

Since 1975, the University of Michigan, School of Public Health, Department of Health Planning and Administration, has offered curricula in health planning and economic development, for mid-career officials from developing countries. Since then, over 107 people from 37 countries have participated in the program. In 1981 and 1982, alumni from the HPED program were surveyed by the Department, in order to facilitate a University evaluation of School offerings. The results of that survey provide the basis for the following analysis of the HPED program.

Raw data for this work were offered by HPED program administrators, in the interests of a comprehensive, fair and professional evaluation by the DENVER RESEARCH INSTITUTE team. Permission was granted by the Department for the evaluation team to use these data during evaluation discussions and deliberations. Permission was not requested, nor granted, for the team to use them in any other way--e.g. comparison to training opportunities in other universities, or discussion with associates in other institutions or A.I.D., etc. Further, the following analyses were not reviewed or cleared by representatives of the Department or HPED program personnel. Hence, they cannot be assumed to represent their interpretations of alumni responses to the program.

Therefore, I request that this report be used for discussion purposes only, by and among, Drs. Black, Grosse, Reinke and Russell, unless and until permissions for other uses are specifically granted by the Department of Health Planning and Administration.

113

THE UNIVERSITY OF DENVER IS AN AFFIRMATIVE ACTION INSTITUTION

Health Planning Training for Developing Countries

Since 1975, the HPED program has provided training opportunities to 107 people from 37 developing countries. Over seventy percent of these alumni (71%) are now working as health program managers; and it can be presumed that in this capacity the majority have opportunity to apply what they learned at the University of Michigan. Further, almost a fifth of the alumni (19%) are working in manpower development positions (training programs, universities, etc.) from which they have opportunity to propogate the health planning methods they learned at the University of Michigan. Only about one-tenth (9%) of the alumni are currently working primarily as health practitioners. It is interesting to note that while so few of the alumni are practitioners, approximately two-thirds (62%) of them were originally trained in this capacity (physicians, dentists, nurses, etc.).

The countries represented by HPED students are ranked below by total number of students from each:

DISTRIBUTION OF LDCs REPRESENTED BY HPED ALUMNI

Countries						No. Students	%
1.	Egypt					14	13
2.	Indonesia					12	11
3.	Ghana					10	10
4.	United States					10	10
5.	Nigeria					7	7
6.	India					6	6
7.	Afghanistan	8.	Bangladesh	9.	Korea	3	3
10.	Taiwan	11.	Uganda				
12.	Iran	13.	Kenya	14.	Nepal	2	2
15.	Tanzania	16.	United Arab Emirates				
17.	Botswana	18.	Bolivia	19.	Colombia	1	1
20.	Ethiopia	21.	Guatemala	22.	Honduras		
23.	Japan	24.	Kuwait	25.	Lesotho		
26.	Libya	27.	Malaysia	28.	Mexico		
29.	New Guinea	30.	Pakistan	31.	Somalia		
32.	Sudan	33.	Syria	34.	Thailand		
35.	Uruguay	36.	Yemen	37.	Zimbabwe		

Survey Respondents

In 1981 and 1982, 37 HPED students completed and returned questionnaires which asked about their work in their own countries, and the usefulness of training received at the University of Michigan. The returned questionnaires came from students in 16 of the countries represented by all alumni (43%). So

while few more than one-third of the population of students is represented, almost one-half of the countries are represented by the returned questionnaires. Furthermore, those countries represented in the sample, include all from which the HPED drew its largest numbers of students. The countries represented in the survey are ranked below by frequency of response to this mail survey.

COUNTRIES REPRESENTED IN THE SURVEY SAMPLE

Countries			No. Students	%
1. Indonesia			9	24
2. United States			6	16
3. Nigeria			3	8
4. Egypt	5. Ghana		2	5
6. India	7. Iran			
8. Korea	9. Uganda			
10. Afghanistan	11. Bolivia		1	3
12. Kenya	13. Tanzania			
14. Thailand	15. United Arab Emirates			
16. Uruguay				

It should be noted that this survey was targeted on HPED alumni. It was not intended to include opinions of LDC health officials who have not participated in the HPED program. Hence, it is not possible to generalize about the value of HPED training to anyone other than alumni.

