DOCUMENT RESUME

ED 183 764 CE 024 223

TITLE	Selected Bibliographies and State-of-the-Art Review for Communicable Diseases Control. Volume 1: Communicable Diseases and Health Planning References. International Health Planning and Reference Series.
INSTITUTION	Office of International Health (DHEW/PHS), Rockville, Md.: White (F.H.) Co., San Francisco, Calif.
SPONS AGENCY	Agency for International Development (Dept. of State), Washington, D.C. Office of Health Development Support Bureau.
REPORT NO	DHEW-PHS-79-50090
PUB DATE	79
CONTRACT	282-77-0128
NOTE	79p.: For related documents see CE 024 224-237.
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	Annotated Bibliographies; *Communicable Diseases; *Developing Nations; *Disease Control; Health Education; Health Programs; *Health Services; Immunization Programs; Literature Reviews; National Programs; *Program Development; *Program Evaluation; Public Health; Vocational Education
IDENTIFIERS	*Epidemiology

ABSTRACT

Intended as a companion piece to volume 1 in the Methods Series, Communicable Disease Control Planing (CE 024 229), this first of six volumes in the International Health Planning Reference Series is a combined literature review and annotated bibliography dealing with communicable disease control in developing countries. The review identifies literature relevant to program planning and evaluation and distills from it the most workable planning and evaluation methods, the required data and data collection methods, and the pitfalls most likely to be encountered. Specific topics include reasons for planning health programs, planning methods, and evaluation. One section also extracts highlights about many of the diseases discussed in the accompanying manual. The 112 references included in the review are contained in the bibliography. The format for each entry is author, title, source or publisher, date of publication, and annotation. (YLB)

International Health
Planning Reference Series

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Communicable Diseases and Health Planning References

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Selected Bibliographies and State-of-the-Art Review for Communicable Diseases Control

Selected Bibliographies and State-of-the-Art Review for Diseases Control

U.S. Department of Health, Education, and Welfare
Public Health Service
Office of the Assistant Secretary for Health
Office of International Health

This document was prepared for, and financed by, the Office of Health Development Support Bureau, Agency for International Development by Dr. James Chin as a sub-contractor to E. H. White Company, San Francisco, California (Contract No. 282-77-0128). All requests or inquiries about this manual should be addressed to Mr. Paul Ahmed, Project Officer, Office of International Health, 5600 Fishers Lane, Rockville, Maryland 20857.

DHEW Publication No. (PHS) 79-50090

PREFACE TO THE SERIES

The International Health Planning Reference Series has been developed by the Office of International Health, Public Health Service, on request of the Agency for International Development.

The series consists of six basic volumes which cover a variety of health issues considered vital for effective development planning. These volumes contain reports of state of the art surveys and bibliographies in selected subject areas. These are intended for the serious researcher and planning professional.

These six volumes are supplemented by ten additional works in the International Health Planning Methods Series, which is intended to assist health sector advisors, administrators and planners in health related activities. Each manual in this series attempts to be both a practical totol and a source book in a specialized area of concern.

The volumes in the International Health Planning Reference Series contain the efforts of experienced professionals who have identified limited but pertinent reference materials for planning in a particular field. Through this effort they hope to provide the AID field officers and the host country counterparts with useful references for systematic health planning in developing countries.

PREFACE TO VOLUME ONE

The combined literature review and annotated bibliography presented here deals with communicable disease control in developing countries. It is the first volume in the series of works known collectively as the International Health Planning Reference Series.

The series was produced by the Office of International Health as requested by the Agency for International Development to provide AID advisors and health officials in developing countries with critically needed references for incorporating health planning into national plans for economic development.

This volume is intended primarily as a companion piece to volume one in the Method series, entitled Communicable Disease Control Planning. The references included here are intended to identify works that support and enlarge upon material contained in the basic manual.

It should be stressed from the outset that the bibliography compiled here makes no claim to be an exhaustive or comprehensive listing of available resources. It is a selective bibliography only. Materials were included only if they dealt primarily with the problem of communicable disease control in developing countries or contained material that was directly pertinent to that limited area of interest.

Texts written in languages other than English were excluded from consideration here. References that were of solely historical interest were not included; nor were several otherwise excellent texts that related only in general terms to developing countries. Most of the references here are to books and articles having a relatively recent publication date.

Preparation of this volume was undertaken for the Office of International Health by E.H. White & Co., management consultants, of San Francisco, California. This volume was prepared under the supervision of James Chin, M.D., and Florence R. Morrison, M.A., both of whom are associated with the California Department of Health Services at Berkeley, California.

The literature on communicable disease control is numerous, but not all of it is relevant to the needs and resources of developing countries. The literature review which resulted in the selections presented here began with a computer search and was followed by a manual review and organization of selected references. The authors describe the selection and organization process in detail in a brief introduction which begins this work.

The authors of this literature review, like the authors of specialized articles and chapters within the communicable disease control manual, have frequently expressed personal points of view with reference to specific works and programs. While their viewpoints generally coincide with organizations or agencies with whom they are associated, the material in this text should not be construed to reflect the official policy of any agency or organization.

It is hoped that the references contained in this work will provide assistance to researchers, advisors and health planners who seek to integrate a concern for communicable disease control programs within the process of planning for national development.

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COMMUNICABLE DISEASE CONTROL PROGRAM PLANNING AND EVALUATION: A REVIEW OF THE LITERATURE

The purpose of this review was to identify the literature relevant to communicable disease control program planning and evaluation in developing countries and to distill from it the most workable planning and evaluation methods, the required data and data collection methods, and the pitfalls most likely to be encountered. The material covered is rather diverse so an outline of the presentation is given to assist the reader. This outline will be found immediately following a description of the literature search.

Literature Search

A computer search of the epidemiologic, medical, and biological literature (Medline data base) was made to identify the material relevant to communicable disease control program planning and evaluation. The computer search was performed through the auspices of the University of California, School of Public Health, Library. The search covered the years 1966 to 1977 and selected references classified under any of the following diseases or categories:

- communicable disease control in developing countries
- planning control programs
- evaluation of control programs
- cost-benefit analyses
- surveys
- disease surveillance
- specific diseases
  - arthropod-borne diseases
  - enteric diseases
    - cholera, typhoid and other salmonellae, shigella
    - unspecified diarrheas, food poisoning
  - filariasis
  - immunizable diseases
    - poliomyelitis, smallpox, pertussis, diphtheria, tetanus, measles, mumps, rubella
  - leprosy
  - malaria
  - onchocerciasis
  - rabies
  - schistosomiasis and other intestinal parasites
  - trachoma
  - tuberculosis
  - venereal diseases

The computer output for the 12 year period listed 2,724 titles—not all were unduplicated. To limit the number of references to be reviewed, all non-English references were deleted. Elimination of the non-English titles reduced the number of citations to 886, still too many for each one to be examined in a limited amount of time.

All the English citations were reexamined and, this time, those retained were those which mentioned or appeared to be related to (1) the planning and evaluation of health programs; (2) surveys for incidence, prevalence or some other measurements of communicable diseases; and (3) surveillance of communicable diseases, particularly before and after control programs had been instituted. This left about 200 references which appeared to be worth examining. Despite this intensive screening, many of the articles were unsuitable or were only tangentially related to communicable disease control program planning and evaluation. While many of these references had to be discarded, some additional titles were suggested by faculty members in the School of Public Health at the University of California, Berkeley, and others were found by review of the bibliographies found in those papers which seemed particularly relevant. Dissatisfaction with the broadness of the computer output led to further discussions with the reference librarians at the School of Public Health Library. However, the chief librarian felt that an additional computer search would also produce the same sort of output and the idea of trying to obtain a more restricted but perhaps more relevant list of references was abandoned.

It is perhaps a fair description then to say that the literature on communicable disease control program planning and evaluation is limited: most of the articles on planning do not deal specifically with communicable diseases though some papers use communicable diseases as examples; and most of the papers on communicable diseases do not deal with planning and evaluation. Probably the greatest deficit in the literature is in the area of evaluation of communicable disease control programs.

Order of Presentation

The following section deals with the question, "Why Plan?" It may not seem obvious that the expenditure of health funds should be planned before spending begins. Planning itself costs money and takes time so that action on serious health problems is delayed. However, the experts show a clear unanimity of opinion on this point.

The general concept of planning and evaluation of health programs is then examined in the next section. First, national health planning methods are examined. Examples of these health planning methods are the following:

Russia
India
Sweden
Latin America— PAHO-CENDES
Sudan
The Pragmatic Approach
Other Planning Methods— Mathematical Models

A discussion of the data required to make utilization of these methods feasible follows descriptions of the methods themselves.

Methods of evaluation are then discussed in the following section. Much of the methodology of evaluation is found in discussions of health planning

methods since both are considered integral parts of the planning process. This section describes the criteria for evaluative indices.

Section Five summarizes important points found in the literature about specific communicable disease programs in developing countries. Finally, the last section gives the summary and conclusions drawn from this review of the literature.

WHY PLAN HEALTH PROGRAMS

There is universal agreement in the planning literature, not wholly unexpected, on this point: the expenditure of money on health programs without planning—that is on a strictly empirical basis is no longer acceptable (A7). Further, though unstated, there is a clear implication that all countries, rich and poor, should plan health program expenditures at a national level. The reasons for health planning in the developing countries are readily apparent. Health problems in the developing countries are substantial. They stem from high fertility rates which swell populations that are illiterate and not easily taught to avoid infection and accept modern medical methods. Malnutrition is widespread and contributes to the inability to resist infection. Indeed some have suggested that ". . . the most important health problem in the world today is population; the second is nutrition . . ." (A39). ". . . malnutrition and overpopulation, because they go together, are as important as infection in killing children" (A43). Traditional forms of society based on attachment to the soil persist as to infectious and vector-borne diseases. In addition to widespread disease and malnutrition, resources to combat these problems—money, trained personnel, technical knowhow and apparatus—are severely restricted. Often trained technical personnel are unwilling to leave urban centers. Equipment, scarce as it is, may never be put back in operation should it break down because of inability to maintain or repair it. Such resources as are available are spent overwhelmingly on curative rather than preventive medicine. Furthermore, infectious diseases of animals get scant attention yet humans live in close contact with them (A43). Overrapid development of some poor nations without attention to the problems such development may create has produced pollution problems, loss of farmland and habitat for people and wildlife and has resulted in the spread of disease. Careful planning is necessary to avoid these disasterous consequences of economic progress (A10).

In those countries where economic development has not progressed much, communications difficulties exist between geographic locales, social groups or sectors of activities. Here, the consequences are continued illiteracy, the limited ability of the marketing structure to provide the population with adequate supplies for basic needs and an outmoded agrarian structure which impedes the production of food. This uneven economic development has produced standards of living so low that the most elementary health needs cannot be met. The end result is a vicious circle of poor nutrition and low productivity. Plans for health services should be integrated into plans for the whole economy (A23).

The same difficulties seen in the least developed societies are apparent in somewhat more developed countries. One sees a large group of independent blocs which communicate poorly at best; a welter of uncoordinated agencies involved in health programs but only a few medical and scientific institutions who receive most of the available funds. Often changes in exsting political structures affect health programs in progress and not infrequently bring them to a standstill (A43).

Finally, programs should be devised to deal effectively with the common causes of illness and disability even if those illnesses do not have a fatal

outcome since improved control of disease and disability will contribute importantly to the stabilization of the world's population (A39).

Data on health and health expenditures are not plentiful but one study of 26 countries found that the percent of gross national product given to health services varied from 2.5 to 6.3 and the greatest component was hospital expenditures (A1). Health planning or the lack of it in developing countries has been determined by historical and cultural elements rather than quantitative knowledge about economic factors or the occurrence of disease disability and death in the population (A2). What is desired by governments and health professionals alike is a rational approach to the expenditure of scarce resources. Before money is spent, careful thought has to be given to what is expected to be the return on that investment (A3). But in order to make decisions about health expenditures other basic information is needed such as: What is already being spent on health services in a given country? What is being devoted to education training, construction and specific health campaigns? Even these minimal data are not available in many developing countries (A1).

It follows that if governmental resources are scarce and if a good deal of competition for scarce resources exists, the allocation of those resources will be determined politically. And that is another point of agreement found in the literature: political support is needed in order to obtain funds for health programs (A19, A34, A43). A further point which needs to be added about scarce resources is that in order to ensure that those health programs or problems which deserve the highest priority obtain it, health planning must be carried out on a national level (A19, A23).

Effective planning depends first on the establishment of quantifiable objectives (A2, A3, A5, A7). Then alternative solutions must be identified and weighed in accordance with their suitability and cost for a given community. When the best solutions are identified, programs can be implemented, but they should contain procedures for collecting data which allow for program evaluation (A7). The development of a health plan, its implementation and evaluation is a continuous process which allows for modifications of the plan as better information, conditions or finances change.

PLANNING METHODS

Once it has been acknowledged that planning is a prerequisite to initiation of and expenditure on health programs, a method of planning must be adopted. The literature offers many injunctions and perhaps a half-dozen distinguishable methods for planning health programs. These methods are general but most are adaptable to communicable disease program planning and evaluation. The best and most detailed descriptions of health planning methods are given in Public Health Papers #43 and #46 (A19, A34). The methods described in the literature are often national health planning methods which encompass a wide variety of goals and techniques or specific mathematical models whose use is usually illustrated by application to a disease or health problem, often a communicable disease.

National Health Planning Methods

The countries which have adopted national schemes for planning health programs are not the world's poorest nations, though they are by no means the wealthiest ones. The United States, for example, has no method or system for

planning health programs at the national level: nor does France, Germany, Switzerland, or Great Britain. Russia is the country that has perhaps been preparing national plans the longest and perhaps it is appropriate to describe their methods first.

Health Planning in Russia (A19, A34):

National health planning has been practiced in the USSR since its earliest days so the nation has had long experience with planning methods and achievements. Russia has recognized the impossibility of planning without numerical expressions which describe various aspects of community health and available medical services. Therefore, great emphasis is placed on the accumulation of data for planning and evaluation.

The value of health planning in the USSR is readily demonstrated by the success of public health: programs which have led to a decline in infant mortality and the eradication of many communicable diseases among other achievements. The number of facilities, for example, has increased tremendously. In 1913 there were 1.3 hospital beds per 1,000 population, whereas, in 1969 there were 10.6 beds per 1,000 population (A34).

The Russian philosophy of planning embodies the following ideas: it is easier to plan when the whole economy is planned; ill health handicaps economic development; losses are averted when the labor force is healthy because this reduces absenteeism and increases working life, job satisfaction and other positive attributes of the job situation.

In Russia, the planning of health services means the careful, intelligent interpretation and orderly development of these services in accordance with modern knowledge and experience to meet the health needs of a nation within its resources (A34). It is also recognized that health planning is an integral part of social and economic planning and indeed a multidisciplinary endeavor. It must be acceptable to government in order to obtain financial and administrative support for its implementation. It is a continuous process which needs to be integrated with national planning.

Fundamental to health planning are indices of health. Russians use a whole gamut of measurements which are available to them because health services are provided by the government: vital and population statistics; information about the physical environment which bears on the health of people in a given area; measures concerned with health services and activities directed toward health improvement— hospital beds, physicians, nurses, etc.; resources such as money, manpower, facilities; and, of course, the level of health and disease in a given community— morbidity, mortality, and disability.

Basically, one must start with priorities in developing any plans for improving the health of people: not all problems can be attacked at once. "Key sectors" must be identified and these will get more money than others. However, the allocation of priorities must be based on the existing situation and probable future development. For example, greater allocations of resources for the years 1966-1970 in the USSR went to provision of services for workers and mothers and children; to programs which affected the greatest number of people; and to services directed at improving the nutrition of the population. It should be kept in mind that the economic aspects of public health bear on public policy and the allocation of priorities.

The following economic principles are used to establish health program priorities: (1) emphasis is on prevention rather than care; (2) strives to save the young rather than the elderly; (3) prevents low cost diseases rather than high cost illnesses; and (4) places health centers in areas or occupations

where skilled manpower is more important to the economy. These principles stress the economic aspects of health expenditures, but planning is motivated by humanitarian as well as economic concerns. However, the greatest return is desired for each public health dollar spent. To achieve the maximum benefit from expenditures it is necessary to think of planning as a continuous activity, always subject to alterations and corrections based on advances in science and technology (A34). Rigid adherence to long-term plans despite marked changes in a disease treatment or ecological situation, for instance, can be very costly.

In Russia, health planning is analytical. The process is divided into component parts and the effect of each part is determined— especially those parts most important to the whole process— then appropriate conclusions are drawn. Expert evaluation is also part of the process and it may be based on requirements for medical care and the extent these have been satisfied within the resources available. Planning and evaluation may involve any one or more of the following methods:

- cost-benefit analysis
- balance method— needs vs resources
- rates, ratios and proportions, e.g. standard ratio of medical facilities to population
- establishment of new norms or standards
- optimization of payoff (output) for expenditure— this technique requires computers and more sophisticated mathematical methods
- operations research
- systems analysis and linear programming
- queuing theory
- computer simulation (Monte Carlo methods)

To implement any planning method, as has been said before, data are needed. Often, though extensive data are available in the USSR, additional data may be required and this may necessitate making special surveys.

The steps in planning are essentially the following: First, the nature and extent of the disease or problem in the population must be analyzed. The variability of the disease by demographic characteristics should be considered as well. Then an analysis of the availability of medical care facilities and personnel along with their distribution is needed. Then the changes to be expected in the disease must be forecast. When this is done the aims and specified targets of the plan can be established as can the norms and standards to be incorporated into the plan. At this point the health plan can be prepared and any of the special methods noted earlier should be incorporated into it. The plan is then implemented though little time is devoted to discussing that very important aspect by the publications which describe the Russian methods. Finally, evaluation studies are carried out to see how well objectives and targets have been met and the plan is revised on the basis of the evaluation findings.

Health Planning in India (A19):

Health planning in India started in 1944, which gives it perhaps the longest history of planning of any non-socialist country. In 1950 a Planning Commission was established and is still in existence today. This Commission is an advisory body to the state and central governments and from its inception has had as members highly distinguished individuals. The Planning Commission's secretariat has both "general" and "subject" divisions: the general decisions are concerned with such broad matters as macro-planning, surveys and

perspective planning while the subject division deals with particular sectors such as agriculture, health, and education. Most planning takes place in these divisions where the 5-year plans are prepared.

Planning in India is interwoven with the political structure and this pattern is seen again in a consultative committee composed of members of the Planning Commission and both houses of parliament. Additionally, there are planning units within some of the central ministries which collaborate with the Planning Commission. Though there is substantial variation among states, each state has some mechanism for planning. This usually takes the form of a planning secretary who is in charge of a planning department which in turn acts as secretariat to an interdepartmental state planning committee. Again, the principle of working through expert groups is followed. India's elaborate planning machinery has been effective because of its political strength, and that has led to an ability to make more rational political decisions because those decisions are based on factual information.

Health planning in India then is an integral part of the general process of national socio-economic planning and is carried out primarily at the state level, since health services are the responsibility of the states. Only certain activities are the province of the central government: research; international quarantine and port health; food adulteration; leprosy; mental deficiency; and the prevention of interstate spread of infectious diseases. For planning to be successful in such a system, there must be general agreement on national policies and coordination at all levels of government.

Over a period of time, further changes were made to insure more effective coordination: these included a central health cadre and the institution of national programs for communicable diseases. Within the Planning Commission a health planning section was created. It assists in evaluating progress and also undertakes studies of special health interest such as manpower requirements of health programs, vital statistics, health education, and the development of indigenous systems of medicine. With the second 5-year plan for 1956-1960, there was a shift from the direct control of diseases to the improvement of basic health services and the strengthening of administrative services at all levels. Communicable diseases continued to receive major attention but other problems considered important were provision of safe water supplies in the villages and establishment of primary health centers in each community.

In the first three development plans, 1/3 of all health allocations was earmarked for water supply and sanitation programs in large cities and in areas where water is scarce or very costly. In the 5-year plan for 1968-1976k water supply and sanitation were to receive a greater allocation than in the previous three plans together. Their share of total health expenditures will be 2/5 instead of 1/3:

In India as in many other countries, one of the great problems is the increase in population. Family planning has become one of the major concerns of health planning. The Indian Government has indicated that its goal is to significantly reduce the birth rate in order to make economic development yield benefits for the ordinary people.

Health Planning in Sweden (A19):

Sweden has for approximately the last 30 years planned comprehensive health services for its total population. These long-range plans have been implemented and subsequently adjusted in accordance with experience. The

approach used has been a decentralized, regional health plan. This regional method goes back to 1862 when community self-government was initiated by laws for local communes. That legislation provided for the creation of county councils whose duties included health care which had, prior to that time, been a function of the central government. One of the most important tasks of these newly created county councils was administration of the hospital system (except for mental hospitals): 85% of the council budgets were devoted to medical care. Until the 1950's, the provision of medical services depended primarily on about 25 county councils— except in the cities of Stockholm, Gothenburg, Malmo, and Norrkoping. A central hospital and some smaller hospitals in each county served a population of 250,000-300,000. These medical services were financed by local taxes.

In 1962, the Ministry of Social Affairs took over the responsibility for public health. With this reorganization, a National Board of Health became the principal health planning agency. In 1968, medical and social services were integrated and the Board of Health became the National Board of Health and Social Welfare: it is the prime authority for supervision and promotion of medical and social services. There is also an independent Central Board of Hospital Planning and Equipment which is engaged in standardization of hospital building and equipment. Sweden has a national health insurance system and all inpatient hospital care is free.

