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A HEALTH-RELATED INFORMATION SYSTEM (HERIS)

For a variety of reasons, bibliographic access to information on public health is not nearly as highly developed as that for clinical and experimental medicine. Yet one of the keys to the achievement of the goal of "health for all by the year 2000" must be the improvement in the quality and effectiveness of planning and management that can only occur through heightened awareness by planners, managers and health workers of new and more cost-effective ways of solving health problems, particularly in developing countries. It was during 1976 with this gap in the international exchange of health information in mind that a health-related information system (HERIS), was conceived of as an international data base on public health, particularly for developing countries. Since then the project has been under intensive study and consultations have been held with the regional offices and the Information Subcommittee of the global Advisory Committee on Medical Research within WHO and with the National Library of Medicine, USA, and the International Development Research Centre, Canada.

The results of this work thus made it possible to commission the attached prefeasibility study, which was prepared by Mr Scott Adams, an information scientist of international repute with broad experience in collaborative efforts in the information field. The paper describes the rationale for HERIS and suggests some of the options to be considered in preparing a fully-fledged feasibility study for HERIS.

The purpose of distributing this study is to solicit comments and suggestions from a broad and representative panel of potential users and information experts so that these can be taken into account in the further development of HERIS.

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1. Role of information in national health programmes.

As countries engage in programmes intended to improve the national health in all its aspects . . . the conquest of disease, maternal and child health, nutrition, sanitation, disease, vector control, and many others . . . they both use and generate information in many categories: scientific, technical, administrative, and managerial. To insure the effective response of their programmes to changing needs, and hence the vitality of these programmes, this information, verified and enriched by information received from other countries conducting comparable programmes, must be selectively fed back to the individual programmes for the further development of the national programme.

This information represents managerial and professional experience, and the country which ignores its own experience and that of others makes less effective use of its resources than those that take this information into account. To enable countries to make better use of the accumulated experience of others is the purpose underlying the proposed Health Related Information System (HERIS).

The sharing of experience acquired in the pursuit of improved health has long been an established principle of national and international policy. Recently, the developing countries, at the UN Conference on Technical Cooperation among Developing Countries in Buenos

Aires (September, 1978), reinforced the principle with regard to their development programmes by proposing "to increase and improve communications . . . leading to a greater awareness of common problems and wide access to available knowledge and experience as well as the creation of new knowledge in tackling problems of development".

## 2. Other international information systems.

It is understandable, therefore, that intergovernmental organizations, concerned with the well-being of their member states in process of socioeconomic development, should pay particular attention to improving the access of these countries to information resources and services.

Starting with the International Nuclear Information System (INIS) of the International Atomic Energy Agency, and with The Agricultural Research Information System (AGRIS of the Food and Agricultural Agency), a number of cooperatively developed bibliographic retrieval systems have been planned and installed<sup>1</sup>. While considerable variation exists among them as to size, character and scope, their common characteristic is an intention to serve the socio-economic purposes of UN member states, regardless of their development status.

A recent example may be found in a field closely related to the interests of the World Health Organization: population. At its 17th session (1974), the Population Commission of the United Nations, expressing interest in the possibility of computerizing demographic information, stated that "the need was felt for an international bibliographic system on population matters which could provide a most valuable service in view of the rapid increase in the publication of studies on population."

A 1975 meeting organized by the Committee for International Coordination of National Research in Demography (CICRED) recommended that "the possibility of setting up a cooperative international population information network" should be explored, and created an Interim Steering Committee and a Technical Task Force. Under the policy guidance of the former, the Task Force produced a report "Towards a World-Wide Information System of the Field of Population: POPINS", which surveyed the existing needs and mechanisms for fulfilling them, and made a series of recommendations for the 19th Session of the Population Commission in 1977.

The effort gained momentum from the well-advanced regional population information activities undertaken by the Population Division of the Economic and Social Commission for Asia and the Pacific (ESCAP) and the Latin American Demographic Centre (CELADE). Experience gained through large U.S. systems in the area of family planning, such as POPINFORM, has also contributed to confidence in planning an international information network; the growing commitment of the United Nations Department of Economic and Social Affairs (ESA) to the provision of specialized information services for development has been of great assistance.

In the field of health, the World Health Assembly has established as a goal for the World Health Organization and its Member States the attainment by all the citizens of the world by the year 2000 of a level of health which would enable them to lead economically and socially useful lives. A broad strategy is evolving to collaborate with countries in reaching this goal, including the promotion of technical cooperation among developing countries (TCDC), emphasis on primary health care, and a focus on major national initiatives through Country Health Programming (CHP).