Secondly, it is important to realize that most of the responding alumni have no continuing relationship with the University of Michigan, which they are interested in protecting. Therefore, there is little incentive for them to make favorable comments about the program, for any reason other than their true feelings about its usefulness and applicability to their current work.

Current Professional Status of HPED Alumni — Asked what their current professional duties and responsibilities are, most HPED alumni mentioned more than one. However, by far the largest proportion of them function in areas which would permit application of the health planning techniques learned at the University of Michigan. The following table depicts these outcomes.

CURRENT PROFESSIONAL STATUS OF ALUMNI

	Roles	N	%
1.	General management and administration	27	38
2.	Health planning	15	21
3.	Research (unspecified)	10	14
4.	Health program evaluation, monitoring and control	9	13
5.	Teaching	8	11
6.	Medical treatment	3	4
	TOTALS	72	101*

*±100% because of rounding error.

Adding categories related to health program management (nos. 1, 2, and 4) shows that almost three-fourths of the HPED alumni (72%) have returned to professional positions in which they can apply what they learned at Ann Arbor. In other words, despite original training to practice medicine, most have made the transition to the health program management sector with the help of the HPED program.

Assuming most alumni studied health planning because they wanted to make this transition, it remains to discover why they chose the University of Michigan curriculum.

Reasons for Choosing the University of Michigan HPED Program

The HPED students were asked why they chose the University of Michigan HPED program for their advanced studies in public health planning. Twenty-nine percent of them replied that they came to Ann Arbor because they desired the particular econometric approach espoused by this Department--as opposed to "more traditional" epidemiological approach offered at other institutions.

Twenty-four percent said they were attracted because the University of Michigan program had the best reputation around the world. Another twenty-four percent knew only that their superiors chose the Michigan program for them--for reasons they did not know. Sixteen percent cited the particular degree as a reason for coming to the University of Michigan; and the balance (7%) cited miscellaneous reasons. These data are reflected in the following table.

REASONS FOR CHOOSING HPED PROGRAM

	Reasons	N	%
1.	Econometric approach	13	29
2.	Reputation of U of M	11	24
3.	Supervisor chose	11	24
4.	MPH/DPH degree	7	16
5.	Miscellaneous	3	7
	TOTALS	45	100

We could interpret this data to reflect real felt needs for this particular approach to national health planning, as well as a modicum of credibility enjoyed by the University of Michigan, in this field.

Value of the HPED Program to Alumni

Asked what was particularly valuable about the University of Michigan curriculum, HPED alumni overwhelmingly nominated the econometric approach to national health planning. Some of them expanded on this theme to emphasize the relationship of health planning to other aspects of country development. Others differentiated this from the "traditional approach" to health planning. The main answers to this line of questioning are represented in the following table.

MAIN VALUE OF THE HPED PROGRAM

	Valuable Components	N	%
1.	Econometric approach	27	50
2.	Specific planning methods	14	26
3.	Overview of health planning	6	11
4.	Personal contacts in field	4	7
5.	Perspective on other LDCs	2	4
6.	Miscellaneous	1	2
	TOTALS	54	100

Again, adding proportions related to the unique character of HPED curriculum (nos. 1, 2, and 4) shows 83 percent of the alumni confirming the special "value" of this approach to public health planning.

Useful Components of the HPED Program

HPED alumni were asked to mention parts of the HPED curriculum which they found "most useful". Many of them mentioned many aspects of the curriculum. However, by far the most frequently mentioned areas were those which distinguish this econometric approach to health planning. Courses relating economics to national development and health policy were cited most often. Seventeen different course subjects are ranked below by frequency of occurrence.