Regionalization of medical care in Sweden was brought about by the increasing cost and complexity of hospital care. It was thought to be indefensible that every county of 250,000 population should become involved in plans to add to the central hospitals' new clinics for thoracic surgery, neurosurgery, plastic surgery, etc. Not only was hospital care becoming prohibitively expensive, but the supply of medical staff, particularly doctors and nurses, was critically short. For these reasons, regional planning was considered as a solution to these problems. The first plan divided the country into hospital regions, that is self-sufficient units for the provision of medical care. A region was defined as an area appropriate in population and size for planning independent, self-sufficient health services.

The medical care system within any region can be described by a pyramid. The regional hospital which provides highly specialized services for about 1,000,000 in 3 or 4 counties is at the top. The regional hospital administration is closely coordinated with the county hospitals in its region. This is achieved by appointment of a regional care committee which is composed of two representatives of each county and which meets several times each year. One of the committee's functions is to determine the contribution made by each county to the regional hospital. The next level of the pyramid is the county hospital which serves about 250,000-300,000 and has about 800 to 1,000 beds. At the next lower level are district hospitals with about 300 beds each which serve a population of about 60,000 to 90,000. At the base of the pyramid is the health center which offers ambulatory care to 10,000 to 20,000 people. Nursing homes to serve chronically ill patients are attached to the health centers. Through a series of hearings with representatives of highly specialized branches of medicine, the Director of the National Board of Health and Social Welfare developed standards in terms of number of beds per 100,000 for the various specialties.

The Swedes have a low birth rate and a long life expectancy. As a consequence, older people constitute an unusually large part of the population and they consume a disproportionate share of medical services. Swedish planners have developed a consumption unit which relates the use of services by a

particular age group to the average use of services by all age groups. The Swedish system also uses sophisticated computer and data processing methods to assist in the medical care given. One Stockholm hospital, for example, maintains information on 1.4 million "potential customers." This information is kept up to date for instant access when patients are admitted and require further care. The same data are used for statistical and medical research, for follow-up studies, and for managerial control.

Seven percent of Sweden's gross national product is spent on medical care— most of that in hospitals.

The PAHO-CENDES Method (A19):

The name of this method comes from the Pan American Health Organization (PAHO) and the Center for Development Studies (CENDES) of the Central University of Venezuela, Caracas. Both organizations collaborate in the development of this methodology for national health planning. At CENDES and other locations throughout Latin America several thousand professionals have been trained in the use of this method which does not require special training in mathematics, economics, or allied disciplines.

Efficiency is the ruling tenet in the PAHO-CENDES health planning method and it can be expressed in the following way: "A resource is efficiently used if the benefit obtained from its use is greater than that which would have been obtained if the same resource had been used for something else." This rule implies that planners must determine the significance of the various health problems in a given area at some time in the future as well as what resources will be available to deal with those problems. The method is concerned also with the most efficient organization of resources to solve specified health problems. Patterns of organization and allocation are then developed in such a way that each resource is allocated to a problem as long as it produces the greatest benefit. When the resource ceases to yield such a return, it is reallocated to another problem for which it can be used more efficiently.

The PAHO-CENDES method involves three basic steps in planning: (1) diagnosis; (2) determination of feasible alternatives in local areas; and (3) preparation of regional and national plans. Diasnosis involves, first, identification of geographic units into which the country is to be divided for health planning purposes. Planning is viewed as decentralized. The local areas distinguished should not exceed 150,000 population and should have medical, surgical, obstetric, and pediatric services in addition to political and administrative machinery. These areas should exhibit important differences in health and related conditions which would otherwise be obliterated in regional or national data. Regions comprise two to six local areas and provide more highly specialized services. Cities with large populations serve in a dual capacity as local areas and as regional centers. The most highly specialized services are provided at the national level. Local areas with inadequate services are provided at the national level. Local areas with inadequate services may be allocated to adjoining local areas. In sparsely populated areas, services may be provided only periodically.

The diagnosis phase also requires that the cost of preventing a death from each of the diseases or health hazards of concern in an area be estimated. Actually it would be too expensive to do this for every cause of death so the Method offers a guide based on magnitude, importance and vulnerability to suggest which causes of death should be included in the cost analysis. Magnitude is determined by the proportion of total deaths accounted for by a given cause. Importance relates to the value of one life compared to another: the

Method provides examples of weights for individuals of different age. Vulnerability is determined by available control or treatment methods. Multiplication of the coefficients of magnitude, importance, and vulnerability yield a score for each of the health hazards or diseases and these scores can then be used to establish priorities for health programs. The larger scores get higher priorities. These priorities then are a guide to those diseases for which the cost of preventing deaths should be determined.

The expenditure for each disease or hazard must be known to carry out the cost analysis and that involves getting a full inventory of all personnel, facilities, supplies, and equipment. Then it is necessary to ascertain whether the health resources spent were used efficiently. To accomplish this analysis, resources are divided into three groups— instruments, tasks, and techniques. An instrument is a combination of resources used to perform a health function. Visiting nurse, as an example, is an instrument which also comprises transport, medical direction, and the administrative personnel necessary for nursing visits. Similarly, a hospital bed must be backed up by laundry and cleaning services, doctors, nurses, pharmacists, and others as well as buildings, equipment, and supplies. Instruments are measured in time units such as nursing hours or hospital days. A task is carried out by an instrument. Hospital beds are to get people well and so can be measured in number of annual discharges.

Techniques are combinations of tasks used to combat a disease. For an infectious disease they may include epidemiological investigation, immunization campaigns, and hospitalization.

The analysis identifies for each significant health hazard given priority by the tests of magnitude, importance, and vulnerability— all instruments used and their composition. Then the number of tasks are calculated and the cost per task is determined. Then the costs for each disease are totalled. When resources are used to combat more than one disease or where one facility, water supply, for instance, serves multiple purposes besides health, general estimates are used. Then annual costs for each disease are computed: these include some share of the cost of physical plant.

Deaths prevented by curative techniques are calculated by comparing the proportion of patients who recover after treatment with the proportion who recover without treatment. The effectiveness of preventive techniques is determined by comparing the probabilities of dying from the disease with and without the protection afforded by the technique. The unit cost is obtained by dividing the total cost by the number of deaths prevented. With some preventive techniques the yearly expenditure must be allocated among the years the protection is expected to last.

The diagnosis should attempt to explain health conditions as well as describe them. These may be faulty public investment policy; lack of community concern or poorly structured local government; characteristics of the population or the disease causing agents; the environment; the socio-cultural milieu; and health policies. Health conditions over the next 5 to 10 years must also be addressed. Projections are needed for future population size and composition as well as probable death rates for the major diseases and the demand for curative services. These estimates of health conditions in future years provide a focal point for evaluation of the health situation. The basic question posed by the method is "would it have been possible, with the per capita resources available, to have attained a higher level of health in the past, or will it be possible in the future to reach a more satisfactory level than that indicated in the projections?"

Operational standards or norms must be developed as a basis for critical assessments. Instruments and techniques are examined to see if those used are of the best composition. Is too much or too little physician time being used? Are the number of patient visits per procedure correct? Are a sufficient proportion of the population reached by a given resource within a specified time? Norms for coverage are particularly difficult to establish because often they not only require the availability of instruments, but they are influenced by public utilization of facilities. Another index of efficiency stressed by the method is utilization. Are health centers operating at full capacity? The health system is examined from the viewpoint of composition of services provided, the number of visits offered per procedure, population coverage and utilization of services to determine where inefficiencies exist. The cost of the inefficiencies is estimated and, in addition, estimates are made of what the costs would be if inefficiencies were corrected.

With this information the planner is able to assess the allocation of resources among diseases according to the yardstick of lowest cost per death prevented. The cost of preventing one death from each disease found significant by the magnitude-importance-vulnerability test and the resources allocated to each are compared. A low allocation to a cause of death that can be prevented at low cost is indicative of maldistribution of funds as does the converse. The main test remains: is the benefit derived from expenditures as great as the benefit that would have been derived if the resources had been devoted to some other health hazard?.

When the diagnosis phase is completed, it is possible to determine feasible alternatives in the local area. The immediate question in dealing with health program alternatives is, "Shall the plan be made in accordance with available resources, or should goals be set and then the resources needed to meet them computed?" Inevitably, compromises must be made and the resultant plans set some targets but are cognizant of the limits in resources. The minimum plan for each local planning area is to maintain existing health levels. This goal provides for care of nonreducible diseases in a community despite the fact allocations on that basis are inconsistent with the concept of lowest cost per preventable death.

The maximum plan for each area indicates the highest possible rate of increase in health levels. This plan assumes the availability of unlimited physical and monetary resources. It contemplates an attack on each reducible disease up to the limit of its control and its targets for the care of nonreducible disease are set at the level recommended by medical experts. The maximum plan is useful to determine the allocation of surplus resources, should any be available, in order to achieve the maximum reduction in deaths. Both minimum and maximum plans require specification of standards for instruments and targets, eg.g the doctors, nurses, technicians, and others along with plant, equipment, and supplies in those proportions which yield the optimum efficiency. Output goals are specified for each instrument— that is how much each should produce. Standards are set by research or estimates which may be absed on either a consensus of experts, a comparison with some other part of the country, or a comparable country. Standards should be revised from time to time as conditions change. Ideally, data should be coming in continually and plans redrafted annually to provide ongoing evaluation as part of the planning process.

Once local alternatives are determined, regional and national plans are prepared.. Regional plans comprise the adoption in various degrees of the

local plans and they also provide for specialized services that are either uneconomical for local areas or they include services for areas not covered by local planning units. The same procedure is followed to develop a plan for specialized services. For sparse populations spread over large areas, data may be all but impossible to get so that plans may be inefficient. This must be true also in emergency situations which arise unexpectedly. These situations are dealt with pragmatically and by allowing for contingency funds.

National planners estimate the resources that will be available for the region. Regional planners then are responsible for allocating any surplus not needed for the minimum regional plan, and this is done by examining the local plans and assessing what disease in what area can be combated at the lowest cost per death prevented. The regional planner assigns funds to this disease in a given local area up to the potential limit of control or until it may no longer be the most attractive choice, or until resources are exhausted. If all reducible diseases can be covered at the levels specified in the local area maximum plans, surpluses may be assigned to care for persons with nonreducible diseases according to the lowest cost per case.

The regional plan developed this way is the first alternative to the minimum. Two additional versions are suggested: one based on the assumption that the total resources which will become available will be 20% greater than estimated and the other that funds will be 20% lower.

The minimum plans and regional reallocations together with certain national programs constitute the national health plan. The national planner reviews regional plans and makes reallocations within the country as a whole. National health programs are centrally controlled operations directed at diseases which require efforts on a very broad scale such as malaria and smallpox. Priority ratings at the national level also are based on costs per death prevented. Other national health planning functions are planning for manpower and capital investment. Manpower needs in the future can be determined from the local plans. A good deal of training is accomplished at the local level, but national institutions, particularly universities, are also involved. Facilities are planned on national levels because much of the design and construction of hospitals and water systems are carried on by national agencies. Finally it is the national planner who must present plans to the central government and from the response estimate the resources available to planners at the regional and local levels. The PAHO-CENDES method provides no scheme for determining how the resources of various health related sectors, such as social services and agriculture, should be allocated. An advantage, however, is that the method facilitates preparation of a program budget which indicates the goals of each program and the amount of resources each is to get. Such budgets facilitate rational decision-making.

An assessment of the PAHO-CENDES method suggests several problems in its use. One is concerned with the concept "cure": a person with a reducible disease is considered as a death prevented if he is cured but the cure of a person with a nonreducible disease is not counted as a cure. Moreover, all persons discharged from the care of a physician or a hospital are considered cured which inflates the number of cures reported. But most important, prevention of death is the primary target of the method and other goals of equal or greater importance are neglected— e.g. reduction of morbidity and alleviation of disability.

Another problem relates to assigning causes of death. Each death must be attributed to a disease or hazard for the method to work. All too often

deaths are caused by a combination of diseases. The same problem is encountered in treatment and prevention. Measures taken against one disease often cure or prevent several. General sanitation is a good example.

Other difficulties concern the enormous amount of data which must be collected and processed. It seems likely that data collection on such a scale is not feasible in developing countries. Further, the method offers no methodology for analyzing political and social factors which are so critical to the success of health planning. The decentralized planning envisioned by the method has proved to be exceedingly difficult to achieve because of the variations found in medical, social, and economic development in such countries as Brazil and Peru. Yet the method is one of the most thorough applications of systems analysis to health planning.

Health Planning in the Sudan (A21):

In 1974, the Government of Sudan with the cooperation of WHO developed a 7-year health plan. The health plan is part of the national socio-economic plan for the period 1977-1978 to 1983-1984 (A21). The plan specified 8 priority programs in health and rural development; three of the 8 programs deal with communicable diseases—malaria, schistosomiasis, and onchocerciasis. The other 5 programs are primary health care, safe water, environmental health, food, and finally, primary health care for regions where the population is predominantly rural and nomadic.

The method used in developing this plan is alluded to as health programming which is portrayed as going a step beyond health planning, though " . . . decision-making and health planning are obviously connected. The outcome of planning is to distil policy and programme alternatives and to present them for decision." The general approach followed in Sudan was a modification of WHO's Working Guidelines for County Health Programming, an unpublished document written in 1974. The approach sought to identify in a pragmatic manner those health related problems of prime concern to Sudan within the context of its socioeconomic development plan. Much emphasis was placed on interactions between the health sector and other socioeconomic development sectors.

Programming was carried out in two main phases: the first led to situation analysis and the second to the development of the National Health Program. For the first phase, relevant data were needed. The article does not say how data were collected or whether data were already available, but information of the following kinds were included: demographic, economic, social development, health (including facilities and personnel), environmental health, unit costs and the policy for development of the health services. A programming committee was formed which included staff of WHO. This committee was then divided into working groups and when required national experts in the fields concerned were added.

The first step in the programming process was to develop criteria for defining problems. Criteria were of two sorts—general (non-medical) and health criteria. These criteria were then weighted: a decision was made to have the total weights of the general criteria equal that of the health criteria. Six general and six health criteria were established. General—the problem or its solution should conform to the Phased Program of Action; meet politically expressed needs; increase social satisfaction (psychological, physical, and economic well-being) and social equity; confer economic benefits; conform to local cultures; emphasize the needs of younger age groups. The Health criteria were: the problem predisposes to sickness in the community; kills people in large numbers; makes people fall ill in large numbers; harms the development

of young people; its solution should produce an immediate improvement in community health and be available to as many as possible of the population at risk. Fifteen problems were defined by the criteria as having the greatest priority, but finally 8 of the 15 were grouped under primary health care and malaria was considered as two problems— nationwide and manmade.

The programming process was carried on then to identify problem indicators and set objectives. Objectives were stated in measurable terms of the annual percent reduction and the expected level of the problem in 1984. Objectives were considered in accordance with their technical feasibility and the general criteria by which the problem had first been identified and given priority. Then current activities in health-related fields and resources were identified. For each problem, inputs and outputs were determined and from that information, a unit cost per output was calculated. These unit costs formed the basis for cost estimates of the programs.

Then for each problem given a priority health strategies were defined and their constraints outlined. After the committee had approved the general outlines of the national and regional strategies for dealing with problems, the proposed programs were then considered from the point of view of feasibility. For effective implementation of the proposed strategies to deal with the 8 priority problems, special national and bilateral or international development efforts were needed. Development needs most likely to qualify for external assistance and cooperation were next identified, and the needs for field operations or research in relation to the programs were outlined.

While all this analysis was going on, the final program document was being developed simultaneously. This document included an information section and all the results of the programming steps already described. The method was illustrated in greater detail as it was applied to formulating the primary health care program (A21).

The Pragmatic Approach (A19):

Pragmatic or practical health planning implies utilization of an approach in which there is no clearly defined methodology that provides techniques of analysis and measurement. The health planner or planners may use an approach based on experience or intuitive skill. In such a situation, there may be no theoretical guidance on the kinds of data that should be gathered and used in planning and evaluation so that data may have little if any impact on decision-making. Such planning rests heavily on judgments not reinforced by data and systematic analysis and is, therefore, vulnerable to political pressures that are not oriented to the long-term welfare of the whole country. Health planning in developing countries has been approached principally in this fashion. As a consequence, in almost any of the less developed countries, facilities are preponderantly curative and concentrated in the urban areas. One exception is the development in the French-speaking parts of Africa of mobile preventive services. Furthermore, most resources are committed to existing facilities so little leeway is available for program expansion. This is a very serious problem in health planning in the less developed countries: existing services even when wasteful, cannot be eliminated or modified to any significant degree. One of the most distinctive characteristics of pragmatic planning is its ability to accommodate to existing political, social, and economic conditions. Since it has limited theoretical postulates, it is extremely flexible. Because of the commitment over a long period of time to already existing facilities in urban areas and limited, almost nonexistant new sources of funds, there appears to be almost no way to finance

rural health services and still maintain urban services. One finds in the less developed countries a shortage of doctors and nurses as well as other health workers. Furthermore, most health workers are located in urban centers and are concerned with curative activities. Additionally, the doctor's education has not prepared him for handling the comprehensive health needs of his community. School standards are Western and seriously deficient for the less developed areas. Pragmatic planning is often merely palliative in orientation and frequently its aim is slow, step-by-step modifications.

While comprehensive planning is presumably the desired approach, most African countries have neither the required data nor the qualified personnel to formulate and execute such plans. In many of the less developed countries where comprehensive planning is not possible, health sector programs can be worked out and implemented. But that is possible only if the administrative capacity in a given country is sufficient to support such health projects. Machinery must be available for health planning within the ministry of health; for coordination with other ministries of immediate concern; for coordination with overall socioeconomic planning at the top level; and lastly, for ensuring the cooperation of the public and of professional organizations.

Theoretically, planning should be carried out at all levels of government and should be essentially a two-way affair—from the top downward and from the local level upwards. This is not possible in many of the less developed countries, especially where there has been no tradition of effective local government.

As already indicated, insufficient data is a basic handicap in less developed countries. But planning itself is a means for improving the production and use of statistical data. Plans could include ways for acquiring and upgrading epidemiological information and data on personnel, facilities, equipment, and supplies: sampling methods might be utilized to obtain data quickly.

When health planning is initiated, it should include:

a. Criteria for the determination of broad consumption objectives
b. Policy objectives determined in the light of expected income
c. Broad policy objectives to be fulfilled in each section
d. Indication of the distribution of resources between sectors

Within the framework of these objectives and the resources expected, a health plan draft should contain:

a. An accurate assessment (diagnosis) of the existing situation
b. Definition of the means recommended to improve efficiency in the operations of the sector
c. An estimate of personnel needs, category by category, together with an indication of the facilities needed for staff training
d. The costing of the various activities, project by project, taking into account and listing separately:
   1) Capital expenditure (buildings, vehicles, and equipment) spent inside the country or spent on imported goods
   2) Recurrent expenditure on personnel in each category and materials bought in the country or imported
e. A description of the expected results, in terms as concrete as possible
f. As accurate as possible an estimate of the expected economic effects
g. Recommendations for activities in other sectors; for example, the health planning unit may make recommendations about nutrition (including crop rotation), health education in educational establishments and environmental health

Budget estimates for the years the plan is to run are also needed. Projected costs will have to be made for the following categories:

a. Capital expenditures on new buildings, major renovations and extensions, communications, equipment and supplies, and training
b. Recurrent expenditure on personnel, training, running cost of new establishments and increased costs of existing ones plus replacement of supplies

Having made these estimates, one usually finds there is not enough money and some priority has to be set. How are priorities to be set without information and presumably without elaborate techniques such as cost-benefit analysis or linear programming? One possible approach is to try to estimate what the most serious disease or health problems are—which cause the most deaths, disabilities, economic loss; and what methods are available for prevention or cure. Here the pragmatic approach seems to be very similar to the more formal planning methods except that no data are available to assist the intuition. It is surprising to find that this approach is essentially the one used by the United States. The advantages of pragmatic planning are low cost and realistic adjustment to circumstances; its disadvantages are a propensity to bend with current forces and the necessity to make decisions without adequate information or analysis.

Other Health Planning Methods

Many methods are described in the literature which do not take into account the national political situation, related socioeconomic development or the multitude of variables which impinge on any health problem widespread in a population. But a great deal of thought and work has been devoted to development of mathematical models for planning health strategies or for deciding on priorities. Many of these models are the work of economists but others have been devised by statisticians, epidemiologists, and other health professionals. Some of the methods described in the literature are complex, difficult to understand and require extensive mathematical or statistical training and often computer and programming skills as well. All these models are designed to achieve a single goal—maximum value for every health dollar spent.

Some of the simplest of these models is exemplified by a scheme to set priorities for health problems which require the most immediate attention and their solutions (A8). The author developed a list of criteria, scheme to weight them, and a rating scale. Fifty-three criteria are listed in four groups:—technologic aspects, health aspects, general social concerns, and planning concerns. The criteria listed are variables to be considered during planning or seeking solutions to problems. This model may not be useful where major health problems are apparent, but it is easy to use and readily modified to fit other situations.