<sup>1</sup> For a comprehensive listing, see Inter-Organizations Board for Information Systems, "Directory of United Nations Information Systems and Services". Geneva, 1978.

The research and training functions of the Country Health Programmes focus on the need to share ideas, methods, information, experiences and the results of evaluations, and will thus create a new dimension of information need.

### 3. Introducing HERIS.

HERIS is, at its present state, a conceptualization of a programme to be undertaken cooperatively by the World Health Organization and its Member States for the development of a bibliographically based system or network, comparable to those undertaken by other UN agencies, which would be dedicated to the achievement of universally improved health by the year 2000.

The system or network to be developed would be based on the following principles:

1. Orientation towards meeting the priority needs of the developing countries who, in general, have further to go in building their health service infrastructures and less resources with which to do so;
2. Cooperation among all WHO Member States and coordination with other national, regional, and global information programmes in health and its related fields;
3. Information sharing not only between the industrialized and the developing worlds, but among developing countries with like needs and experiences;
4. Increased ability to select, apply and utilize existing information relevant to the needs of individual countries;
5. Complementarity rather than duplication between related information systems and networks.

HERIS would have as its over-all objective the strengthening of the planning, implementation and management of national health programmes through providing those responsible for these programmes with improved access to the knowledge and experience they need in their work. The concept is based on two major assumptions: (1) despite cultural, economic, political and ethnic differences among countries, the maintenance and improvement of the health of the people is an important responsibility of the state, and (2) information, whatever its origin, that can be used to further this objective is a resource that should be shared internationally.

### 4. Implementation of HERIS.

As stated earlier, the present document is a conceptualization of a cooperative programme. While there is no prescribed model for initiating an international information system or network, a review of comparable programmes undertaken by other UN agencies suggests the following sequence of events:

Step 1: Conceptualization, and identification of the basic parameters and options. This should be in sufficient detail to inspire confidence in an investment in a formal feasibility study.

Step 2: Decision to proceed with the initiation of a feasibility study.

Step 3: Conduct of a feasibility study. The purpose of such a study is to explore in depth the requirements, alternative forms and costs of the system, and to make recommendations based on the conclusions. Normally, a feasibility study will concern itself with the following:

- ... Validation of need. This includes estimates of the size and requirements of user-groups, assessment of the adequacy of coverage by related services, gaps in their coverage, etc.
- ... Validation of assumptions relating to the scope and coverage of the literature, and definition of the size of the universe to be included in HERIS.
- ... Examination of desirable services and products. Cost estimates should be developed for each.
- ... Determination of the optimum pathways to achieve the desired services and products at controlled costs. This also includes consideration of alternative management configurations and costs.

Step 4: Decision to establish. To be anticipated from the outset is the need for a mechanism to review the feasibility study, and to make judgments on the testing of its hypotheses, on its managerial provisions, and on the suitability for the short- and long-term support of the system.

The present document represents the first step only. It will endeavour to present a basic concept for HERIS as a cooperatively developed information system, to identify its hypothetical parameters, and to suggest some of the options for its scope, composition, and organization, which may be explored at greater length in a formal feasibility study.

#### b. Conceptualization and working hypothesis.

In order to have a focus for the discussion of the choices that must be made in designing an information system, it is useful to adopt an arbitrary preconception as a working hypothesis. This hypothesis may be altered in any particular, or even abandoned, as evidence, pro and con, is collected. It will have served its purpose well if it provides a temporary universe for discussion.

For the purposes of this paper, HERIS is conceived of as a cooperative international information network, operating to monitor, select, digest and utilize the published and unpublished literature originating in developing and developed countries of use to developing countries in the planning, development, and administration of their national health programmes.

A few words of explanation may help flesh out this definition. While fully appreciating the importance of statistical information for health programme planning and evaluation, HERIS would concentrate its attention on published and unpublished textual materials of use to health programmes of developing countries, wherever generated. This implies both a concern for selectivity, and for receptiveness to reports and publications devoted to the health problems of developing countries issued by the countries themselves, as well as those issued elsewhere, e.g., by national technical assistance agencies, private voluntary organizations and by experts associated with WHO and its regional offices. "Of use" to developing countries implies a selection from the research, clinical and managerial literature based on judgments of its relevance to the programme objectives of a specific country or of a region. "Digest" implies condensation and summarization into forms suitable for assimilation and use.

Assuming this preconception to be acceptable as a working hypothesis, what can be done to take the first steps toward testing it, and in the process explore the concept in sufficient detail to develop specifications for a feasibility study? A useful way to accomplish this is to seek answers to the following questions:

1. Whom is HERIS intended to benefit?
2. What is the scope of the information they require?
3. How adequately do other services provide access to this information?
4. What services and products will be most beneficial?
5. How should HERIS be organized best to provide these?