MOST USEFUL COMPONENTS OF THE HPED PROGRAM

	Subject Areas	N	%
1.	Development economics	20	15
2.	Health policy analysis	14	11
3.	Program evaluation	13	10
4.	Research: international health	12	9
5.	Biostatistics	11	8
6.	Health planning	9	7
7.	Comparative health care systems	7	5
8.	Cost/benefit-effectiveness	6	5
9.	Resource allocation		
10.	Financial management and budgeting		
11.	Epidemiology		
12.	Public health administration	4	3
13.	Economics of health manpower		
14.	Computer programming		
15.	Survey methods	1	1
16.	Data analysis	1	1
17.	Miscellaneous	6	5
	TOTALS	103	101*

*±100% because of rounding error.

Adding those areas which distinguish the HPED curriculum (nos. 1, 2, 4, 6, 8, 9, 10 and 13) yields almost two-thirds of the response (60%) emphasizing the utility of an economic basis for public health planning.

Summary Approximately one-third of the HPED alumni, representing 16 countries, responded to this mail survey. Their reactions to the program reflect fairly positively on the need, value and utility of the econometric approach to national health planning:

1. There is a felt need, among LDC mid-career public health managers, for a working knowledge of the economics of public health planning.

2. The HPED program has some level of credibility among LDC public health managers.

3. By far the majority of HPED alumni have returned to health program management duties in which they have opportunity to apply what they learned in Ann Arbor.

4. The most "valuable" and "useful" aspects of the HPED program are those relating specifically to the economics of public health management.

Data analyzed, interpreted and report written by:
Dr. Hugh C. Russell,
DENVER RESEARCH INSTITUTE

APPENDIX F

SUMMARY OF GHANIAN ADAPTATIONS OF THE MODEL

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General Overview

Originally the University of Michigan proposed to conduct field studies of the Model in Ghana and Pakistan as well as Egypt and Indonesia. However, international political events rapidly stemmed the effort in Pakistan. In Ghana, on the other hand, considerable innovative research was commenced before political events there precluded further work.

Initially, the Ghanians had planning questions related to manpower development and depolyment. GOG health program policy at the time encouraged district hospital development. Therefore, the research team developed manpower/facilities model to generate time-phased schedules for introducing the new health services capability and to calculate costs and coverage over time. This model was used in January, 1980 to compare the feasibility and costs of alternatives for expanding coverage of the rural population. It was reported in: "Development of Rural Health Services in Ghana: Implications of Three Modes of Medical Care Delivery on Cost and Coverage."

This work led to a requirement for more, and better, data. Planners in the Ministry of Health prepared to develop the data through survey work. At this point, problems in the management of enumerators interrupted further progress on the study. They were compounded by nationa. political problems.

Ghanian Advances in Modeling Technology

In the main body of this report it was noted that neither Egyptian nor Indonesian work with the Model generated health intervention cost of effects changes over time. Further, we encouraged the University and AID to continue research in this arena. It is unfortunate that the Ghanian work was not completed because this was a particular outgrowth of the manpower/facilities Model developed for use there.

The original Model was combined (at the University of Michigan) with the Michigan effectiveness model for estimating mortality and morbidity. Together, they comprise a dynamic planning model known as DYNPLN. The original manpower/facilities model did not incorporate the effect of changing demographic and service patterns, over the years, on the disease profile and health status. But DYNPLN converted the country's disease profile into a time-phased model which examined morbidity and mortality over time with a changing population and changing service utilization rates.

121

Earlier we also emphasized that the Model, as evaluated by us, has not been applied for purposes of optimizing health sector resource alternatives. Again unfortunately, the cessation of Ghanian researches with the Model stemmed some momentum in converting the Michigan technology to an optimizing capability. Under contract to the Michigan team, Edward B. Berman Associates, Inc. of Marblehead, Massachusetts developed a "Dynamic Optimizing Model" from Michigan's earlier work. It was designed to further Ghana's health manpower planning effort. Based on DYNPLN, this version reportedly generated an optimized schedule of fully staffed health facilities, and their costs, over time. It also detailed personnel training and facilities construction required to meet the optimized schedule. This work was reported more fully in: "Dynamic Optimizing Model: Application to Ghana."