Probably some of the most useful mathematical models are those developed by Cvjetanovic and his colleagues (A13, B8, B62, B63). In two papers (B8 and B63), a similar method is used to determine the cost-benefit balance point for immunization and sanitation programs. In both instances data are required that describe disease incidence for various segments of the population, cost of treating a case, cost of control measures to be compared, the effectiveness of the various control measures in preventing disease, and the length of time protection is afforded. With this information, comparisons can be made between the costs of various control measures and that measure which gives the greatest

benefit for the cost can be determined. Nomograms are constructed to facilitate comparisons. Various authors in addition to Cvjetanovic discussed cost benefit or cost effectiveness as a means of promulgating and evaluating health programs (A5, A44, B8, B63, etc.). The national health planning methods already described generally incorporated one or more of these indices.

In a more general paper about infectious diseases and another on typhoid fever (A13, B62) computer simulation techniques were used to plan and evaluate control measures. Again the data needed were susceptibles, immunes, sick persons, and carriers. Transitions from one state to another were expressed in terms of proportions or probabilities and were derived from knowledge of the disease in a given population. Newborns or immigrants entered the population; deaths and emigrants left. Once all the relevant factors had been determined, computer simulation was used to assess what changes occurred in any of the factors. Simulation demonstrated, for example, that immunization against typhoid fever produced a marked reduction in disease incidence but the gain was lost after a few years. Repeated immunization every five years produced further reductions in new cases but the gains became successively smaller. The model demonstrated that the effect of sanitation, however, was longer lasting and so gave better results than immunization in the long run.

A simulation method quite similar to the two just described is presented by Elveback and her associates (B16). While the model was developed for influenza epidemics, the authors suggest that it may be adapted to any infectious agent spread via person to person. Adaptation to specific diseases is possible by changing the variables and their values or adding and subtracting variables. Probably other adaptations can be made in the underlying assumptions so that the model more accurately reflects the epidemiology of a given disease (with the same mode of spread) in a particular country. This model might be particularly useful to determine what proportion of a population and what age groups should be immunized to stop epidemic spread of a disease.

Another simple epidemiological model is described by Sundaresan and Assaad (B54). Originally applied to trachoma, the technique should be usable with any disease for which prevalence data are obtained periodically. This method involves the use of a computer, but the computer program is probably available through WHO. Use of this model demonstrated that the reduction in trachoma attributable to the control program was not 30% as suggested by a prevalence measure but 60% of the former disease load.

The more complex mathematical models found in the literature were developed by economists (A5, A14, B57, B59). The models generally attempted to provide, as did the simpler models, a method by which the best strategy for dealing with a health problem can be identified. Best was usually defined to be the most cost-effective or cost-beneficial, though the terms used such as output maximization and optimum reduction in disease often sounded foreign. Computer technology was mandatory for the utilization of these modes.

By and large what distinguishes the more complex models from the simpler ones are the mathematical computations performed and the data required. Tuberculosis is a disease frequently modeled: It is a disease that has afflicted most of the developed and the less developed countries of the world and for which a good deal of data exist. Of the two complex tuberculosis models (B57, B59) reviewed, neither seems particularly useful for developing countries. It should be mentioned that the modesl are illustrated by use of tuberculosis data but the authors feel that the models are readily adaptable to other infectious diseases. Both require the solution to differential equations, either directly or by linear programming algorithms. In addition, both appear to be

too ambitious: one (B57) attempts to account not only for biological and epidemiological considerations of tuberculosis but also for the psychological and social dimensions of the problem. This model allows for 100 alternatives in program activities. The necessary data must be obtained by population survey.

The second model (B59) requires the solution to nine differential equations of great difficulty. And if that were not enough to limit its potential use in developing countries, the authors overlooked some important epidemiological considerations in deriving the model.

The other three models (A5, A14, B47) are less complex mathematically than those just described and a good deal more usable. However, they require a great deal of information about a great variety of health and health related questions. In Barlow's model (A5) expenditures for general hospitals and for mass immunization programs were available in Morocco. Utilization of these data in the model made it possible to demonstrate that immunization programs were a much less expensive way of reducing mortality than expenditures on curative measures. Of course that result was well known. It might be argued that it hardly requires sophisticated mathematical procedures to detect the obvious.

The model described by Feldstein (A14) is in the words of the author " . . . still a long way from being a practical planning device . . ." Its utility lies in its ability to . . . help both development planners and health officials to understand the structure of the problem of health sector planning: the way in which preferences, population structure, disease incidence and prevalence, scarce resources and technology are inter-related in determining the optimal set of activities."

The last model in the group (B47) utilizes schistosomiasis for illustrative purposes and appears to be a good deal more practical as well as nearer to epidemiological realities. The model gave a good fit to data from 54 villages used in a regression analysis. Utilization of the model made it possible to compare the effectiveness of alternative disease control measures: results indicated that a combination of mullusciding, chemotherapy and engineering equipment used to cover snail habitats was the most cost-effective. However, further work is needed to determine the best combination of control measures.

Other Advice

Aside from methods of planning, the literature contains much that can be called miscellaneous advice, comments, or exhortations. Many papers allude to the desirability or necessity for having trained personnel to carry out the variety of functions required to develop a health plan. The report of a WHO Expert Committee (A26) discusses in detail the kinds of staff needed in health planning and the type of coursework which should be included in their training. The emphasis in this document is on national health planning which is seen as linked to other sectors of society concerned with socio-economic development. Planning is considered to be under the charge of political executives or administrators but the insights of many other persons is necessary to the development of the total plan. These other specialists are health professionals, economists, systems analysts, political analysts, information specialists, and social scientists. Planning is linked also with implementation and evaluation and, therefore, is continually revised in the light of new information.

Emphasis on understanding the political situation is noted in several other articles (A27, A31, A35). Planning can be successful only when governments have a clearly stated and understandable health policy and when health

plans lie within the framework of that policy. All too often, one authority points out, health and other policies are faultily generated, inadequately expressed, internally inconsistent or inappropriate to the real needs and demands of the people (A31). This kind of situation leads to the failure of administrators and planners to influence policy toward what is possible with resulting waste in effort and resources.

Otolorin (A35) stresses three points of prime importance in planning health programs:

1. Plans must be capable of execution under the system of government which exists.
2. Other basic services must be developed in parallel with health services—good water supply, good housing, good education, abundant food, and optimum labor conditions.
3. In developing countries where so many deaths are due to preventable diseases, preventive measures must be given the emphasis they deserve.

The emphasis on comprehensive health services and on disease prevention and control is mentioned in a recent article which describes WHO's 1978-1983 plan for health expenditures (A27). Four other areas of major concern are environmental health, health manpower development; biomedical and health services research and program development and support. WHO's long range goal is an acceptable level of health for the entire world by the year 2000.

Finally, one author (A20) notes that in developing countries now, the choice in controlling disease lies between the improvement of sanitation and widespread immunization or use of efficient drugs. He suggests that there are ten primary purposes of a health service in developing countries: eight are preventive and two curative. Yet the two curative activities absorb 80% of the available resources. The author believes that health services should be reorganized to provide a more equitable distribution among the four major health functions. Those are food, environment, preventive health, and curative services.

The Data Required

Most authorities concur that planning is necessary to make the most of every health dollar. There is, additionally, complete agreement that planning requires data and no amount, however detailed, is superfluous. The inability of health professionals to plan health programs, to identify health problems or to set priorities without data is exemplified by the current situation in China (A25). Few statistics are available in China on diseases diagnosed or people treated. Claims that health and medical services have greatly improved under the communist government cannot be evaluated. Little or no published data describe disease incidence, prevalence, mortality or accessible health services.

A WHO Expert Committee suggests that when no data are available or when the lack of accurate and complete data is a serious problem, the collection of essential data must be pursued simultaneously with planning and plans will then have to be modified based on the information gathered (A23).

No list of data can be exhaustive, but generally the kinds of information or indicators needed are the following (A23). Among indicators of resources are:

Money--funds expended on health services and programs listed source of funds.

Manpower--personnel in various categories employed in the provision of health services: data should include utilization indices.

Organization--information on the organization of health services which should include the functions of different personnel (the team concept) and all available equipment and supplies. Indicators of Health and Disease include mortality, morbidity, disability rates and ratios, and levels of health.

Particularly useful are ratios of resources to population such as hospital beds per 1000 population, doctors per 100,000 population, cost per tuberculin or other test or cost per health center.

Data on health resources is needed by all countries. Utilization indices indicate what part of the need for health services is currently being met and what diseases are receiving attention. Health planning need not wait for precise information to become available. A broad indication of the more prevalent diseases is sufficient for the preparation of a health plan and such a broad indication can be gotten from a study of utilization statistics. However, it is certainly true that more precise information on the causes of illness and the segments of the population affected in a given country or area make it possible to develop a better plan.

The health indicators just outlined are old standbys in any attempt to appreciate the health status of a given population. But more recently these measures have been described as crude (A29). A WHO study group which reviewed these indices recommended only three usually accessible mortality measures as useful to evaluate a nation's health:

- Expectation of life at birth and at one year
- Crude death rate
- Proportional mortality ratio.

Yet none of these measures provides an index of the well-being of people. A modern measure of a nation's health should include not only death but the economic and social consequences of prolonged disability, reduced productivity and the need for care. Such information must be obtained from annual or periodic surveys.

Others concur that mortality is no longer a sensitive indicator of those factors which affect a community's health (A2, A11, A39). One study of the effects on the expectation of life at birth and at various ages through the elimination of particular causes of death in India found that a 50% reduction in all causes of death would add about 10 years to the expected length of life at birth (A17).

Another excellent, comprehensive discussion of the kinds of data needed for planning and evaluation of health programs is given in a later report of a WHO Expert Committee on health statistics (A9). In this report as in many others, evaluation is seen as an integral part of the planning process. The report identifies eleven major obstacles to the use of statistics in health planning:

1. Lack of collaboration between planners and statisticians
2. Administrative relations between the two activities are often dysfunctional in that they are located at different levels of the health hierarachy or they may be located in agencies other than the one responsible for health and health services planning.
3. Administrators may fail to provide the personnel, equipment, and money required for the work both planner and statistician have agreed is necessary.
4. Ignorance of each other's methods, skills, and experience persists.

5. Differences exist in educational background, professional orientation, expertise, and status. Statisticians may not be available and services may be provided by statistical clerks which will not be of the same caliber. Additionally, empirical planners may have had little exposure to quantitative methods or concepts.
6. Too often the planner fails to specify in detail the goals and objectives to be achieved or the statistician fails to ask questions that would result in clear statements of such goals and objectives.
7. There is a lack of recognition of the fact that both the making of changes in the organization, staffing, distribution, and financing of health services and the establishment of health and health information systems take a long time.
8. Inflexibility with respect to planning methods, or statistical information systems; and lack of imagination in defining or recognizing health problems, and in designing statistical measures for such problems are not uncommon.
9. There are differences in time scales and in perspective. The statistician may be concerned with past events and retrospective analyses, while the planner may be concerned with forecasting future events.
10. There are differences in work methods.
11. There may be disparities in the power assigned to each of the two functions.

Clearly administrative problems may exist between planning and statistical staff which should be resolved in order to make the contribution of each effective.

The Committee examined so-called routine health statistics and considered new methods of data collection and analysis in the light of the problems noted. Vital and health statistics the Committee felt yield unduly optimistic estimates that distort the true state of affairs as a result of under- or over-reporting, incomplete coverage, and errors introduced at the time the primary records are established. "Of the various indices produced, several have stood the test of time; none, with the possible exception of mean expectation of life, can be regarded as a measure of health." (A9). Others such as disease and mortality rates are measures of ill-health. "The use of mortality indices as the sole basis for planning health services is highly unsatisfactory"(A9). In developing countries like the developed countries, though for different reasons, mortality rates may fail to reflect the total demand for services. Examples are gonorrhea and trachoma, neither fatal, may require large sums of money and resources. Data available through hospitals, clinics, health centers or financing agencies may be useful for planning purposes, but only if they are population based. If demographic, socioeconomic and residence data are included in such records, their value is greatly enhanced.

Statistics which describe environmental conditions should also be examined: Changes in health status due to the improvement of the environment should not be erroneously attributed to the effects of personal health services.

As an index of health, the Committee suggests the use of duration of disability allied with some measure of functional impairment, combined with a measure of severity. Additional research is needed to develop and test such a measure. The following are requirements for such an index:

- Data should be available without complex investigations.

- Data should cover the entire population to which the index refers.
- Data should not be affected by time or place of collection.
- The index should express a group of factors that determine and affect the level of health.
- Calculation should be as simple as possible.
- The index should be widely accepted and used, understood, and interpreted.
- The index should produce the same results when used by different specialists.
- The index should reflect only those phenomena it is designed to express.
- The index should be sensitive to changes in the phenomena it reflects.
- The index should be a true expression of the factors it is supposed to measure.

The Committee felt, however, that the development of a single index of health would take time and recommended in the interim period that the following types of information should be acquired by any health information system: vital statistics, environmental health statistics, household interview statistics, health examination statistics, accident statistics, and health services statistics.

Health services statistics which might be particularly relevant are hospital discharge statistics, ambulatory medical care statistics, drug surveillance statistics; health facilities statistics, health manpower and training, and expenditure and financial statistics are also relevant.

While lack of data is a serious problem in developing countries and most of the literature mentions it, some authors point out that other indices not usually considered a requisite for planning may be just as important. In one paper (A16), the author suggests that the costs of controlling and of not controlling various infectious diseases should be determined so that the best use can be made of the available resources. Another view on control of communicable diseases (A36) states that it is not enough to enumerate the number of cases of a disease, the age groups, sexes, socioeconomic groups affected, etc.: it is also important to study the conditions which favor the spread of infections, the animal reservoirs, the vectors and their biological properties, particularly resistance to insecticides. Other factors which merit attention because they may influence the incidence and spread of disease are social and economic changes, population movement, industrial and agricultural investment projects and international trade.

The literature suggests a general paucity of statistical information in developing countries yet stresses repeatedly that data are necessary to plan health programs. Is there any way out of the dilemma other than laboriously setting up systems to collect the requisite data— an endeavor which will take years to design and implement? Several answers are noted in the literature, but the technique almost universally recommended is some form of survey. Surveys have many advantages over registration or reporting systems: speed, adaptability and better quality data are among the most important. In addition, surveys, depending on type and scope, may be less expensive. But perhaps even more important, the survey may be the only way to obtain desired data (A4). Survey methods have been in use for a long period of time so that training and consultation in the use of these methods are readily available (A9). Another advantage of surveys is that they can be carried out before and after some

program is put into effect so that comparison or evaluation is possible. Survey data are sometimes regarded as "soft" in comparison with death data from hospital autopsies (where no registration system exists) but they may be much "harder" as predictors of needs and demands for health services and the extent to which such services are used. In reality, they may be much more useful for planning purposes (A9). Questions of validity, reliability, response rate, coverage and bias all must be taken into account, but the same is true of mortality and morbidity data derived from professional and institutional records. Indeed the literature gives examples (A38, A40) of how estimates derived from such systems are easily biased. Furthermore, institutional and professional records in developing countries may be grossly inaccurate (A40).

EVALUATION OF HEALTH PROGRAMS

While evaluation is considered an integral part of the health planning process, it is a subject not as widely discussed as planning. The omission is due mainly to the stated belief that planning is a continuous, neverending process (A7, A19, A23, A34). This assumes that evaluation also is continuous since new plans or program redirections must be based on what has been found out about the program. Another reason that evaluation is less prominantly mentioned is the generally accepted view that the same indices used to plan health programs will be used in their evaluation (A13, A21, B8, B62, B63). More important still, most discussions of health planning assume that long and short term objectives are developed in the planning process. Though not always explicitly noted, objectives have expected time limits, e. g. immunize 50% of first graders within the next year, or reduce the incidence rate for new cases of tuberculosis by 25% in the next five years. At the end of the stated time, the program should have the data which makes it possible to determine if its objectives have been met.

Of course, "The best laid schemes o' mice and men gang aft a-glay." The problems of evaluation are complex and should not be passed over too lightly. Evaluation should take into account the effectiveness and efficiency of health services (A9). The essential relationships between effort expended and results achieved in relation to a plan and its implementation can be expressed by the following four factors:

A. Effort planned
B. Effort achieved
C. Results planned
D. Results achieved.

The ratios formed by the four factors provide some basic information about program accomplishments. For instance, C/A can be referred to as the planned efficiency which may be compared with D/B, achieved efficiency. The discrepancy between planned and achieved results given by C/D might be the subject of a special study.

The following important terms used in evaluation were defined by a WHO Expert Committee (A9):

Efficacy: The benefit or utility to the individual of the service, treatment regimen, drug, preventive or control measure advocated or applied.

Effectiveness: the effect of the activity and the end-results, outcomes or benefits for the population achieved in relation to the stated objectives.

Process: the procedures, methods or arrangements by which the effort was expended and the effect achieved.

Structure: the human resources, knowledge, technology, organization, facilities, equipment and finances that assist or constrain the expenditure of effort and the achievement of effects or end-results.

Efficiency: the effects or end-results achieved in relation to the effort expended in terms of money, resources, and time.

Controlled clinical trials are generally regarded as the most objective means to evaluate the efficacy of drugs, surgical, and medical procedures as well as administrative and management procedures. One publication suggests that the first step in the evaluation of existing services might be an examination of evidence for the efficacy of various procedures and regimens recommended for use by the health services (A9).

The measurement of effectiveness is also difficult. However, as suggested earlier, clear statements of objectives make measurement of effectiveness relative easy, whereas ambiguous or obscure statements make it difficult or impossible. Wherever possible, biological results expected should be clearly stated, e.g., disappearance of parasites from the blood within 60 days after treatment. Other clear measurements might be days of inactivity, disability, or discomfort.

Preventive measures, diagnostic investigations, surgical operations and therapeutic regimens are all means directed towards the achievement of stated end-results. The volume and nature of these procedures in relation to the known risks and benefits can be reviewed by various forms of medical audit. This process usually becomes a self-regulatory device for determining not only the medical care given to individuals, but also the nature and availability of services to the population. Though it is true that the ultimate results are the most relevant basis for assessment from the patients' point of view, various stages in the process of providing services can be identified. Such identification helps to clarify plans and suggest ways in which health services can be organized and monitored.

Examination of the organizational structure, facilities, and equipment through which services are provided is related to process analysis. The study of institutions, staff patterns, payment and financing mechanisms, and of the characteristics of the health services themselves, is useful as a means of finding the causes of variations in the final results or in effectiveness and efficiency.

Efficiency relates to how economically the final results are achieved. The problem of relating expenditures to functions performed requires scientific accounting practices. To improve efficiency in the delivery of health services requires first the acceptance that all are jointly responsible for the health care of the population concerned. Failure to do the best job possible reflects adversely on professional and technical personnel and on the institutions serving that population. Second, an appropriate information system must exist. Such a system must provide information related to the problems and objectives of the organization and make it possible to change plans and practices when those are shown to be uneconomical or faulty.

COMMUNICABLE DISEASE PROGRAMS

The following brief notes extract from the literature reviewed relevant highlights about many of the diseases discussed in the accompanying manual

on communicable disease control program planning and evaluation. These are in no way a digest of the extensive material published about each of these diseases: the literature review undertaken here was not intended to do that. The literature search as outlined at the start of this paper was oriented to publications that dealt with planning and evaluation methods for communicable disease control programs: the following summaries are also concerned with those aspects programs which deal with the specific diseases of interest.

Filariasis

One investigation carried out along the Liberian coast found that between 22 to 28% of the population was infected with filariasis (B1). Of those infected, 12 to 25% suffered with hydrocele and somewhere between 18 and 25% had elephantiasis. About 6% of the total population exhibited the more severe symptoms of the disease. Another survey in Ethiopia which utilized volunteers and prisoners found a marked reduction in filariasis in the central highlands where infection had been common (B3). In a pilot trial in Recife, Brazil, diethylcarbamazine was administered orally for 40 days, then added to the salt for one year. This medication removed almost all the microfilariae from the blood, caused no untoward effects, seemed quite acceptable to patients, and was simple to administer (B2). The authors recommend further investigation to see if this method is suitable for mass filariasis control programs.

Immunizable Diseases

In developing countries communicable disease occurs in the mass and must, therefore, be dealt with largely in the mass by means of mass campaigns which must embrace a total and rigid geographic coverage of the population at risk as well as future additions to that population by birth, immigration, or both. The aim of a mass camapign is to achieve a speedy interruption of the cycle of transmission for the disease under attack. The methods which may be used are:

- extermination vectors
- destroying the agent
- destroying the intermediate host
- increasing the resistance of the host
- improving the environment to reduce exposure (A28).

Immunization (a method of increasing host resistance) is generally accepted by many health professionals as a simple, inexpensive, long lasting method of control for communicable diseases. Childhood diseases are believed by one author to be precipitating factors of severe protein-energy malnutrition and he suggests that a major obstacle to better child health services in developing countries is the heavy demands made on the available resources of manpower and finance by large numbers of cases of preventable disease. Immunization is a fairly simple and inexpensive procedure: the cost is between $1 and $2 per child for comprehensive immunization. This cost is estimated even in countries where per capita expenditures on health are low to be only 2% to 5% of the annual health budget (B6).

Agreement is not general, however. Another view (A18) urges that a national network of basic medical units which are accessible to the majority of the population and geared to curative and preventive medicine are needed. While the value of immunizations are recognized, it is suggested they are not better than food. Only when basic medical units have been widely established throughout the rural areas in West Africa will malaria control, on-going immunization programs, and nutritional and health education so vital for the

public health, in general and children in particular, become really feasible (A18).

Still another view described an attempt to use immunology as a measure to control the natural history of infection (B7). The idea grew out of the observation that in many areas at any given time, there were many susceptible persons despite routine immunization programs. In immunization drives, often the same persons were repeatedly immunized and the susceptibles were not only left untouched, but they accumulated so that whenever infection occurred in an area, there was ample potential for its spread and maintenance. The author argued that while it was very difficult to immunize 100% of a population, it was desirable to protect every body from some infections. Such protection can be achieved by providing an optimum degree of herd immunity. An attempt to immunize five villages rather than the villagers was made. Every household was contacted and cards were prepared for each family. Results were 95% of children 5 and under received the first dose of vaccine and about 80% received the second dose.

While herd immunity is an interesting theoretical concept, in the immunization campaign depicted, however, theoptimum level of herd immunity required—for diphtheria and whooping cough in this case—to insure that no transmission of disease occurred, was never mentioned. Furthermore, the study did not differ significantly from a great many other immunization campaigns whose details are given in the literature.

Smallpox. In the fight to eradicate smallpox in Bangladesh, some valuable lessons well worth reporting were learned.

(a) Study the enemy--know its epidemiology in the region in which you are working as well as its clinical manifestations.
(b) Study the people's perception and realize that confidence is built on effective action in dealing with the real needs at the village level.
(c) Measure the problem: rewards instead of punishment for reporting new outbreaks changed the attitudes of health staff and villagers.
(d) Establish a single line of authority and responsibility.
(e) Establish a clear achievable plan of work.
(f) Establish quantifiable targets.
(g) Provide adequate and appropriate logistic support: transport, equipment, supplies, funds, and facilities.
(h) Encourage public participation. Success or failure often depends on the cooperation of village leaders.
(i) Develop programs to meet quantifiable objectives and implement them gradually with concurrent assessment to identify deficiencies (B51).

An evaluation of a measles-smallpox vaccination program in a rural area of the Ivory Coast demonstrated that a positive history of prior measles or prior measles immunization was not a good indicator of measles seriologic status. The smallpox vaccination major reaction rate was 93% and 91% of children with a recent vaccination scar serio-converted to measles vaccine. Thus, the smallpox scar read at the second visit proved the best clinical marker for determining both coverage and immunologic effectivensss of the campaign (B4).

In an urban population of Indian children under 10, it was found that vaccination against smallpox was satisfactory--97%, but that for BCG, triple oral polia vaccine, and TAB/TABC (an abbreviation for typhoid-paratyphoid A

and B and cholera) immunization was poor— 23%, 12%, 10%, and 1% respectively. Immunization status and parental awareness of the need for vaccines was related to higher socioeconomic status, community involvement, maternal literacy, nuclear family, and infant delivery at a private nursing home (B5).

Measles. As already noted, some authorities are strongly in favor of immunizations for children (A28, B6). In the Ivory Coast, of 95% of children initially susceptible to measles, 90% showed sero-conversion after immunization (B4).

Hendrickse argues against measles immunization in developing countries (A18, B9). He indicates that he does not believe that measles vaccine will measure up to expectation either in respect of reducing costs of treating the sick or in reducing childhood mortality. He suggests that mortality figures are grossly exaggerated because they are extrapolated from hospital data. Further, a major determinant of morbidity and mortality is protein-energy malnutrition (Cook (B6) agrees) and freedom from measles will not guarantee the survival of many children in whom the interaction of malnutrition and infection continues to occur (B9). Cook, however, sees measles as the precipitating cause of severe protein-energy malnutrition. Hendrickse states also that the cost of the vaccine and the requirements for successful delivery preclude the general use of measles vaccine in most developing countries. Measles vaccine can be made available only if more rudimentary health services are not funded and in the long run that would prove wasteful and would fail (B9).

Support for Hendrickse view comes from other authorities (B15) who suggest that the cost of measles vaccine even with bulk orders would absorb a very large percent of the health budgets of most poor-resource countries! And furthermore, most people in these poor countries could not afford to pay the cost themselves. The authors attempted to fractionate the vaccine dose to reduce the cost, but concluded that there was no certain way of reducing the cost by limiting dosage to below half. Their recommendation is to use measles vaccine for the limited objective of protecting "at risk" children and groups; additionally, to offer the vaccine in clinics when available.

Poliomyelitis. Poliomyelitis in many tropical and subtropical countries is static or actually increasing. Where data are available for less developed countries in Africa, Asia, and Central and South America, they show that poliomyelitis increased between 1951-1955 and 1961-1964. Two problems are noted: live polio vaccines in tropical countries have not been successful in producing antibody response in a high proportion of cases; and it has been difficult to maintain adequate immunization campaigns in under-developed countries (B14).

In a survey of 10,000 households in India, poliomyelitis incidence in children under eight was found to be 4/1,000 for urban residents and 6/1,000 for rural residents (B10). Poor seroconversion rates to oral polio vaccine were documented in Indian children aged three months to six years (B11). In one group of children without antibody to polio, conversion after two doses of vaccine was 28% to type 1, 77% to type 2, 50% to type 3. In another group after two doses of trivalent vaccine eight weeks apart, the seroconversion rates were 35% to type 1, 76% to type 2, 48% to type 3. Loss of vaccine potency, interference of enteric viruses and interference among the three vaccine virus types were excluded as the cause of the poor responses observed.

In a survey conducted in Ghana to assess the impact of endemic poliomyelitis, investigators found a prevalence of lameness attributable to polio of 7 per 1,000 school-age children and estimated the annual incidence of polio to be at least 28 per 100,000 population. These estimates are considered conservative, yet they compare with rates in the USA and Europe during years of severe epidemics. The authors felt the price of natural acquisition of immunity was too high and recommended a higher priority for polio immunization (B12).

From a survey made by mailed questionnaires, it was estimated that lameness due to poliomyelitis throughout Ghana was 6 per 100 school-aged children and the annual incidence of paralytic polio was 23 per 100,000 population. Official rates range from 0.1 to 2.1 per 100,000: this suggests that 90% of cases are not reported. The high rates did not appear to be due to unreported epidemics. The results were interpreted to mean that the annual incidence in tropical countries with endemic transmission has always been as great if not greater than in temperate countries during epidemic periods. They deduced also that paralytic poliomyelitis throughout the world has been reduced by only 25% since the use of polio vaccine (B13).

Leprosy

The effects of three measures for the control of leprosy were evaluated by a population survey in an area of Indonesia. The three methods were segregation of patients, mass chemotherapy, and BCG vaccination. Leprosy incidence following the introduction of sulphone in 1950 declined. A mass BCG vaccination program was carried out in 1957. The conclusions drawn were that segregation did not affect incidence. The major decline was due to mass treatment, but the immunization campaign contributed to the additional decline of tuberculoid leprosy (B19). Another evaluation of antileprosy measures in Bombay demonstrated that case holding was a more urgent priority than case detection (B18). Trials confirmed the effectiveness of dapsone chemoprophylaxis for contacts of infectious index cases in crowded households. It was determined also that outpatient treatment was more cost-effective than hospitalization. Health measures recommended were health education of patients, their relatives, and friends; screening of high risk groups in case detection; and priority given to minimizing the defaulter rate (B18). A resurvey of school children in ten areas on Bombay highly endemic for leprosy found a prevalence of 10.8 per 1,000 with a range of 2 to 15 per 1,000. Prevalence was higher in those 14-16 than in the group 5-7 and lower in children who had received BCG (B17). The results suggested that surveys of schools in endemic areas should be given high priority in urban control programs.

Malaria

Malaria eradication campaigns have not achieved their goal. The WHO eradication campaign launched in 1956 was spectacularly successful. Following early successes, there was a rapid decline in training malaria workers and in drug research. Other problems identified were mosquito resistance to insecticides; resistance of parasites to drugs, and the identification of vector mosquitoes which feed outdoors. The net result was a serious resurgence of malaria in the tropics (B28, B30). In India, additional setbacks were caused by late receipt of insecticides and refusal to accept spraying. But the most unfortunate part of the malaria eradication program was a 75% government tax levied on DDT which was in scarce supply and expensive. Clearly, government policies did not support the eradication program (B20).

In Tanzania, prior spraying of houses in the South Pare area with dieldrin

had greatly reduced the transmission of malaria. By 1970, the vectors and the theoretical inoculation rates had returned to pre-spraying levels, yet the prevalence of malaria parasites in the population was still significantly less than formerly. Serological findings, however, indicated that more transmission was occurring than was demonstrated by the parasite rates. The widespread use of anti-malaria drugs was an important factor in the delayed resurgence of malaria (B21). In other parts of Africa, spraying of houses over many years, though it failed to stop malaria transmission, achieved much that is often ignored (B25, B26, B29). Spraying had a direct effect in lowering malaria indices: furthermore, a significant improvement occurred in the health status of the population and was apparent even in areas where malaria prevalence and incidence was not drastically changed by insecticiding.

In the Americas, countries and territories fall into three groups with respect to their malaria programs. Group I includes 12 countries or territories where malaria has been eradicated. Group II includes 8 countries which have a good prospect of achieving eradication in a short period. Group III encompasses 14 countries which are in a maintenance phase. Some cannot expect eradication in the foreseeable future and they should concentrate on keeping gains already made (B27).

Some recent research on malaria demonstrated that malaria affected the labor force by incapacitating the individual worker or by reducing his efficiency when he was able to work. Additionally, workers who were ill were not readily replaced by other family members or neighbors, as was generally believed, so that there was both a decrease in the amount of work done and substantial disruptions in the normal pattern of work. Malaria also affected expansion of production for internal consumption and for export, and diversification of diet (B24). In southern Africa, prevalence surveys were not sensitive enough, investigators found, to assess the malaria situation where transmission was at a very low level. It was found, also, that the method of collecting blood specimens— filter paper or capillary tube— gave different infection rates when compared with immunofluorescent antibody tests. In an attempt to identify the major factors which might have influenced serologic test results, investigators found that complications arose from the variation inherent in test procedures and materials which were not standardized. Interpretation of results depended, in addition, on the sensitivity and specificity of the test and the definition adopted for reactivity. Standardized terminology and methodology were necessary to compare test results (B23).

Trials in Kenya with a new insecticide, fenitrothion, showed that after two years of spraying, the prevalence of infection fell from about 60% to 15% and in infants, there was a 96% reduction in the force of transmission. The investigators felt that the insecticide could be recommended for malaria control, but its high cost limited its use (B22).

Finally, the earlier work of several researchers on the development of malaria vaccines appeared promising, but a good deal of additional work remained to be done (B28).

Onchocerciasis

The most recent estimates suggest that 20 million people, at a minimum, are infected with onchocerciasis, a disease that occurs mainly in Africa. Other areas in which the disease occurs are Yemen, Central and South America. The blackfly vector requires fast flowing rivers and streams for breeding and, as a consequence, the distribution of the disease is predominantly focal and affects primarily those who live close to fertile river valleys (A12).

A survey in Gemu Gofa Province, Ethiopia, found that the northern areas of the province were affected while inhabitants of the southern portion were not. Further, people who lived in densely populated towns and villages were not infected. The disease was more common in men than in women and in adults of middle age rather than children. The disease was, also, more prevalent in coffee producing areas and in areas closer to the Omo River drainage. Infected individuals did not appear to be greatly affected by the disease—a finding attributed to the small number of parasites per slide (B32). A study in the Mo river valley, Togo Republic, used a new membrane filter concentration technique to identify infected individuals. This new technique yielded substantial increases in detected prevalence of the disease (B34).

A review of the effectiveness of ground application (larviciding) compared with aerial application (larviciding and adulticiding) as measures to control Simulium vectors of onchocerciasis concluded that ground larviciding was preferable. It achieved the best results at less cost in those foci where the vectors usually breed in small, densely wooded streams.

Schistosomiasis

Schistosomiasis has been called the greatest unconquered disease now afflicting man and animals. Recently, it was estimated that schistosomiasis affects some 180 million people in Asia, Africa, South American and the Caribbean (B42).

The primary factors used to determine the importance of schistosomiasis are geographic distribution, prevalence, intensity of infection, morbidity and mortality, and transmission pattern. These, in turn, are influenced by environmental conditions, efficiency of intermediate hosts, agricultural practices, and human behavior. One author using Egyptian data estimates that 1.5 million individuals in Africa are permanently disabled by the disease and that their removal from a productive existence costs about $212 million annually. An additional $308 million annually is lost if one assumes that those with only moderate disease lose 10% of their working capacity (B50).

Prevalence estimates for schistosomiasis vary widely. The discrepancies are due to a lack of real data as well as differences in definitions of the disease and the enthusiasm of the estimator. Diagnosis based on skin test or serologic test will yield higher prevalence estimates than will diagnosis based on demonstration of eggs in excreta. In urine surveys, some children pass too few eggs to be detected. This may explain why it is possible to find more cases by skin or serologic tests (B46).

A seven year snail control project was undertaken in Egypt during the late 1960's: its effect on the endemicity of Schistosoma haematobium in an area of the Nile delta was also estimated. The authors who reviewed the project results concluded that a previous evaluation of the project results after a period of two years gave premature and unjustifiedly optimistic results. They felt a four-year period of observation was necessary to draw legitimate conclusions. The study design was faulty in some rather important respects: it did not follow a cohort of uninfected children through the years of minimal to maximal prevalence of infection in the area, it did not study intensity of infection simultaneously, and it did not make comparisons with a similar untreated control area. Incidence was incorrectly calculated since the study group was constantly diluted by the addition of children who had very low infection rates (B40). They felt, further, that the rate of natural loss of infection in children in an area where disease transmission

had been interrupted and chemotherapy had not been used should be assessed. Sampling should have been stratified on the basis of prior prevalence data. Finally, it was their opinion that molluscicding alone in the Nile delta and similar environments was unlikely to interrupt transmission significantly over several years (B44).

A study to estimate the prevalence of S. haematobium in children aged 6 months to 10 years in three villages near Cairo found rates of 27% to 68% in the village with the lowest standard of living. The next-highest rates were in the village with the highest standard of living—7% to 47%. Prevalence was lowest in the village with the intermediate standard of living, 0% to 33%. The impact of schistosomiasis on the health of children was considered mild except in heavily infected children (B35).

A household survey of the Qalyub region of the Nile delta found the prevalence of infection with S. mansoni was 40.5%, much higher than previously reported in the area. Conversely, S. haematobium prevalence was 27%, much lower than expected. The increase in S. mansoni infection was thought to be due to use of a very sensitive parasitologic technique. Snail surveys in the area indicated a marked drop in the levels of Bulinus species possibly related to ecological changes brought about by construction of the Aswan high dam (B43).

In Kenya, mulluscides prevented infestation of schistosomiasis snail hosts in the Ahero Pilot Scheme, an irrigation and land use demonstration project. This conclusion rests only on the small numbers of snail hosts recovered during routine sampling: no control area was used. The author presumed that snails would probably have become established, as occurred elsewhere, in the absence of control program. The snail control program cost $11,000—a negligible amount compared to the production value of the rice crop: $1,213,304 (B39).

In an Ethiopian study of the clinical manifestations of S. mansoni infection in children aged 7 to 16, prevalence was found to be 88%, but an even higher rate of 95% was found in 12 year olds who also showed the greatest intensity of infection. Frequency of liver enlargement rose with increasing egg count and uninfected boys performed better in a 12-minute walk-run, but otherwise infected children seemed no worse off than uninfected children. The authors concluded that morbidity in this population was minimal and in line with the low intensity of infection (B45). A study of S. haematobium in the Gambia found the prevalence reached 100% by age 10, but infection rates declined during the second and third decades (B49). Additional laboratory studies by the same investigators led them to conclude that some infected individuals showed evidence of a defect in cell-mediated immunity (B48).

In Iran, mass chemotherapy with niridazole was used as a method to control schistosomiasis. The control program was directed at villages with a prevalence of 10% or more. Criteria of interrupted transmission were (1) total absence of snail hosts near the village and (2) minimum age of infected children of not less than three years. The study detected 7,317 cases and treated 6,488 (88.6%). At followup three months later, only 3% of some 3,700 treated subjects were excreting eggs: at 6 months, only 2.1% of 325 persons examined were still positive. It was estimated that 80% of cases were cured in each village (838).

Study of a rural community with 1,056 inhabitants in Puerto Rico, found 149 of some 700 interviewed infected with S. mansoni. Each of the infected group was matched with an uninfected control. Palpable livers were more frequently found in the infected group but other data cast doubt on S. mansoni

as the cause. The authors concluded that morbidity from S. mansoni was low in the surveyed community (B41).

Trachoma

Trachoma today is still the most important single cause of preventable blindness in the world (A12). The disease additionally is responsible for the partial loss of vision which subsequently reduces educational and vocational aptitudes. Reliable data on trachoma prevalence do not exist, but a widely quoted estimate is 400 to 500 million infected individuals throughout the world. Possible control methods are mass antibiotic treatment, improved standard of living to the point that trachoma dies out, or immunization. However, at present, development of a trachoma vaccine seems only a remote possibility (B52). Realistically, the only safe method of large-scale treatment in developing countries is topical therapy with tetracycline ointment. Research on trachoma vaccines suggests that the problem of vaccine-induced sensitization may be more difficult to solve than the enhancement of resistance to infection (B51).

In Haryana State, India, a school survey found a prevalence of 42%. Females had a higher prevalence than males primarily because of the use of eye makeup. The infectious stages of the disease were more prevalent in younger than older children. Children in the lower socioeconomic groups were more frequently affected (B53).

Tuberculosis

A review of worldwide tuberculosis morbidity data indicates that the highest tuberculosis rates are found in the eastern fringe of Asia, the southern and northwestern parts of Africa, and the middle of the western coast of South America. Mortality rates are highest in the Philippines and Macao—more than 60 per 100,000 population. Mortality though has become an unreliable measure because of the steady decrease in the proportion of treated patients who actually die from tuberculosis. Areas which still have high tuberculosis mortality rates are the Western Pacific region, the southern part of Africa, and South America. Present estimates indicate that there are about 7 million infectious cases worldwide, an annual incidence of about 3½ million and ½ million deaths each year (B55).

WHO has repeatedly stated that the success of any modern tuberculosis control program depends mainly on the availability of well-developed, ambulatory care facilities. WHO has also recommended that financial resources and manpower for tuberculosis control be used to organize ambulatory programs rather than to support hospital treatment. Despite this, some countries show an upward trend in tuberculosis hospital beds. Hospital or sanitarium treatment for tuberculosis with prolonged bed rest and dietary supplements is usually unnecessary and serves only to prolong patient incapacity and to increase the cost of treatment (B56).

The use of BCG vaccine to reduce tuberculous disease is a cost effective method of control with infection rates of 2 per 100 to 2 per 1,000 population. However, at an infection rate of 2 per 10,000 population, it is too costly a method of control (B60). These results were obtained by computer simulation techniques.

In a survey of the East Central State of Nigeria, it was found that there were 108 cases of tuberculosis instead of the 4 known to authorities. The authors suggest that adding tuberculosis diagnosis and treatment to rural medical care services costs almost nothing (B58).

Repeated tuberculosis surveys of the pediatric population in India over a period of 25 years has proved the value of BCG vaccine, particularly in malnourished children. In older children, chemotherapy and BCG immunization on a massive scale has been valuable in the control of tuberculosis. However, tuberculosis control programs should be integrated with general health measures and should involve community health workers as part of the team at health centers in order to reach the rural population (B61).

SUMMARY AND CONCLUSIONS

A review of the literature which deals with communicable disease control program planning and evaluation was made. The books, monographs, and papers which have been published on national health planning methods include sufficient details so that the methods can be understood and probably followed. The literature contains little about implementing plans once they have been developed: this is a rather important omission. Discussions of evaluation methods are rather more limited than descriptions of planning methods. A generally accepted viewpoint is that if one has planned carefully, developed measurable objectives and gathered data during the operation of the program, then evaluation is carried out by utilization of the same indices used to plan the program but with the updated information gathered. This concept is rather faulty as a simple reading of Section IV (Evaluation of Health Programs) will show: measures of the efficiency and effectiveness of program services, for instance, are not usually available during the planning stage and even if they were, might not be used for planning purposes.

There is general agreement among authorities that data are vital to both planning and evaluation and further that useful data in developing countries are scarce. However, the requisite data are described in elaborate detail as are the modern techniques that can be used to acquire them. Of course, like most other things in developing countries, trained personnel to design data collection systems or surveys are limited, but WHO may be able to supply both consultants and computer programming and processing services. Some very useful mathematical models which can be used to choose the best program strategies are also described.

The literature on communicable diseases is primarily devoted to small segments of problems with specific diseases in limited areas. Planning and evaluation of comprehensive communicable disease control programs are not the subject of many published papers. Moreover, the planning literature offers conflicting points of view: many authors recommend planning on a national basis only in order to make the most of scarce resources; others insist that it is not possible to set priorities and attack all problems at once.

The major difficulty the potential planner of a communicable disease control program faces is the sheer bulk of material that must be read and weighed before a decision can be made. If advice on national health planning is desired, a few basic monographs present almost all the methods currently used. No such publications deal with communicable disease control program planning and evaluation at the present time. This deficiency is due primarily to the marked variations in the incidence, severity, and patterns of infectious diseases which are encountered from country to country.

AN ANNOTATED BIBLIOGRAPHY
FOR
COMMUNICABLE DISEASE CONTROL

A1.

Abel-Smith, B. An International Study of Health Expenditure and Its Relevance for Health Planning. Public Health Papers No. 32, WHO, Geneva, 1967, 127 pp.

The author collected data from about 26 countries in order to determine what proportion of funds in any country was spent on health. Not all information sought was provided by each country. This study was undertaken because it is not known if changes in health services affect economic growth in developing countries, and because in order to allocate scarce resources certain basic information is needed: (1) the proportion of total resources in the country already devoted to health; (2) the proportion of resources given to health by other countries at a similar level of development; (3) the share of budgets actually spent on health by different countries; (4) contributions by other agencies; (5) the proportion of funds given to preventive and curative services; and (6) the prpportion devoted to education, training, construction and specific health campaigns. The author found it noteworthy that even these basic data were not easily or at all available. The percent of gross national product given to health services varies from 2.5 to 6.3: hospital expenditures were the greatest component.

A2.

Abel-Smith, B. What Priority Health? Tasks and Priorities in the Organization of Medical Services. Israel J Med Sci, 4(3):350-367, 1968

The thesis is presented that historical and cultural factors have shaped health planning in the developing countries. That procedure should give way to planning which takes into account economic factors and quantitative background information. Equally, measurable objectives must be established and weighed to determine which are the most valid when resources are severely limited. For example, the economic burden of chronic disability may be far greater for a community than the burden of premature death since those who die do not need to be maintained but chronically disabled individuals do. Costs for preventing various diseases and deaths are required in order to set objectives and plan effectively.

A3.

Abel-Smith, B. Health Priorities in Developing Countries: The Economist's Contribution. Int J Health Serv, 2(1):5-12, 1972.

Incisive look at the role of economists in health planning. The author deplores

the burgeoning model building and jargon which obscures a wellknown fact: "Before we spend money, we should think out carefully what we expect to get for it." This is at the bottom of rational planning in health--the difficulty in applying the yardstick is that physicians and other health workers refuse to think of measuring health in crude economic terms. Some acceptable measure of health output must be found. The author suggests that progress can be made by a study of the total effects of particular programs: it is unrealistic to believe that health priorities can be determined for all programs in a given country say, at the present time. The author illustrates the value of cost-effectiveness studies by using as an example the expansion of medical education in developing countries, which could be contributing substantially less to health than if the resources were used in alternate ways.

A4.

Armitage, P., Linder, F.E., Manceau, J.N., et.al. Sampling Methods in Morbidity Surveys and Public Health Investigations. WHO Tech Report No. 336, Geneva, 1966, 29 pp.

Good discussion and description of sample surveys as a means to investigate various aspects of a population's health. The advantages of sampling over registration systems are noted: speed, adaptibility, better quality data, cheaper. In developing countries surveys may be the only way to obtain data since maybe no permanent statistical system is in operation. The paper gives a clear, nontechnical description of the various aspects of sample design, selection and size determination. Sampling and non-sampling errors are discussed as are methods to deal with these errors. Included also is an outline of how to analyze, evaluate and report sample results and how to generalize from sample estimates to the population.

A5.

Barlow, R. Applications of a Health Planning Model in Morocco. Int J Health Services, 6(1):103-121, 1976.

Good paper which argues that public health planning should be guided by the principle of output maximization. The objectives of the health sector (program) should be specified and measurable forms of output should be derived from the statements of purpose. The objectives and output measurement and the contributions that various combinations of inputs make toward output, allow calculation of that use of available inputs which will maximize output. Included is a discussion of the objectives or forms of output in a public health system both humanitarian and economic. A model of such a system for an underdeveloped country is constructed which identifies the relationships which must be known if spending decisions are to succeed in maximizing output. In the Moroccan model, the respective contributions of general hospitals and of mass vaccination programs toward the objective of reducing mortality are estimated. The preventive activities (mass vaccinations) are found to be a much cheaper way of saving lives than are the curative activities (general hospitals).

A6.

Barzilai, I. Some Reflections on Developing Health Services. Israel J Med Sci, 4(3):384-389, 1968.

Some scattered comments on problems in the developing countries with relation to the development of health services. He touches on the scarcity of personnel, funds, technological knowhow and, despite these deficiencies, the necessity to continue to plan with whatever means are available, rather than do nothing.

A7.

Bengoa, J.M., Beaton, G.H. Some Concepts and Practical Considerations in Planning and Evaluation. WHO Monogr Ser (62):213-222, 1976.

Useful article on planning and evaluation. Author indicates that a strictly empirical approach is no longer acceptable. Judgments must be made and plans prepared only after careful review of the best information available. In addition, the quality of the available information must be continually upgraded. Five basic steps in the planning and process are defined:

1. identification of the problem and definition of objectives;
2. determination of alternative solutions;
3. consideration of the suitability and relative costs of various solutions for particular communities;
4. selection and implementation of programs;
5. provision for evaluation.

The author also stresses that planning is not a one-time activity: it is a continuing process that permits and encourages modification of program approaches as conditions and resources change.

A8.

Blum, H.L. Priority Setting for Problems, Solutions, and Projects by Means of Selected Criteria. Int J Health Sci, 2(1):85-99, 1972.

Interesting paper which offers a list of criteria and a weighting scheme for use with the suggested criteria in setting priorities for health problems and their possible solutions. The criteria, absolute weights for each criterion and a rating scale are given in a table. The criteria are divided into 4 groups: technologic aspects, health aspects, general social concerns and planning concerns. Fifty-three criteria are listed in these 4 general groups. They act as reminders of things which should not be forgotten in planning or seeking solutions to problems. The criteria, however, are probably not too useful for developing countries where the health problems of most immediate concern are apparent.

A9.

Brotherston, J.H.F., Cerkovnyj, G., Ferrero, C., et.al. Statistical Indicators for the Planning and Evaluation of Public Health Programmes. (14th Report of the WHO Expert Committee on Health Statistics). WHO Tech Report No. 472, Geneva, 1971, 40 pp.

Excellent, comprehensive discussion of the kinds of data needed for planning and

evaluation of health programs. Defines health planning, kinds of health planning and how the process proceeds. Suggests a more scientific approach based on appropriate methods and types of information is needed. Discusses evaluation and its problems, the kinds of evaluation possible and the kinds of data required to make evaluative judgments. The most effective and productive planning approach is that in which planners and statisticians work together. Reviews the kinds of data usually available in some degree in various countries but also indicates characteristics of the data which make it most useful for planning. Health information systems for planning purposes are described also: nine kinds of data should ultimately be included in such systems and they may be collected by a variety of methods.

A10.

Carter, L.J. Development in the Poor Nations: How to Avoid Fouling the Nest. Science, 163:1046-1048, 1977.

The author points out that little thought has been given to environmental problems that headlong development of poor nations may bring about. The price of development has included pollution problems, loss of farmlands and habitat (for people as well as wildlife) and even the spread of disease. He points to the need for ecological studies and careful planning. He also describes conferences convened to review this problem and presents many examples of environmental problems resulting from economic development projects. Pressure can be exerted by international aid-granting institutions for developing countries to plan better, but it is considered unlikely that government agencies such as AID can because of the political considerations involved. Ultimate solution may lie with public awareness and pressure plus research and education.

A11.

Chiang, C.L. The Making of Annual Indices of Health. Health Services Res, Winter:442-451, 1976.

Starting with the thesis that mortality can no longer be regarded as a sensitive indicator of those factors which affect a community's health, the author develops a stochastic model which recognizes various states of health as well as death. The central concept is that health is a continuum which extends from some optimum state of well-being to death. The health spectrum must have the following properties: (1) the states must be clearly and unambiguously defined both conceptually and operationally; (2) the states must be mutually exclusive and exhaustive; and (3) the operational definitions of states associated with the health spectrum must make it possible to collect reliable and valid data. While the derivation is complex, the formulas obtained are not. However, data must be collected in order to use the formulas. The author suggests surveys which record information over a six-week period on successive samples, selected throughout the year. Data collection should include personal interviews at the start and end of the period and maintenance of a daily diary.

A12. Cruickshank, R., Standard, K.L., Russell, H.B.L. (Eds.). Epidemiology and Community Health in Warm Climate Countries. Churchill Livingstone, Edingurgh, 1976, 492 pp.

Interesting book which includes 39 chapters on epidemiology, planning and

evaluation of control measures and descriptions, with epidemiology and control measures, on various communicable diseases. Except for the chapter on planning and evaluation of control measures, the book does not deal to any great extent with that subject. However, the chapter on planning and evaluation contributed by B. Cjvetanovic is brief but clear in outlining many of the considerations which are important in planning and evaluating communicable disease control programs. Cjvetanovic stresses the desirability of continuous evaluation of control programs in order to detect and correct weaknesses and the use of models to assess the cost-benefit and cost-effectiveness of alternative strategies. He emphasizes also the utility of simulation techniques which are most readily adapted to computers but which may also be carried out with less sophisticated technology.

A13.

Cvjetanovic, B. Use of Mathematical Models in the Planning and Evaluation of Control Measures Against Infectious Diseases. J. Egypt Pub Health Assn, 47(2):121-128, 1972.

Clear, well-written article which makes a plea for use of practical cost benefit analysis in the health field. The model is based on functional transcription of the natural history and epidemiological characteristics of the infectious disease into mathematical formulas that are suitable for use in computers. Population states which need estimates are: susceptible, immunes, sick persons, carriers, etc. Transitions from one state to another are expressed in terms of proportions or probabilities. Newborns or immigrants may enter the population; deaths and emigrants leave. Once all the relevant factors have been determined, computer stimulation can be used to determine what happens with changes in any of the factors. These models are extremely useful tools for health planning and evaluation as well as for cost benefit and cost effectiveness analysis. While computers may not be available locally in underdeveloped countries, they may be available nationally.

A14.

Feldstein, M.S. Health Sector Planning in Developing Countries. Economica, 37: 139-163, 1970.

This paper describes a method of allocating scarce health funds, manpower and facilities of an underdeveloped country to different disease control programs and individual activities in a way which yields optimum reductions of mortality, morbidity and economic losses. The method uses a linear analysis of a given health sector: a vector of inputs and a vector of outputs is associated with each health activity. This leads to an optimization procedure which uses a linear programming algorithm. The model is complex and quite detailed--probably too complex to be utilized in the developing countries.

A15.

Fendall, N.R.E. Primary Medical Care in Developing Countries. Int J Health Sci, 2(2):297-315, 1972.

Common to all developing nations are lack of financial resources and trained

manpower, illiteracy, high fertility, a traditional society based on attachment to the soil and diseases related to undernutrition, infections and vector-borne illnesses. The distribution of well-trained medical personnel is poor. While there is no lack of knowledge or understanding of what to do about these problems, there is insufficient application of such knowledge toward practical solutions. One cannot take a pattern of service from one country and apply it in its entirely to another. Principles and concepts need to be modified and adapted to suit local conditions. Realistic planning of primary care will utilize non-professional workers operating from planned centers. The pattern of disease in developing countries is changing from highly endemic infectious diseases to epidemic outbreaks of some diseases and with the increasing presence of non-infectious diseases. However, major attention should be given to childhood diseases and those diseases associated with poor hygiene and unsafe water supplies.

A16.

Gordon Smith, C.E. Prospects for the Control of Infectious Disease. Proc Roy Soc Med, 63:1181-1189, 1970.

Sufficient knowledge exists to control many severe infectious diseases and this has been accomplished in developed countries. In many developing countries problems still exist because they are unable to exploit existing knowledge. Research is needed to determine the costs of controlling and of not controlling various diseases so that the best use can be made of the resources available. That is, a method is needed by which priorities can be established logically. For respiratory diseases, the best control method, if available, is vaccination. For fecally transmitted diseases, environmental sanitation is the best method. Other types of infectious disease and their control methods are also discussed. Little attention is focused on how control of infectious diseases is to be achieved in developing countries except through the assistance of prosperous, developed countries.

A17.

Gupta, R.B. Impact of Partial Elimination of Specific Causes of Death on the Human Survivorship: An Indian Situation. Ind Jour Pub Hlth, 19(1):11-35, 1975.

Using methods developed by Bayo, Greville and Forden, the author examines the effects on the expectation of life at birth and at various ages of the elimination of particular causes of death--complete and partially. Findings show that the maximum gains in expectation of life at birth would be achieved by elimination of diseases like cough and fevers. Elimination of infant deaths alone also adds substantially to the expectation of life at birth. A 50% reduction in all causes of death would add about 10 years to the expected length of life at birth.

A18.

Hedrickse, R.G. Health Problems in Pre-School Children: (6) West Africa. J Trop Ped, 14(4):253-256, 1968.

The author describes a broad spectrum of bacterial, parasitic, viral, genetic and nutritional diseases which affect the health and development of West African

pre-school children. He mentions also that non-medical problems, primarily economic and political, also disrupt life in the developing countries of West Africa and affect the health of children. His belief is that a national network of basic medical units which are accessible to the majority of the population and geared to curative and preventive medicine are needed. While he recognizes the value of immunizations, he suggests they are not better than food. He states his view that only when basic medical units have been widely established throughout the rural areas in West Africa, will malaria control, on-going immunization programs and nutritional and health education, so vital for the public health in general and children in particular, become really feasible.

A19.

Hilleboe, H.E., Barkhuus, A., Thomas, W.C. Approaches to National Health Planning. Public Health Papers No. 46, WHO, Geneva, 1972, 108 pp.

A valuable publication which gives a philosophical background for health planning and illustrates health planning in various parts of the world: India, Russia, Sweden, South America, United States, Peru, Taiwan, Turkey. Also distinguished are pragmatic and systematic health planning approaches, or what is called the integrated approach. The authors point to four steps required for planning to be complete and effective: (1) need accurate, relevant data; (2) the desired ends must be identified as a result of problem analysis and in the light of explicated values; (3) feasible and satisfactory, ir not optimal, choices have to be made among available alternatives; (4) projected actions must be understood and accepted by those who will carry them out if they are to govern organizational behavior.

A20.

Hopwood, B.E.C. Organization for Health. Lancet, II(7941):915-916, Nov. 8, 1975.

The author suggests that it is widely believed that investment in prevention at an increased level would lead to a reduction in the cost of hospitals and other curative centers. However, he points out, it has not happened in the Third World. Examples of preventive measures which substantially reduced disease in industrialized countries are given. It is also noted that prevention was not only better than cure, it was the only practical thing to do because there were no cures. In developing countries now the choice in controlling disease lies between the improvement of sanitation and the provision of immunization or the use of a wide spectrum of efficient drugs. The 10 cardinal purposes of a health service in developing countries are 8 preventive and 2 curative yet the 2 curative absorb 80% of the available resources. The author suggests a reorganization of health services to distribute funds equitably between 4 major health functions: food, environment, preventive health and curative services.

A21

Idriss, A.A. Lolik P., Khan, A., Benyoussef, A. Sudan: National Health Programme and Primary Health Care. 1977/78-1983/84. Bull WHO, 53:461-471, 1976.

In 1974, the Sudanese Government developed a 7-year health plan for the period 1977/78-1983/84. In that plan 8 priority programs in health and rural development

were specified: Primary health care, malaria, schistosomiasis control, safe water, environmental health, food, onchocerciasis, the last relates to primary health care for selected regions, especially to those areas where the population is predominantly rural and nomadic. In this article, the methods used in formulating the primary health care program are discussed. The general approach followed was first to identify the health related problems of prime concern. The second was to analyze the problems identified by use of the relevant data available on demography, economic and social development, health (including facilities and personnel), environmental health, unit costs and the policy for development of health services. Criteria for defining problems were established and weighted; objectives were set and health strategies determined after analysis of constraints which might affect proposed activities.

A22.

Isely, R.B., Martin, J.F. The Village Health Committee: Starting Point for Rural Development. WHO Chron, 31:307-315, 1977.

This article describes the successes and setbacks encountered in a project in which village committees were established and put into action in south-central Cameroon. 39 village health committees were established in a 2-year period. The committee is an organization of village leaders that assesses the health needs of the villagers, identifies health problems, plans and implements programs to deal with these problems and generally promotes the well-being of the population. Experience with these village health committees in this project leads the authors to conclude such committees can generate purposeful and effective action--latrine construction, water source protection and similar projects. The committee is also of critical importance in legitimizing health-promotion activities that might cause resistance if they appeared to be imposed from outside. The committee also seemed to have a catalytic effect on other aspects of village life. Thus the village health committee is a feasible starting point for integrated rural development.

A23.

Jungalwalla, N., Abel-Smith, B., Hilleboe, H.E., et.al. National Health in Developing Countries. (Report of a WHO Expert Committee). WHO Tech Rep Ser No. 350, 40 pp. 1967.

Excellent review of the situation in developing countries with regard to planning. Outlines the characteristics of developing countries which make planning difficult, how health planning should be organized, planning methods and the training needed by health planners. Health planning suffers in developing countries because of communications difficulties between regions, social groups or sectors of activities. The consequences are difficulties in educating an illiterate population in health matters, the limited ability of the marketing structure to provide the population with supplies adequate for their needs and an outmoded agrarian structure which impedes the production of food. Uneven economic development has produced standards of living so low that even the more elementary health needs cannot be met. This leads to a vicious circle of poor nutrition and low productivity. For these reasons, plans for health services should be closely integrated with the plan for the whole economy.

A24.

Krishnaswamy, A.K. Economic Aspects of Communicable Disease Control Programme. Indian J Pub Health, XI(1):28-31, 1967.

This paper is a summary of the papers given at a symposium on factors in socio-economic development and its affects on communicable disease control programs. The paper is not very informative and in some instances the passing of 10 years reversed achievements made a decade ago. Smallpox is all but eradicated today while malaria has recrudesced; the viruses of hepatitis A and B have been identified though immunization and specific therapy are still unavailable. Many diseases remain significant problems: tuberculosis, hookworm disease, malaria are a few and provision of pure water and disposal of sewage remain serious problems for much of the world.

A25.

Liang, M.H., Eichling, P.S., Fine, L.J., Annas, G.J., Chinese Health Care: Determinants of the System. Am J Pub Health, 63(2):102-110, 1973.

Few statistics on people treated, diseases diagnosed, etc. are available in China. Therefore, this article is valuable only because it points out how little is known about disease in China at present and how much information about disease incidence, prevalence, mortality and health services generally is unavailable. It follows that estimates of how much health and medical services have improved are unreliable.

A26.

Lopes da Costa, O., Halter, S., Lutwama, J.S.W., et.al. Training in National Health Planning. (Report of a WHO Expert Committee) WHO Tech Rep Ser No. 456, 1970, 59 pp.

Discusses in some detail the kinds of personnel needed in health planning and the type of course work which should be included in training. Throughout the emphasis is on national health planning--an activity which must be integrated with economic and political factors in any given country. A general model of health planning is presented: it includes 12 basic characteristics. Planning for health is linked with other sectors of society concerned with socio-economic development; planning is under the charge of political executives or administrators; planning involves a plurality of insights--health professionals, economists, systems analysts, political analysts, information specialists and social scientists; planning must use rational and explicit methods; planning is integrally linked with execution and evaluation; planning is dynamic and is being continually revised in the light of new information. These are probably the most important characteristics of national health planning.

A27.

Mahler, H. WHO at the Crossroads. WHO Chron 31:207-238, 1977.

Interesting article about WHO's plans for health expenditures and activities for 1978-1983. Actual amounts budgeted for each program are not given but goals are defined--long and short range--priorities are stated and the strategies to be used

outlined. The health program for the next five years is subdivided into six major areas of concern: (1) development of comprehensive health services; (2) disease prevention and control; (3) promotion of environmental health; (4) health manpower development; (5) promotion and development of biomedical and health services research, and (6) program development and support. The long-range goal of WHO is stated to be an acceptable level of health for the entire world population by the year 2000.

A28.

Manuwa, S. Mass Campaign As an Instrument of Endemic Disease Control in Developing Countries. Brit Med J, 4:634-636, 1968.

"In the underdeveloped areas...release of the countries from the tangled undergrowth of mass disease is a prerequisite of development... Somehow governments will have to finance the capital requirements of health."--United Nations (1952). In developing countries communicable diseases occur in the mass and must therefore be dealt with largely in the mass by means of mass campaigns. These campaigns must embrace a total and rigid geographical coverage of the population at risk and also of future additions to that population by birth, immigration, or both. The principal aim of a mass campaign is to achieve a speedy interruption of the cycle of transmission for the disease under attack. The methods which may be used are: (1) exterminating vectors; (2) destroying the agent; (3) destroying the intermediate host; (4) increasing the resistance of the host; (5) improving the environment to reduce exposure. It is most economical to attack one disease at a time and it is also more effective in building up a trained program staff.

A29.

Measures of Health Status (Editorial) Ind Jour Pub Hlth, 19(1):1-2, 1975.

Past measures of health have been crude: age-adjusted death rates, infant mortality rates and expectation of life. A study of such indices by a WHO study group recommended only three generally accessible mortality measures as useful to measure a nation's health: (1) expectation of life at birth and at one year; (2) crude death rate, and (3) the proportional mortality ratio. These measures fail to provide an index of the well-being of people. Currently, more attention is given to the economic and social consequences of illness in evaluating health levels and the importance of health problems. Their consequences include not only death but prolonged disability, reduced productivity and the need for care. Morbidity then should be included in a measure of health but as a concept it should incorporate the disabling consequences of disease and injury. Such information can be obtained from annual health interview surveys.

A30.

Mendia, L. Environmental Health in Developing Countries. Israel J Med Sci, 4(3): 415-527, 1968.

Not generally useful for communicable disease program planning and evaluation. Notes that more modern view of health is not absence of illness but a broader one which encompasses physical, mental and social well-being. Does note that problems common to all kinds of environments are water supply, sewage disposal, solid waste disposal and housing.

A31.

Montoya-Aguilar, C. Health Goals and the Political Will. WHO Chron, 31:441-448, 1977.

All over the world, people are expressing the hope for better health, yet planning is clearly necessary for those hopes to be realized. Planning in turn can be successful only when governments have a clearly stated and understandable health policy and when health plans lie within the framework of that policy. Too often health and other policies are faultily generated; inadequately expressed; internally inconsistent or inappropriate to the real needs and demands of the people. As a result planners and other administrators are often misled and they fail to influence policy towards what is possible; efforts and resources are wasted and the community is deceived. The author suggests that a scientific approach to the understanding of policies is needed so that policy can be influenced in an intelligent way. The author presents a scheme for review and analysis of national policy based on the tenets of political science. Political science eventually then will play a role similar to that which epidemiology now plays in health planning--helping to explain the problems and find their solutions.

A32.

Olivier, L.J. The Economics of Human Parasitic Infections. J Parasitenk, 45: 197-210, 1974.

A platitudinous paper which concedes that the consequences of disease and their control are part of a complex which involves many social and economic factors: therefore the consequences of disease should not be measured without considering those related factors. The parasitic diseases are considered not only because they simplify a complex subject but because they tend ot be chronic and so may cause great economic loss. However, the author feels that the evidence of economic impact is inadequate. He cites 7 ways that parasitic disease can have economic consequences but points out that economic factors also influence the prevalence and severity of parasitic infections and also affect the success of control programs. Better data on the economic impact of parasitic disease are very badly needed. These data should be collected by teams composed of economists, statisticians, disease experts and others who carry out surveys in highly endemic areas.

A33.

Pandit, C.G. Economic Aspects of Communicable Diseases Control Program. Indian J Pub Health, 11(1):28-31, 1967.

This paper summarizes the papers given at a symposium on factors in socio-economic development. Because of that, the paper is quite general in summarizing achievements made in control of communicable diseases in India over the previous 50 years.

A34.

Popov, G.A. Principles of Health Planning in the USSR. Public Health Papers NO. 43, WHO, Geneva, 1971, 172 pp.

A detailed description of the health planning process in the Soviet Union. Defines health planning and gives principles of health planning as well as the types of data needed to set the planning process in motion. Discusses priorities in health planning and some economic principles utilized to set priorities in the USSR, though the author does point out that health planning is not done for economic reasons only but for humanitarian concerns as well. Health planning in the Soviet Union is analytical primarily but other methods are also used: expert evaluation based on pre-set norms; cost-benefit analysis; balancing of needs and resources; optimization of pay-off for expenditures; mathematical modeling; computer simulation; operations and systems analysis and queuing theory. By and large, the Soviet experience and expertise is too sophisticated for wide application to the developing countries. Those lesser developed countries have neither the technical nor financial resources to make it possible to utilize the techniques described in this monograph. Furthermore, they do not have the extensive data which also makes it unlikely that they can apply sophisticated methodology to planning.

A35.

Otolorin, M.P. Priorities in Medical Services. Israel J Med Sci, 4(3):368-383, 1968.

Reviews Nigeria's experience with health planning and provision of medical services. He suggests several principles used by Nigeria and indicates that each country may have a different philosophy in dealing with health, but feels that the following three points are of prime importance: (1) the plans must be capable of execution under the system of government which exists; (2) other basic services must be developed in parallel with health services--good water supply, good housing, good education, abundant food and optimum labor conditions; (3) in developing countries where a good proportion of deaths is due to preventable diseases, preventive measures must be given the emphasis they deserve. Other factors which must be understood and taken into account in planning are finances; training of personnel; specialists and super-specialists; and finally mobile health teams.

A36.

Raska, K. Concept of Epidemiological Surveillance of Communicable Diseases. Israel J Med Sci, 4(3):402-414, 1968.

This paper presents a broad definition of surveillance as follows: "Surveillance thus means the epidemiological study of a disease as a dynamic process involving the ecology of the infectious agent, the host, the reservoirs and the vectors, as well as the complex mechanisms concerned in the spread of infection and the extent to which this spread occurs." The author suggests that it's not enough to enumerate the number of cases of a disease which occur, in what age groups, sexes, socio-economic groups, etc.; it is important to study the conditions which favor the spread of infections, the animal reservoirs, the vectors as well as

their biological properties and their resistance to infection in reservoirs or to insecticides in vectors. Other factors also merit attention: events which may influence the spread of infection and the incidence of diseases such as social and economic changes in the country, population movement, large industrial and agricultural investment projects, and international trade.

A37.

Rice, D.P. Estimating the Cost of Illness. Health Economics Series No. 6, PHS Pub No. 947-6, May 1966.

While generally not applicable to the developing countries--morbidity, mortality and cost data are unlikely to be available in those countries--the publication suggests some measures to be used in evaluating health programs.

A38.

Shepard, D.S., Neura, R. A Pitfall in Sampling Medical Visits. AJPH, 57(8):743-749, 1977.

Health planners often need estimates of the number of people with particular conditions seen annually in clinics. Ordinarily, these clinics do not have a patient roster from which a sample can be drawn and so the alternative of drawing a sample of patient visits is often used. The authors point out that such samples may be biased because patients with more frequent visits are over represented. The authors present a weighting procedure in which each sampled visit is weighted inversely to the number of clinic visits made by a given patient during the sample period, which avoids the bias inherent in the sampling method.

A39.

Snyder, J.C. Population and Disease Control. Am J Trop Med & Hyg. 21(4):386-391, 1972.

Quoting Alexander Langmuir, the author states "...the most important health problem in the world is population; the second is nutrition; the third is tuberculosis." The author sketches the growth of population in three types of societies: high birth, high death rates; high birth, low death rates; and low birth, low death rates. His conclusion is that the process of demographic transition to low birth and low death rates must be completed as quickly as possible for the two-thirds of mankind now in the first two categories, and that is no simple matter. His solution is that fertility control services should be an integral part of basic health care for families everywhere, in all socio-economic circumstances. In addition, resources and ingenuity should be used to deal more effectively with the common causes of illness and disability whether or not the conditions lead to a fatal outcome, since improved control of disease and disability will contribute importantly to the stabilization of the world's population.

A40.

Swift, P.N., Hamilton, P.J.S. Evaluation of Pediatric Care from Routine Hospital Records: Report of a Study at Mbale, Uganda. J Trop Med Hyg. 75:300-315, 1973.

Because the existing hospital record system was inadequate for the purpose of improving standards of care, a study was made of 10,125 in-patients under six who were discharged from Mbale Hospital between June 1, 1969, and April 30, 1971 (23 months). The existing case record was used but the accuracy of data entered on the record was checked on daily ward visits and on discharge or death by the clinician in charge. The case record was used as the primary document from which data was extracted. A comparison of the data obtained by the study with that of the hospital records system for a 12-month period showed vast discrepancies in discharge diagnoses and in deaths. Comparative data, presented in much detail, was highly informative about seasonal variations in discharges and outcomes, age and sex of patients, distance from hospital, length of stay, bed occupancy and various other factors. It was found that the data were quite valuable for medical care planning.

A41.

Tell, R. A Realistic Approach to Health Planning. Hosp Admin, 14(4):90-98, 1969.

Another paper with some good general comments but nothing substantial for the neophyte. "Realistic health planning is within reach but awaits the realistic health planner," the paper proclaims. Realism implies avoiding planning mythology such as that planning is a science, or that planning principles are immutable. Instead we should realize that the principles of planning, if accepted, should be seen as temporary insights into particular problems at a specific time and therefore are always subject to change.

A42.

Thomas, W. Health Planning and Realism. Hosp Admin 14(4):16-34, 1969.

This paper is much too general to be useful: it discusses various views of planning and gives some definitions but nothing very specific. Examples: Planning is to promote rationality in the use of appropriate means to accomplish the end in view; planning should maximize the chances of success; planning should be systematic in the use and interpretation of data; rationality is irrelevant to the choice of goals--it has to do only with the relationship between means and goals; goals are generated in the community while planning merely discovers these goals.

A43.

Waksman, B.H. Infectious Disease in Africa. A Personal Viewpoint of Research and Control Measures. Yale J Biol Med, 48:239-249, 1975.

The author discusses his impressions of research and control measures for infectious disease in Africa after a six-week tour in 1974-75. He points out

many problems, scientific and non-scientific, which hamper efforts to control infectious diseases. Some of these problems are: poor communications due to a large group of independent blocs; a welter of agencies are involved in the work and they funnel most funds through a limited number of medical and scientific institutions. Political change greatly affects work in progress and often brings it to a complete halt. Difficulties arise also from a lack of coordination among government agencies, unwillingness of educated Africans to leave urban centers and the breakdown of equipment. The problems though large are not totally insoluble. The author stresses that infectious diseases of animals also need attention and that malnutrition and overpopulation, because they go together, are as important as infection in killing children.

A44.

Weinsten, M.C., Stason, W.B. Foundations of Cost-Effectiveness Analysis for Health and Medical Practices. N Eng J Med, 296(13):716-721, 1977.

Limited health-care resources make it impefative that decisions about the allocation of resources be guided by considerations of cost in relation to expected benefits. In cost-effectiveness analysis, the ratio of net health-care costs to net health benefits provides an index by which priorities may be set. The methods described are not particularly complex or difficult but they depend on estimates of costs or actual costs and data unlikely to be available in most developing countries. However, the idea is useful and applicable to a wide variety of problems.

A45.

White, K.L., Henderson, M.M., (eds). Epidemiology as a Fundamental Science. Oxford U Press, New York, 1976, 235 pp.

The book is a collection of papers on the use of epidemiology in health services planning, administration and evaluation. Unfortunately it is directed almost exclusively to examples and applications from the English speaking developed countries. Evaluation gets little attention in this volume, so that there is little of value for developing countries. What does seem clear is that money alone does not insure good health even in the developed countries.

A46.

World Health Organization. World Health Organization Publications Catalogue, 1947-1973. WHO, Geneva, 1974, 206 pp.

This catalog lists all WHO publications printed between 1947 and 1973. A review of the titles listed under communicable diseases, general and the various communicable disease special sections indicates that no publications deal with program planning and evaluation. The section on public health administration lists nine publications which deal with health planning but none deal with communicable diseases specifically.

A47.

Zhdanov, V.M. Tropical Diseases. Israel J Med Sci, 4(3):390-401, 1968.

The author discusses the major tropical diseases which affect the lesser developed countries. In this group he places cholera, smallpox, malaria, epidemic helminthoses (schistosomatosis type), hemhorrhagic fever viruses and trepanematoses. In addition, malnutrition and nutritional diseases are widespread in tropical lands. A plea is made that priority also be given to the establishment of adequate national public health services.

B1.

Brinkman, U.K. Epidemiological Investigations of Bancroftian Filariasis in the Coastal Zone of Liberia. Tropenmed Parasit, 28:71-76, 1976.

Five areas along the Liberian coast were selected for a study to gain information on the prevalence of bancroftian filariasis. Surveys to gain similar information had been carried out in 1947, 1950, 1953, and 1955 in four of the areas studied in the present investigation. One of the purposes of the study was to determine if filariasis had spread much. Where comparisons were possible, the authors conclude cautiously, it did not appear that filariasis had spread much (these data are not presented in the paper). However, the area with the highest prevalence in the present study was not surveyed in the 1950's. Another question considered important by the Liberian Health Authorities was: Are the rural foci of filariasis a threat to the large urban capitol Monrovia? Again the data did not give a clear answer. The authors estimated that 16,000 to 20,000 individuals in a population of 71,000 are infected with filariasis and that 2,500 to 4,000 men suffered with hydroceles and that 3,700 to 4,000 had elephantiasis. Therefore, bancroftian filariasis must be regarded as a health problem in coastal Liberia.

B2.

Hawking, F., Marques, R.J. Control of Bancroftian Filariasis by Cooking Salt Medicated with Diethylcarbamazine. Bulletin WHO, 37:405-414, 1967.

Filarial infection can usually be reduced to low levels by oral administration of diethylcarbamazine in small-scale pilot trials. However, in mass campaigns it is often difficult to persuade large numbers of people to swallow the tablets. The authors believed that the compound could be incorporated into cooking salt in order to overcome this difficulty. A similar technique has been used with chloroquine to control malaria. Laboratory trials showed that cooking the compound in food did not make it toxic or diminish it's antifilarial activity. A pilot trial in Recife, Brazil, used 0.4% diethylcarbamazine for 40 days then 0.1% of the compound in salt for a year. This medication was simple to administer; quite acceptable to the subjects; caused no untoward effects and removed almost all the microfilariae from the blood. The authors recommend further investigation to see if this method can be used for mass campaigns to control filariasis.

B3.

McConnell, E., Asfaha, W., Dennis, D.T. A Survey for Wuchereria Bandrofti in Ethiopia. Ethiop Med J, 14:31-36, 1976.

Communities in the central highlands and southwestern lowlands of Ethiopia were surveyed for the presence of W. bancrofti. Volunteers from the highlands were selected from adults who attended local health centers or who were in prison. In the lowlands, volunteers were selected from the general population. Microfilaremias were detected only among inhabitants of the southwestern lowlands. No infections were found in the central highlands where bilateral elephantiasis of the lower extremeties commonly occurs.

B4.

Breman, J.G., Coffi, E., Bomba-Ire, R.K., Foster, S.O., Herrmann, K.L. Evaluation of a Measles-Smallpox Vaccination Campaign by a Sero-Epidemiologic Method. Am J Epidem, 102(6):584-571, 1975.

In a rural area of the Ivory Coast during the maintenance phase of a measles-smallpox vaccination program, 1,762 children from 0-72 months were inspected. The campaign achieved a coverage of 53.6% of the children in the target group. Initially, 94.6% of children in the study were susceptible to measles and after vaccination 90.2% showed sero-conversion. The authors found that a positive history of prior measles or prior measles-vaccination was not a good indicator of measles serologic status. The smallpox vaccination major reaction rate was 93.2%: 91.4% of children with a recent vaccination scar sero-converted to measles vaccine. Thus, the smallpox scar read at the second visit proved the best clinical marker for determining both coverage and immunologic effectiveness of the campaign.

B5.

Chansoria, M., Taluja, R.K., Mukerjee, B., Kaul, K.K. A Study of Immunization Status of Children in a Defined Urban Population. Indian Pediatrics, XII(9): 879-888, 1975.

A study of 2,249 children under 10 from 1,000 randomly selected families in Jabalpur Cantonment indicated that immunization against smallpox was satisfactory (97.3%) but that for BCG, triple OPV and TAB/TABC immunization was poor (23, 12, 10 and 1% respectively). Revaccinations for smallpox fell sharply while those for other vaccines were negligible. Immunization status and parental awareness of the need for vaccinations was related to higher socio-economic status, community, maternal literacy, nuclear family and infant delivery at a private nursing home.

B6.

Cook, R. Immunization Programmes in the Context of Prevention of Malnutrition. WHO Monogr Ser (62):268-276, 1976.

The author presents a divergent view of the value of immunization and nutrition (see Hendrickse, Stanfield and Bracken). He sees the diseases of childhood as

precipitating factors of severe protein-energy malnutrition and suggests that a major obstacle to better child health services in developing countries is the heavy demands made on the available resources of both manpower and finance by large numbers of cases of preventable disease. Immunization, in his view, is a fairly simple and inexpensive procedure. It is difficult to reconcile these divergent points of view especially as he estimates the cost of comprehensive immunization as between $1 and $2 per child and suggests that even in countries where per capita health expenditure is low, such costs would amount to only 2% to 5% of the annual health budget.

B7.

Deodhar, N.S. Immunization of a Village, a New Approach to Herd Immunity. Prog Drug Res, 19:252-256, 1975.

While immunizations are available against various communicable diseases, these have generally been used on an individual basis. No serious attempt seems to be made to utilize immunology as a measure to control the natural history of infection. While it is very difficult to immunize 100% of a population, it is desirable to protect everybody from some infections. This can be achieved by providing an optimum degree of herd immunity. This paper describes an attempt to immunize 5 villages rather than the villagers, in the Poona district. The village people were involved at all levels of the program. Every household was contacted and cards were prepared for each family for ease of identification and record of immunizations. On the day of immunization, local volunteers and field staff ensured the attendance of all the children from the assigned area. Results were 95% of children 5 and under received the first dose of vaccine and about 80% received the second dose.

B8.

Grab, B., and Cvjetanovic, B. Simple Method for Rough Determination of the Cost-Benefit Balance Point of Immunization Programmes. Bull WHO, 45:536-541, 1971.

Funds available for health programs or the lack of them is one of the most important constraints in planning health services. Limited resources makes it imperative that such resources be used as effectively as possible. Selection of the most profitable course of action is particularly important in developing countries where the needs are so great and the resources to restricted. The authors present a simple aid in planning control measures against acute communicable diseases of bacterial origin against which there are effective vaccines. To use the method some essential information is needed: (1) incidence, if possible by sex, age, race, geographic area, social structure, etc.; (2) cost of treating a case; (3) cost of immunizing an individual and (4) vaccine effectiveness in preventing disease and length of protection. With this basic information, comparisons can be made in the costs of treating or immunizing segments of the population. Nomograms are constructed and the method illustrated.

B9.

Hendrickse, R.G. Problems of Future Measles Vaccination in Developing Countries. Trans Roy Soc Trop Med Hyg, 69(1):31-34, 1975.

The author discusses current beliefs about the benefits of measles vaccination

in developing countries and states that he does not believe that vaccination will measure up to expectation either in respect of reducing costs of treating the sick or in reducing childhood mortality. He believes that mortality figures are grossly exaggerated because they are extrapolated from hospital data, that a major determinant of morbidity and mortality is protein energy malnutrition, and finally freedom from measles will not guarantee the survival of many children in whom the interaction of malnutrition and infection continues to occur. Further the cost of the vaccine and the requirements for successful delivery preclude the general use of measles vaccination in most developing countries. This can be done only if more rudimentary health services are not funded and in the long run that would prove wasteful and would fail.

B10.

Jhala, C.I., Goel, R.K.D., Dave, S.K., Dave, A.D. Morbidity Due to Poliomylitis in Urban and Rural Area of Gujarat in Pediatric Population--A House to House Survey. Indian Pediatrics, 13(11):821-825, 1976.

In a house-to-house survey, 10,000 households covering 51,393 urban inhabitants and 10,042 rural households (57,435 individuals) were included. A total of 23,914 children under 8 were identified. Poliomyelitis incidence in those under 8 was 4.23/1,000 for urban residents and 5.8/1,000 for rural residents. Age at onset for over 95% of cases was under 5 years.

B11.

John, T.J., Jayabel, P. Oral Polio Vaccination of Children in the Tropics. I. The Poor Seroconversion Rates and the Absence of Viral Interference. Am J Epidem, 96(4):263-269, 1972.

This study found, as had other investigators previously, that the sero-conversion rates to oral polio vaccine were unsatisfactory in hot climates. The study reported here was carried out in Vellore, Tamil Nadu, India on a group of children aged 3 months to 6 years. Among 40 children without antibody to polio types 1, 2 or 3 after 2 doses of vaccine, seroconversion rates were 28% to type 1; 77% to type 2; 40% to type 3. In another group of 191 children, prior to vaccination 72 were seronegative to type 1, 93 were seronegative to type 2 and 94 were seronegative to type 3. After two doses of trivalent polio vaccine given 8 weeks apart, their seroconversion rates were 35% to type 1, 76% to type 2 and 48% to type 3. Loss of potency of the vaccine, interference of enteric viruses prevalent at the time and interference among the 3 vaccine virus types were excluded as the cause of the poor serologic response observed.

B12.

Nicholas, D.D., Kratzer, J.H., Ofosu-Amaah, A., and Belcher, D.W. Is Poliomyelitis a Serious Problem in Developing Countries?--The Danfa Experience. Brit Med J, 1:1009-1012, 1977.

Children were examined for lameness in the Danfa Project district of rural Ghana to assess the impact of endemic poliomyelitis and to test the hypothesis that paralytic polio is relatively rare in such rural districts--i.e. less than

1 per 100 affected children. The study found a prevalence of lameness attributable to polio of 7 per 1,000 children of school age and estimated the annual incidence of polio to be at least 28 per 100,000 population. Because of the way in which the study was carried out, these estimates of prevalence and incidence are conservative yet they compare with rates in the USA and Europe during years of severe epidemics. Authors conclude that in this district a high price is being paid for natural acquisition of immunity and recommend a higher priority for polio immunization.

B13.

Ofosu-Amaah, S., Kratzer, J.H., Nicholas, D.D. Is Poliomyelitis a Serious Problem in Developing Countries?--Lameness in Ghanian Schools. Brit Med J, 1:1012-1014, 1977.

A survey made via mailed questionnaires indicated that lameness attributable to poliomyelitis throughout Ghana was 5.8 per 100 children of school age and annual incidence of paralytic polio was 23 per 100,000 population. Official rates range from 0.1 to 2.1 per 100,000 population which suggests that 90% of cases are not reported. No evidence was found to suggest unreported epidemics accounted for these high rates. The authors believe that these findings suggest that mean annual incidence rates in tropical countries with endemic transmission have always been as great if not greater than in temperate countries during epidemic periods. They deduce also that paralytic poliomyelitis throughout the world has been reduced by only 25% since the use of polio vaccine.

B14.

Editorial. Poliomyelitis as a World Problem. Med J Aust, 710, Oct 11, 1970.

W.C. Cockburn and S.G. Drozdov are quoted: these authors surveyed world poliomyelitis trends and showed that in many tropical and subtropical countries the disease was static or actually increasing. In the less well developed countries of Africa, Asia and Central and South America, insofar as figures are available... the number of reported cases of poliomyelitis increased between 1951-1955 and 1961-1964. Live poliovirus vaccines in tropical countries have not been successful in producing an antibody response in a high proportion of cases as in temperate climates, possibly because of the large number of competing enteroviruses. Another is the mere logistic difficulty of maintaining adequate vaccination campaigns in underdeveloped countries.

B15.

Stanfield, J.P., Bracken, P.M. Evaluation of Methods Designed to Reduce Cost of Measles Vaccine Programmes. Trans Roy Soc Trop Med Hyg, 69(1):26-28, 1975.

The authors point out that the cost of one dose of measles vaccine is about 15 pence sterling and that this level of expense even with bulk orders would absorb a very large percent of the health budgets of most poor-resource countries. Further, most people in these poor countries could not afford to pay the cost themselves. The authors then examined the possibility of fractionating the dose and decided that there was no certain way of reducing the cost of measles vaccine by limiting dosage at least to below half. They recommend use of measles

vaccine for the limited objective of protecting "at risk" children and groups and offering the vaccine in clinics when and where the vaccine is available.

B16.

Elveback, L.R., Fox, J.P., Ackerman, E., Langworth, A., Boyd, M., Gatewood, L. An Influenza Simulation Model for Immunization Studies. Am J Epidem, 103(2):152-165, 1976.

A stochastic simulation epidemic model based on discrete time intervals and appropriate for any infectious agent spread by person-to-person contacts is presented. The model is simple to use and can be varied easily to add, subtract, or change variables and their values. It can be used to determine, for instance, what proportion of the population at various ages should be immunized to halt epidemic spread of a disease. Use of the model requires the availability of computers and technically trained personnel.

B17.

Ganapati, R., Naik, S.S., Ackarekar, M.Y., Pade, S.S. Leprosy Endemicity in Bombay: An Assessment Through Surveys of Municipal Schools. Lepr Rev. 47:127-131, 1976.

Earlier surveys of randomly selected schools in Bombay in 1970-1971, identified areas with high endemicity for leprosy. Rates were on the order of 10 per 1,000 in these endemic pockets located primarily in the northern suburbs of the city. A resurvey was made of 83,413 children in 148 schools in 10 presumable endemic localities. The survey covered from 77 to 87 percent of children enrolled in these 10 areas: 733 leprosy cases were identified for an overall prevalence rate of 10.8 per 1,000, range 2.0 to 14.5. Prevalence was higher in the 14-16 year olds than in the 5-7 group and lower in children vaccinated with BCG. The authors feel the results suggest that intensive surveys of schools in endemic areas should be given high priority in urban control programmes.

B18.

Koticha, K.K., Nair, P.R.R. Antileprosy Measures in Bombay, India: An Analysis of 10 Years' Work. Bull WHO, 54:67-77, 1976.

Although the data collected on different aspects of leprosy during the 10-year period 1963-72 are hospital-based and retrospective, their analysis provides a useful indicator of the possible situation in the field. The significance of health education in relation to early detection of leprosy is analysed. However, it is demonstrated that case holding is a more urgent priority than case detection. Trials confirmed the effectiveness of dapsone chemoprophylaxis for contacts of infectious index cases in crowded households. Comparison of annual expenditure per outpatient in leprosy clinics with that for inpatients in a leprosy hospital demonstrates greater cost-effectiveness of outpatient treatment. Control measures are recommended: these emphasize health education of patients, their relatives and friends; priority to minimizing the defaulting rage; screening high risk groups to increase the yield of case detection efforts.

B19.

Leiker, D.L., Fischer, P. The Incidence of Leprosy Between 1943 and 1973 in a Hyperendemic Area, Before and After the Introduction of Leprosy Control Measures. Lepr Rev, 47:115-125, 1976.

The effects of three measures to control leprosy, segregation of patients, mass chemotherapy and vaccination with BCG was evaluated by a survey of the whole population of the villages of Wandamen Bay, Indonesia. In the period 1943-1952 segregation of infectious patients was the only control measure used. In 1950, sulphone treatment was introduced and all segregated patients were treated. Subsequently, an intensive casefinding and mass treatment program was implemented. Between 1958 and 1960, leprosy incidence declined sharply whereas segregation did not affect the incidence. In 1957 a mass BCG vaccination program was carried out. The authors concluded that the major decline was due to the mass treatment campaign but that the vaccination campaign contributed to the additional decline of tuberculoid leprosy.

B20.

Banerjee, N. Malaria Back Again. J Indian Med Assn, 65(6):186-188, 1975.

Despite intensive campaigns to control malaria in India, malaria incidence has been increasing steadily since 1966. The control programs suffered setbacks caused by late receipt of insecticides, refusal to accept spraying and resistance of the vector to insecticides. But the most unfortunate part of the malaria eradication program was occasioned by a 75% government tax on DDT which was in scarce supply and expensive. Government policies must be reversed if malaria eradication is to be successful.

B21.

Draper, C.C., Lelijveld, J.L.M., Matola, Y.G., White, G.B. Malaria in the Pare Area of Tanzania. IV. Malaria in the Human Population 11 Years After the Suspension of Residual Insecticide Spraying with Special Reference to the Serological Findings. Trans Roy Soc Trop Med Hyg, 66(6):905-912, 1972.

In 1970, a parasitological and serological survey was made in the South Pare area of Tanzania. At eight month intervals for a period of three years from 1956 to 1959, houses in this area had been sprayed with dieldrin, a residual insecticide. The insecticide spraying had greatly reduced the transmission of malaria. By 1970, the vectors, A. gambiae and A funestus, and the theoretical inoculation rates had returned to pre-spraying levels yet the prevalence of malaria parasites in the human populations was still significantly less than formerly. Serological findings, however, indicated that more transmission was occurring than was demonstrated by the parasite rates. An important factor in the delayed resurgence of malaria was the wide-spread use of anti-malaria drugs.

B22.

Fontaine, R.E., Pull, J.H. Malaria Control: Field Testing of a New Insecticide. WHO Chron, 31:102-105, 1977.

WHO in cooperation with the Ministry of Health and the rural population concerned,

carried out a field trial to evaluate fenitrothion as an aid to malaria control in Kenya. In the evaluation zone, 8 clusters of 250 people were selected for observation; 4 similar clusters were selected in the comparison zone. Information was kept on malaria incidence: a diagnosis of malaria was based on presence of malaria parasites in the blood. For one year prior to spraying, baseline data were collected. Over the next 2 years, spraying with fenitrothion was carried out every 3 months. In the following year, a surveillance program to detect fever cases was carried out. Follow up showed that for adults, the prevalence of infection fell from about 60% to 15% and in infants there was a 96% reduction in the force of transmission. The infant mortality rate fell from 153 per 1,000 to 93 per 1,000. While the insecticide can be recommended for malaria control, its current high cost limits its use.

B23.

Grab, B., Pull, J.H. Statistical Considerations in Serological Surveys of Population with Particular Reference to Malaria. J Trop Med Hyg, 77(10):222-232, 1974.

The major objective of the paper is to identify the major factors which may influence serologic test results and so lead to a more accurate interpretation of the findings. The authors demonstrate that serological test results are subject to great variability. A statistical analysis of serological results when, as is usually the case, the number of simultaneously interacting parameters is large and the experimental material rather limited does not always allow definite conclusions. Further complications arise from the additional variation inherent in test procedures and materials which are not yet standardized. Accurate interpretation of results depends also on the sensitivity and specificity of the test and the definition adopted for reactivity. In order to compare test results, a standardized terminology and methodology will have to be adopted.

B24.

The Impact of Malaria on Economic Development. WHO Chron, 30:223-228, 1976.

In an effort to determine the economic impact of illness, the Pan American Health Organization sponsored a 22-month study in Paraguay. The paper describes the study and its findings. Families in the easternmost region of paraguay near the Parana River were studied. They were classified into 3 groups on the basis of economic variables the degree of impact malaria had on the family. The study showed that malaria affects the labor force by incapacitating the individual worker or by reducing his efficiency when he is able to work. The study also found that workers who were ill were not readily replaced by other family members or neighbors (as is sometimes believed) so that there was both a decrease in the amount of work done and substantial disruptions in the normal pattern of work. Malaria also caused the restriction of the area cleared and hence the rate of investment of these families. Malaria also affected other economic plans--i.e., expansion of production, both for internal consumption and for export, and diversification of diet.

B25.

Kouznetsov, R.L. Malaria Control by Application of Indoor Spraying of Residual Insecticides in Tropical Africa and Its Impact on Community Health. Trop Doctor, 7:81-91, 1977.

Over the past 30 years, most malaria eradication pilot projects in Africa failed to achieve their primary objective though they did achieve a considerable degree of malaria control. At that time programs changed from antilarval operations to house-spraying with DDT and BHC. House spraying alone failed to interrupt malaria transmission and the Second African Malaria Conference recommended that insecticidal attack be supplemented by chemotherapy (1955). This also was unsuccessful due in all instances to spraying operations that were below the required level. Experience during these 30 years indicates that malaria could be brought to a very low level of endemicity or even be eradicated in semi-desert areas, remote African islands and in highland savanna areas with sub-tropical and temperate climates; it could be reduced from high endemicity to hypo-endemicity in tropical areas in the forest zone, in the islands near the mainland and in parts of the highland savanna zone; it could be reduced from high endemicity to low meso-endemicity in the lowland savanna zone. These achievements are related to the quality of spraying operations, the size of the area, and population ecology.

B26.

Kouznetsov, R.L. Malaria Control: Benefits of Pact Activities in Tropical Africa. WHO Chron, 31:98-101, 1977.

Antimalaria activities in tropical Africa have generally failed to achieve the objective of interruption of malaria transmission. House spraying with DDT or HCH (hexachlorocyclohexane) was begun on a large scale in 1948 in six sub-Saharan countries. At the end of 1960, 4½ million people in these countries were living in areas where the malaria eradication program was in a late phase and another 6½ million were living in areas still in the attack phase. But in 1961 on the basis of a review by the WHO Expert Committee on Malaria, antimalaria activities were abandoned and emphasis shifted to development of basic health services. The gains which resulted from these programs have been often ignored. Insecticide spraying had a direct effect in lowering malaria indices: additionally a significant improvement occurred in the health status of the population and was apparent even in areas where malaria prevalence and incidence was not drastically changed by insecticiding.

B27.

Liang, K.C. The Priority of Malaria Eradication Programs. Bull PAHO, IX(4): 295-299, 1975.

For many years the Governments of the Americas have assigned high priority to combating malaria. The planning of health activities begins with the setting of priorities--i.e., the selection and arrangement of the problems to be attacked in an order consistent with their gravity and the possibilities that exist for the adoption of effective measures for solution. As matters now stand in the Americas, countries and territories can be placed into one of three groups with respect to their malaria programs. Group I--12 countries or territories where

malaria has been eradicated. Their activities should ensure they remain free of disease. Group II--8 units--have good prospect of achieving eradication in a short period. Here the highest priority should go to elimination of residual foci. Group III--14 units--are in a maintenance phase. Some cannot expect eradication in the foreseeable future and they should concentrate on keeping gains already made.

B28.

Peters, W. Current Concepts in Parasitology: Malaria. N Eng J Med, 297(23): 1261-1274, 1977.

Because of the spectacular early successes of the WHO malaria-eradication campaign launched in 1956, there was a rapid decline in the training of malaria workers and in drug research in the following 5 years. Since then problems have been identified: mosquito resistance to insecticides; resistance of parasites to drugs and the resistance of man to the intrusion of malaria-control workers into his houses. The net result is a serious resurgence of malaria in the tropics. In view of the difficulties which now beset eradication programs, what is to be done? New drugs are needed not only for chloroquine-resistant falciparum malaria but for vivax malaria against which only primaquine is of value today. Additional work must be done on the development of malaria vaccines: earlier work by several researchers is promising. But more money and manpower must be put into research in tropical diseases. WHO has launched a massive new campaign of research in these diseases. For malaria, two scientific working groups have been established--one for chemotherapeutic and the other for the immunologic aspects of the problem. However, more support for basic research is needed.

B29.

Smith, A., Hansford, C.F., Thomson, J.F. Malaria Control: Epidemiological Research in Southern Africa. WHO Chron, 31:105-107, 1977.

The objectives of the study described here were to increase knowledge of malaria epidemiology through longitudinal studies; relate epidemiological findings to the timing and quality of control operations; and to attempt to interrupt malaria transmission in limited areas with residual insecticides. The project area was a rural area of Sibasa district in the north of the Transvaal which has a population of 17,000 located in 22 villages. The investigators found that prevalence surveys were not sensitive enough to assess the malaria situation where transmission was at a very low level. Not a single case was detected in 6m000 blood samples taken in prevalence surveys but the screening of fever cases detected 42 cases. It was also found that the method of collecting blood specimens, filter paper or capillary tube, gave different infection rates in immunofluorescent antibody tests. Annual treatment of houses with residual insecticides over a 30-year period, had a profound effect on the anopheline mosquito population.

B30.

Weller, T.H. World Health in a Changing World. J Trop Med Hyg, 77(9):54-61, 1974.

An enthusiastic, time-limited antimalarial campaign was accomplished with finite financial support in 1955-1965. Since then all support has markedly declined. The

author uses malaria as an example to illustrate that economic assistance to developing countries has been provided but that scant consideration was given to the health component of the process of development. Appeals have been made to health planners and fiscal sources to rectify this situation.

B31.

Editorial. Nutritional Surveillance in the Ogaden. Lancet, 911-912, October 29, 1977.

Points out the difficulties of recognizing famines and of obtaining accurate data about the nutritional status of people in the affected areas. Furthermore, it is difficult to assess the value of practices instituted to alleviate nutritional deficiencies when the methodology used is not clearly detailed in published reports. This is particularly true when dealing with nomadic peoples. Many variables affect the quality of the data obtained on nutrition: sampling techniques, sampling sites (i.e., accessibility), time of day, livestock prices, and many others.

B32.

DeSole, G., Walton, J.C. Onchocerciasis in Gemu Gofa: An Anthropological and Ecological Survey. Ethiop Med J, 14:37-48, 1976

A survey was made of towns and markets in Gemu Gofa Province. The northern areas of the province (Gofa Awraja) were affected by the disease but not the southern portion (Geleb Hamer, Bako Awraja). Townspeople were not affected by the disease possibly because the vectors do not enter densely populated towns and villages. Onchocerciasis is more common in males than females and in adults of middle age than in children. The disease was found to be more prevalent in coffee producing areas than in non-coffee producing areas in a ratio of about 3 to 1. It was also more prevalent in the areas closer to the Omo River drainage. Infected individuals did not appear to be greatly affected by the disease. The authors believe the low degree of symptomatology was related to the small number of parasites per slide.

B33.

McMahon, J.P. A Review of the Control of Simulium Vectors of Onchocerciasis. Bull WHO, 37:415-530, 1967.

This paper reviews the available information on the control of Simulium vectors of onchocerciasis in Africa and Central and South America. The efficacy of ground application (larviciding) as compared with aerial application (larviciding and adulticiding) is discussed. It is concluded that ground larviciding is likely to achieve the best results at less cost in foci where the vectors usually breed in small, densely wooded streams.

B34.

Scheiber, P., Braum-Munzinger, R.A., Southgate, B.A., Agba, K.N., Epidemiological Studies on Onchocerciasis by Means of a New Field Technique. Bull WHO, 53(4): 472-475, 1976.

A study was carried out in 5 villages in the Mo river valley, Togolese Republic. The area is an important focus of onchcerciasis. A new membrane filter concentration technique for the detection and quantification of Onchocerca volvulus microfilariae in skin snips was compared for sensitivity and efficiency with a widely used "standard" technique. In each village an attempt was made to examine the whole population present when the study team visited. Skin snips taken from each side of the body were examined alternately by the standard and the new techniques (a measure to avoid bias). The new technique yielded an increase in the detected prevalence and an increase in the mean and median microfilarial densities observed. These increases were substantial. No information is given on the ease with which the new technique can be performed compared with the standard or any differences in costs.

B35.

Abdel-Salam, E., Abdel-Fattah, M. Prevalence and Morbidity of Schistosoma Haematobium in Egyptian Children: A Controlled Study. Am J Trop Med Hyg, 26(3):463-469, 1977.

A study to estimate the prevalence of S. haematobium in children aged 6 months to 10 years was carried out in 3 villages in Giza, an area in upper Egypt near Cairo. Children in the area in the age group under study numbered 8,403 and this constituted 54% of the total population of 15,562. The villages differed in social and economic status and another aspect of the study was to determine if those factors also affected infection rates. The study found that the highest prevalence rates were found in the village with the lowest living standard: 27% in children aged 0-2; 63% in those 3-5; and 68% in children 6-10. However, the next highest rates were in the village with the highest standard of living--6.7%, 30% and 47% in the same age groups. The lowest prevalence rates were found in the village with an intermediate standard of living: they were 0%, 19%, and 33% respectively. Intensity of infection measured by the heaviness of urinary egg output was unrelated to prevalence findings, but intensity of infection correlated with severity of clinical symptoms. The impact of schistosomiasis on the general health of children was mild except in heavily infected children.

B36.

Andreano, R.L., Helminiak, T.W., Li, J-YH. The World Distribution of Schistosomiasis: Some Quantitative Economic Comparisons. J Trop Med Hyg, 77(9):170-176, 1974.

The paper presents a statistical approach to understanding and explaining the world distribution of schistosomiasis. The authors used measures of economic and social characteristics and schistosomiasis incidence on a national and geographic basis. The approach was first to estimate multiple regressions between prevalence rates as the dependent variable and certain socio-economic vales as independent variables. This was done for all countries for which it was possible to obtain

these data. Second, a qualitative ranking was made of countries included in the first analysis if there was additional information about severity of disease and, for countries not included in step 1, if survey data were available which indicated the existence of schistosomiasis. Results were generally disappointing and not useful for guiding public policy or planning.

B37.

Adnreano, R.L. The Recent History of Parasitic Disease in China: The Case of Schistosomiasis, Some Public Health and Economic Aspects. Int J Hlth Services, 6(1):53-68, 1976.

This paper examines the extent to which the prevalence of schistosomiasis may have increased in China during 1958-1964. Hypothesis mainly dealing with irrigation and water conservancy construction are examined, as are the probably economic and demographic effects of schistosomiasis. The author concludes that schistosomiasis prevalence probably did increase but that the economic-demographic effects of the increase were probably minimal. Statistical analysis to demonstrate that a relationship exists between yield of rice per province, change in population growth, proportion of cultivable land under irrigation, the rate of growth of new irrigation construction and the percentage of sown areas in each province in rice production produced unconvincing results.

B38.

Arfaa, F., Farahmandian, I., Soleimani, M. Evaluation of the Effect of Mass Chemotherapy with Niridazole as a Method of Bilharziasis Control in Iran. Trans Roy Soc Trop Med Hyg, 64(1):130-133, 1970.

Prior to instutition of mass chemotherapy, thorough surveys had been made of endemic foci of schistosomiasis in Iran. The survey identified 156 villages which had a prevalence rate of 10% or more for this disease. On the basis of this information it was decided to treat all patients identified in each of the villages and to obtain evidence which would indicate if disease transmission had been interrupted. Criteria of interrupted transmission were (1) total absence of snail intermediate hosts near the village and (2) minimum age of infected children of not less than 3 years. The study detected 7,317 cases in 139 localities and treated 6,488 (88.6%). At 3-month followup only 3% of some 3,700 treated subjects were excreting eggs and at six months 2.1% of 325 persons examined were still positive. It was estimated that 80% of cases were cured in each village.

B39.

Choudhry, A.W. The Results of Five Years of Snail Control at Ahero Pilot Scheme, Kenya. East African Med J, 52(10):573-577, 1975.

Evidence is presented to indicate that the use of molluscicides to prevent infestation of the Ahero Pilot Scheme by schistosomiasis snail hosts was both feasible and economical. Though no control area was used, the conclusion was drawn because only small numbers of the intermediate snail hosts were recovered during routine sampling. The author presumed that snails would probably have become

established, as occurred elsewhere, in the absence of a snail control program. No control area was used because experience elsewhere showed how difficult it might have been to eliminate snail populations if they had become established. The cost of the snail control program ($11,000) was negligible compared to the production value of the rice crop ($1,213,304), for the 5 years of the study period. Total expenditure for operation of the Ahero Pilot Scheme (an irrigation and land use demonstration project) was 1,414,608 dollars: snail control represented less than 1% of the total.

B40.

Chu, K.Y. The Validity of Baseline Data for Measuring Incidence Rates of Schistosoma Haematobium Infection in the Molluscided Area, UAR-0049 Project. Ann Trop Med Parasit, 70(3):365-367, 1976.

The author discusses statistical problems associated with the UAR-0049 project which studied the effect of area-wide snail control on the endemicity of schistosomiasis in Egypt. The random sampling technique used was erroneous and the study group on which incidence rates were calculated, was constantly diluted by adding to the group children who had a very low incidence. For fair evaluation, the author notes, the same children should be followed to a much older age while younger ones are added.

B41.

Cline, B.L., Rymzo, W.T., Hiatt, R.A., Knight, W.B., Berrios-Duran, L.A. Morbidity from Schisotosoma Mansoni in a Puerto Rican Community: A Population-Based Study. Am J Trop Med Hyg, 26(1):109, 1977.

The authors investigated a rural community in eastern Puerto Rico with a population of 1,056. Seventy percent of the inhabitants were interviewed and had physical and laboratory examinations. 149 were found to be infected: an uninfected control matched to each case by age and sex was selected for comparison. While the infected group had significantly more infections with hookworm and trichuriasis and a higher absolute eosinophilia, no difference was found in the signs and symptoms of schistosomiasis. Further, while palpable livers were frequently found in the infected than in the controls, evidence seemed to case doubt on S. mansoni infection as the cause. The authors concluded that their data indicated that morbidity from S. mansoni was low in the surveyed community--a finding consistent with the apparent decline in S. mansoni morbidity in Puerto Rico in recent decades and the relatively low intensity of infection in this community. While some aspects of the survey were omitted, the results were unlikely to be radically different from what was reported.

B42.

Editorial. J Trop Med Hyg, 77(10):222-232, 1974.

Two publications on schistosomiasis are discussed: one which referred to it as the greatest unconquered disease now afflicting man and animals and another which studied the association between social and economic factors and the geographic occurrence of schistosomiasis. The editorial cautions that worldwide

assessment of socio-economic factors in transmission may give a misleading impression of their true importance.

B43.

El Alamy, M.A., Cline, B.L. Prevalence and Intensity of Schistosoma Haematobium and S. Mansoni Infection in Qualyub, Egypt. Am J Trop Med Hyg, 26(3):470-472, 1977.

A survey was made in the qualyub region of the Nile Delta to determine the prevalence and intensity of S. Haematobium and S. mansoni infections. The last such survey was made in 1958 when S. haematobium prevalence was estimated to be in the range of 50% to 70% while S. mansoni prevalence was about 5%. In the current survey, every 4th household in each of 8 villages was included in the sample. Of the 9,456 household members picked in the sample, 92% cooperated and provided stool and urine specimens. The prevalence of infection with S. mansoni was 40.5%--much higher than previously reported in the area. S. haematobium prevalence was found to be 27%--much lower than expected. No explanation could be offered for the low prevalence of infection with S. haematobium; the increase in S. mansoni was thought to be due to use of a very sensitive parasitologic technique. Snail surveys in the area do indicate a profound decrease in the population levels of Bulinus species and that may be related to ecological changes brought about by construction of the Aswan high dam.

B44.

Gilles, H.M., Abdel-Aziz Zaki, A., Soussa, M.H., Samaan, S.A., et.al. Results of a Seven Year Snail Control Project on the Endemicity of Schistosoma Haematobium Infection in Egypt. Ann Trop Med Parasit, 67(1):45-65, 1973.

This paper reviews a seven year snail control project which also obtained estimates of the endemicity of Schistosoma Haematobium in an area of the Nile delta, Egypt. The authors conclude that a previous evaluation of the project results after a period of 2 years of control gave premature and unjustifiedly optimistic results: a minimum of 4 years observation is necessary to draw legitimate conclusions. The study design was faulty in that it did not follow a cohort of uninfected children through the years of minimal to maximal prevalence of infection in the area, it did not study intensity of infection simultaneously and it did not make comparisons with a similar untreated control area. Further, the rate of natural loss of infection in children in an area where the disease transmission has been interrupted and chemotherapy has not been used should be assessed. Sampling should be stratified on the basis of prior prevalence data. Various other desirable study characteristics are noted, and the opinion given that in the Nile delta and similar environments, molluscicding alone is unlikely to interrupt transmission significantly over several years.

B45.

Hiatt, R.A., Gere-Medhin, M. Morbidity from Schistosoma Mansoni Infections: An Epidemiologic Study Based on Quantitative Analysis of Egg Excretion in Ethiopian Children. Am J Trop Med Hyg, 26(3):473-481, 1977.

The clinical manifestations of S. Mansoni infection were examined in a Highland

Ethiopia school population aged 7 to 16 years. For 336 children (94% of those in school) the following was obtained: stool specimens, clinical histories, physical examinations which included anthropometric measurements and a venous blood sample. Prevalence of infection was found to be 88% of 272 children for whom all information was available. The highest prevalence and intensity was found in 12 year olds: 95% were infected with an average of 300 eggs per gram. Schistosomiasis symptoms were not significantly associated with intensity of infection but children with higher egg counts more often reported blood in stools. It did appear that the frequency of liver enlargement increased with increasing egg count, but anthropometric measurements, average grades and school days absent were not related to intensity of infections. Physical performance in a 12-minute walk-run was better in uninfected boys. The authors concluded that morbidity in this population was minimal and in line with the low intensity of infection.

B46.

McMullen, D.B. Discussion of the Paper by Willard H. Wright: "Schistosomiasis as a World Problem". Bull NY Acad Med, 44(3):313-316, 1968.

The difference in the estimates of prevalence for schistosomiasis are discussed. The discrepancies are due to a lack of real data as well as differences in definitions of sc histosomiasis and the enthusiasm of the estimator. Diagnosis based on skin test or serologic test will yield higher prevalence estimates than will diagnosis based on demonstration of eggs in excreta. In urine surveys in Rhodesia it was found that some children passed too few eggs in urine to be detected, and this may explain why it is possible to find more cases positive by skin or serologic tests.

B47.

Rosenfield, P.L., Smith, R.A., Wolman, M.G. Development and Verification of a Schistosomiasis Transmission Model. Am J Trop Med Hyg, 26(3):505-516, 1977.

A model to predict the prevalence of schistosomiasis in Khuzestan Province, Iran, was developed. The model took into consideration the fraction of the population infected with schistosomiasis, the rate at which infection takes place and the rate at which de-infection takes place. Additionally, the rate of infection was a function based on two variables--meters of accessible snail habitats since that factor is an index of the likelihood of contact of uninfected individuals with snail infested water; and the size of the infected population since that factor is most important in determining the level of miracidial contamination of snail habitats. The model was then verified by regression analysis on data from 54 villages in the area; the fit was quite good. However, most important of all the model was used to compare the costs and effectiveness of alternative disease control measures. Results indicate that a combination of molluscicding, chemotherapy and engineering equipment used to cover snail habitats was the most cost-effective.

B48.

Wilkins, H.A., Brown, J. Schistosoma Haematobium in a Gambian Community. II Impaired Cell-Mediated Immunity and Other Immunological Abnormalities. Ann Trop Med & Parasitol, 71(1):59-66, 1977.

arasitic infections evoke in the host a complex immunological response which may be accompanied by a non-specific functionsl impairment of the immune system. The authors studied subjects from the hyperendemic Daru area of The Gambia (i.e., Schistosoma haematobium) and a control group in the Keneba area where S. haematobium is absent. The investigators found that the population heavily infected with S. haematobium showed a decreased response rate in delayed hypersensitivity reactions. Laboratory studies showed a depressed lymphocyte response to phytohemagglutinin in infected subjects. Together these findings suggest the presence of a defect in cell-mediated immunity in some infected subjects.

B49.

Wilkins, H.A. Schistosoma Haematobium in a Gambian Community. I The Intensity and Prevalence of Infection. Ann Trop Med & Parasitol, 71(1):53-58, 1977.

The intensity and prevalence of S. haematobium unfection was measured in a community of the Gambia. The author found that prevalence reached 100% by age 10 and counts of more than 1,000 eggs in urine samples taken at noon (10 ml) were common. During the 2nd and 3rd decades, infection rates declined and the mean egg output of a cohort fell by approximately 50% every three years. In those 30, and over, sex differences in exposure and egg output suggested a possible effect of protective immunity.

B50.

Wright, W.W., Schistosomiasis as a World Problem. Bull NY Acad Med, 44(3):301-312, 1968.

The various factors to be considered in appraising the medical, public health and economic importance of schistosomiasis are primarily geographic distribution; prevalence, intensity of infection, morbidity and mortality, and transmission pattern which in turn are influenced by environmental conditions, efficiency of intermediate hosts, agricultural practices and human behavior. All of these factors are reviewed: estimates of the prevalence of infection and economic cost are given but are considered to be conservative. Using data from Egypt, the author estimates that 1.5 million individuals in Africa are permanently disabled by the disease and that their removal from a productive existence costs about $212 million annually. An additional $308 million annually is lost if one assumes that those with only moderate disease lost 10% of their working capacity.

B51.

Foster, S.O. Smallpox Eradication: Lessons Learned in Bangladesh. WHO Chron, 31:245-247, 1977.

The author outlines some important lessons learned in the fight to eradicate

smallpox in Bangladesh. He lists 8 points. First, study the enemy--know its epidemiology in the region in which you are working as well as its clinical manifestations. Second, study the people's perception and realize that confidence is built on effective action in dealing with the real needs at the village level. Third, measure the problem: rewards instead of punishment for reporting new outbreaks changed the attitudes of health staff and villagers. Fourth, establish a single line of authority and responsibility. Fifth, establish a clear achievable plan of work. Sixth, establish quantifiable targets such as "...detect 80% of new outbreaks within 15 days of the date of the first rash in the first outbreak." and "...stop 100% of outbreaks within 15 days..." Seventh, provide adequate and appropriate logistic support: transport, equipment, supplies, funds and facilities. Eighth, encourage public participation. Success or failure often depended on the cooperation of village leaders. Finally, programmes should be developed to meet quantifiable objectives and should be implemented gradually with concurrent assessmeut to identify deficiencies.

B52.

Collier, L.H. Some Aspects of Trachoma Control and Provisional Estimates of the Cost of Vaccine Production. Israel J Med Sci, 8(8-9):1114-1123, 1972.

No reliable data exist on trachoma prevalence since it is nonlethal and found mostly in less developed countries. A widely quoted estimate is 400 to 500 million infected individuals, and though that may be an overestimate, trachoma appears to be a major public health problem still. The most satisfactory solution would be to raise the standard of living to the point at which trachoma dies out, but this appears to be hardly likely in the foreseeable future. That leaves mass treatment campaigns with antibiotics or possibly long-acting sulfonamides (if problems of safe administration can be overcome) and the more remote possibility of a trachoma vaccine as the available control methods. Because of the difficulties of treating a large number of patients topical therapy with tetracycline ointment is still the only safe method of large-scale treatment in developing countries. Research on trachoma vaccines suggests that the problem of vaccine-induced sensitization may be more difficult to solve than the enhancement of resistance to infection. A great deal of research is needed before a trachoma vaccine is a viable proposition.

B53.

Sharma, J.L., Lal, S., Chauhan, B.S., Singh, M., Singh, I. Epidemiological Survey of Prevalence of Trachoma Among the School Children in Haryana State. Ind Jour Pub Hlth, 19:63-68, 1975.

Trachoma prevalence among developing and growing primary school children was studied by means of a school survey. It was determined that the prevalence rate for all children included in the survey was 42.05%. Female children had higher prevalence rates than did males, primarily attributable to the use of eye makeup. Infectious stages of trachoma were more prevalent in younger children compared with older children. Children in the Harijan caste and in lower socio-economic group had higher prevalence rates. Dietary habits did not show any relation with trachoma prevalence.

B54.

Sundaresan, T.K., Assaad, F.A. The Use of Simple Epidemiological Models in the Evaluation of Disease Control Programmes: A Case Study of Trachoma. Bull WHO, 48:709-714, 1973.

The authors argue that too often inappropriate quantitative measures fail to reflect the full effect of control measures on many-faceted diseases. They use a simple epidemiological model to demonstrate that the "force of infection" in trachoma is a sufficient parameter to describe the changes in the disease picture after a control program had been in effect for 10 years. Data from a community in which two trachoma prevalence surveys were carried out in 1960-61 and again in 1968-69 were used. Simple exponential curves (the paper refers to them as catalytic) were fitted to prevalence data with the help of a computer program. The authors found that the ordinary measures used to describe the disease situation, incidence, prevalence or the intensity of infection underestimated the reduction in disease achieved by the control program. A prevalence measure suggested that trachoma was reduced by less than 30% in ten years while the control program had in fact reduced the disease load to about two-fifths of its former level.

B55.

Bulla, A. Tuberculosis Patients--How Many Now? WHO Chron, 31:279-286, 1977.

A review of worldwide tuberculosis morbidity data--though risky and hazardous because of the very diverse criteria used throughout the world for reporting tuberculosis and obtaining bacteriological confirmation--indicates that the highest tuberculosis incidence rates are found in the eastern fringe of Asia, the southern and north-western parts of Africa and the middle of the western coast of South America. The highest mortality rates are found (more than 60 per 100,000 population) in the Philippines and Macao. Mortality has become an unreliable measure because of the steady decrease in the proportion of treated patients who actually die from tuberculosis. Still there are areas in the world with high tuberculosis mortality: these are mainly in the Western Pacific Region, the southern part of Africa and South America. A reliable picture of tuberculosis infection, morbidity and mortality will be obtained only after worldwide improvement in the epidemiological statistics on this disease. However, present best estimates indicate that there must be about 7 million infectious cases of tuberculosis in the world, an annual worldwide incidence of about 3½ million new cases and ½ million deaths every year.

B56.

Bulla, A. Tuberculosis Beds--Too Many Now? WHO Chron 31:287-293, 1977.

Despite the reliance on the use of hospital and sanatoria facilities for the treatment of tuberculosis patients in many areas of the world, the WHO Expert Committee on Tuberculosis suggested in 1964 and again in 1973 that the success of any modern tuberculosis control program depends mainly on the availability of well developed ambulatory care facilities. The Expert Committee also recommended on more than one occasion that financial resources and available manpower for tuberculosis control be used to organize efficient and widespread ambulatory programs rather than to support hospital treatment. Despite this, some countries

show an upward trend in tuberculosis hospital beds. The answer to the question in the title is "yes." Hospital or sanatorium treatment of tuberculous patients with prolonged bed rest and dietary supplements is usually unnecessary and serves only to prolong the patient's incapacity and to increase the cost of treatment.

B57.

Feldstein, M.S., Piot, M.A., Sundaresan, T.K. Resource Allocation Model for Public Health Planning: A Case Study of Tuberculosis Control. Bull WHO, Supplement to Vol 48, 110 pp. 1973.

Comprehensive, detailed and difficult to apprehend description of a mathematical model tested here with tuberculosis data but presumably applicable to various infectious diseases. The model claims to be able to account for biological and epidemiological considerations as well as psychological and social dimensions. The model is defined in much the same fashion as the health index constructed by C.L. Chiang except that in this paper a linear programming algorithm is used to obtain the solution rather than a set of stochastic probabilities. In this model too, the data required are not routinely available in developing countries and must be obtained by careful survey. The model is quite flexible and allows for 100-age and stratum-specific activity alternatives based on 15 fundamental tasks. Its major attraction is the allocation of scarce resources to obtain the maximum benefits for the community or the country. It is probably too complex for widespread use in developing countries.

B58.

Pust, R.E., Onejeme, S.E., Okafor, S.N. Tuberculosis Survey in East Central State, Nigeria: Implications for Tuberculosis Programme Development. Trop Geograph Med, 26:51-57, 1974.

rior to the development of a tuberculosis control program to serve a rural population in East Central State, Nigeria, the authors conducted a tuberculosis survey in a pilot area. Cluster sampling was used to select the population to be included in the survey. The major objective of the survey was to determine basic tuberculosis epidemiologic indices for the area surveyed. Out of 2,265 persons given tuberculin tests 2,093 were read. Of those read, 573 or 27.4% were positive--had reactions of 10 mm or more to PPD RT-23 2 TU. Tuberculin conversion rate in the population aged 0-9 was 1.64% and 6 persons were found to have acid fast facilli in sputum. Estimates of acid fast excretors for the pilot area and for the State were made. A mobile "cough clinic" found an additional 38 cases of tuberculosis and five health centers found another 64. The total of 108 cases was a considerable improvement over the 4 known cases before the survey was undertaken. Unfortunately the authors never discuss how to use this information in program planning and evaluation though they do state that adding tuberculosis diagnosis and treatment to the existing rural medical care costs almost nothing.

B59.

Revelle, C., Feldman, F., Lynn, W. An Optimization Model of Tuberculosis Epidemiology. Management Science, 16(4):190-211, 1969.

The authors offer an epidemiological model to be used in the management of

tuberculosis in developing countries. The model, however, requires the solution to 9 differential equations and the solutions are so difficult that approximations are needed. Furthermore, the model omits from consideration transmission via other routes than person-to-person. In many developing countries where cattle particularly are a large part of the economy and where cows' milk is part of the diet, bovine tuberculosis may also be an important aspect of the transmission cycle. Other animals may also play a part in transmitting tuberculosis--e.g., monkeys and goats. This model is too difficult to use for developing countries and the authors have failed in their attempt to be fully cognizant of the epidemiologic facets of the tuberculosis problem in developing countries.

B60.

Rouillon, A., Waaler, H. BCG Vaccination and Epidemiological Situation. Adv Tuberc Res, 19:64-126, 1976.

Lengthy and detailed paper which describes a decision model for determining whether or not immunization with BCG to prevent tuberculosis is warranted for a given set of circumstances. Utilization of the decision model requires access to a computer. The model incorporates clinical and epidemiologic variables, economic factors, psychological factors (worry) and uses these variables to determine when vaccination produces a greater benefit or gain than non-vaccination. After defining the variables to be used in the model, the authors used a computer to simulate the results of vaccinating 3 cohorts: 100,000 newborns, 100,000 school enterers aged 6.5, and one of school leavers aged 16, at three different levels of infection, 2, 0.2 and 0.02%. The cohorts were followed in the simulation for 15 years. Simulation results indicate that use of BCG at the highest level of infection in all three cohorts is cost effective. At the intermediate level of infection, BCG vaccination remains cost effective but at the lowest rate of infection it is too costly. The model presented is easy to understand and vary to account for different situations.

B61.

Udani, P.M., Bhat, U.S., Bhava, S.K., Ezuthachan, S.G., Shetty, V.V., Problem of Tuberculosis in Children in India: Epidemiology, Morbidity, Mortality and Control Programme. Indian Ped, 13(12):881-890, 1976.

The problem of tuberculosis in children cannot be dissociated from the disease in adults who form the major reservoir of infection and of active disease. Repeated tuberculosis surveys of the child population in the western states of India over a period of 25 years has proved the value of direct BCG vaccination of children, chemotherapy and BCG vaccination on a massive scale has been valuable in the control of tuberculosis. However, tuberculosis control programs should be integrated with general health measures and should involve community health workers as part of the team at primary health centers and sub-centers in order to reach the rural population.

B62.

Cvjetanovic B., Grab, B., Uemura, K. Epidemiological Model of Typhoid Fever and Its Use in the Planning Evaluation of Antityphoid Immunication and Sanitation Programmes. Bull WHO, 45:53-75, 1971.

The paper describes a sophisticated epidemiological model which takes into account population parameters such as number of susceptibles, number of infected and immune, transition rates between the groups and assigns numerical values to these parameters in order to simulate realistically a situation in which typhoid is of stable endemicity. With changes in the parameters, it is possible to see what effect on disease incidence mass vaccination and general health improvement and sanitation have. Simulation demonstrated that vaccination effects a considerable reduction in disease incidence but the gain is lost after a few years. Repeated vaccination each 5 years produces further incidence reductions but the gains become successively smaller. On the other hand, the model demonstrates that the effect of sanitation is long lasting and thus gives better results than vaccination. The model was used also to make forecasts about preventive measures for a selected population. The model may also be used to predict future trends of typhoid and material and manpower required for specific control projects. The model is a powerful tool but requires a good deal of detailed information and trained statisticians or mathematicians to make the calculations.

B63.

Cvjetanovic B., Grab, B. Rough Determination of the Cost-Benefit Balance Point of Sanitation Programmes. Bull WHO, 54:207-215, 1976.

Since resources in developing countries are limited they must be used judiciously to obtain the best possible effect and cost-benefit analysis is a tool which allows better utilization of scarce resources. The paper presents a simple method for rough determination of the cost benefit balance point: little computation is required, and monograms are included. The method is illustrated by use of data on cholera, typhoid and dysentery. The authors demonstrate that the financial benefit of sanitation is related to the cost of the disease and its incidence. As the incidence and/or cost of treatment rises, the benefits of sanitation increase. When the general state of health and standards of living improve, the incidence of most bacterial enteric infections declines. However, the financial benefit of sanitation does not necessarily decline proportionately since treatment becomes widely available, more sophisticated and more expensive. At very low incidence rates no financial benefit is derived from control measures, but when that stage is reached the community is sufficiently wealthy to fight the infection on humanitarian grounds.

B64.

Gangarosa, E.J. A Perspective on the Global Problem of Enteric Diseases. Bull PAHO, 11(1):3-7, 1977.

Progress has been made in the understanding of the causes, pathogenesis and treatment of acute intestinal infections. Research on enteric diseases has led to a dramatic reduction in the case-fatality ratio in cholera and to oral-fluid therapy of diarrhea regardless of the etiology. While there have been setbacks in attempts

to control enteric diseases using a single disease approach, there has also been a growing awareness that faulty water supplies and poor sanitation are at the root of the problem. The ultimate goals of public health workers in the enteric disease field are a safe water supply and a population literate enough to maintain sanitary standards now found in industrialized countries.

B65.

Willcox, R.R. International Aspects of the Venereal Diseases and Non-venereal Treponematoses. Clin Obst & Gyne, 18(1):207-222, 1975.

Describes the worldwide distribution of syphilis, gonorrhea, chancroid, granuloma inguinale, lymphogranuloma venereum and the nonvenereal treponematoses. Otherwise, not particularly valuable with regard to infectious disease control planning and evaluation.

* U. S. GOVERNMENT PRINTING OFFICE : 1979 O - 300-734

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