In the course of exploring some of the answers to these questions, a process of definition by elimination will have been established, permitting, it is hoped, a restatement of the working hypothesis in more specific terms.

#### 6. Whom is HERIS intended to benefit?

The categories of users of health information are almost as many as are the purposes for which they seek it. Functionally, however, users may be aggregated under three headings: those associated with research, health delivery, and health programme management.

The uses that each of these groups make of information services may also be generalized: researchers use information services to disseminate and validate their contributions to the increase of knowledge; practitioners use them to apply accumulated and validated knowledge to the provision of health care; and health programme managers use them to plan, execute and evaluate health programmes. In varying degrees, all of these uses and the functions they serve are involved in the total national health effort; the determination of priorities among them is fundamentally a matter of national development policy.

The information-seeking practices of the user groups are determined by a number of external factors, including the modes available to them for gaining access to information resources, the institutional arrangements that have evolved for supplying information, and the use conventions of the several groups. These are explored in the following sections:

##### 6.1 The role of information in bio-medical research.

Researchers use information services primarily as a means of disseminating their findings to other researchers for the purpose of validation, and of gaining personal prestige. To provide for the testing and collection of the new knowledge they produce, the industrialized countries have developed highly institutionalized communication practices: scientific journals, abstracting and indexing services, libraries, documentation centres, and computerized retrieval systems such as MEDLARS and Excerpta Medica.

While the number of qualified researchers in any one country is small (especially in developing countries), they are members of an international fraternity, contributing to and deriving benefit from an international body of specialized knowledge. As a matter of national health and development policy, most developing countries assign priority to efforts to apply new knowledge to their own health problems, i.e. to applied research. Thus the

research results have optimum value for the geo-climatic region where the problems exist. The support of basic experimental research in the biomedical sciences is costly in terms of equipment, training, and information resources required, and governments of developing countries tend to limit their expenditures in this area.

Other factors entering into the relationship of health researchers in developing countries to their information supply include:

- ... the pressure to achieve recognition by publishing in journals of international stature outside the country (the so-called "publication drain")
- ... the pressure to conduct research in countries with superior laboratory and information resources (the "brain-drain")
- ... barriers to effective scientific communication from abroad and within the country (poor telephone and postal service, customs requirements, etc.)
- ... poor or non-existent information infrastructure: publishing outlets, libraries, photoduplication service, etc.

In summary, biomedical researchers in developing countries, a small but important group, work under major economic constraints. Their international affiliations lead them to use the same information locating devices that their more fortunate colleagues in developed countries employ, but the high costs of importing them deny ready access.

## 6.2 The role of information in the delivery of health services.

The national health effort involves many professions and occupations, ranging from physicians, nurses and para-medical personnel to sanitary engineers, hospital administrators, and public health specialists. However specialized their expertise, a common denominator is that, for them to do their job, they require special education and training; this in turn requires instruction dependent to some degree on published materials. Indeed, to raise the levels of health service delivery, most countries make provision for some form of continuing education, so that new and improved methods of health delivery may be communicated and adopted. Hence, there is a strong educational motivation involved in the information-seeking practices of health service personnel.

The important differences from the internationally-oriented research community may be observed. With the possible exception of physicians, the information requirements of practitioners tend to be country-specific. Health delivery personnel lack the familiarity with the international languages of science used by their research-oriented colleagues; informational materials in the vernacular are needed.

In a number of the developed countries, specialized libraries and information services have been developed for many of these specialties. These are usually affiliated with the educational institutions (dentistry, nursing, hospital administration, pharmaceutical chemistry, etc.). Lacking this infrastructure, health delivery personnel in developing countries often are reduced to retaining the frequently outdated textbooks from their initial training for reference, supplemented by manuals and guides issued by technical cooperation groups, governments and international agencies, and such other occasional materials they may happen to acquire.

In sum, the information requirements of health delivery personnel, whose concern is the application of specialized knowledge to the provision of health care in its broadest sense, are related to the continuing process of updating that specialized knowledge. Since the application requires adaptation in many cases to the social, cultural and economic conditions of the individual countries, the importation of information from external sources tends to favour methodologies and practices which can be generalized for adaptation. In order to insure the effectiveness of such adaptation, repackaging and translation of information acquired from abroad to suit the local purpose is desirable.

### 6.3 The role of information for managing the health programme.

Like biomedical researchers, those charged with the management of national health programmes constitute a minority group. But unlike researchers, neither their education nor their traditions lead them to seek their information through the formal channels of the published literature and the apparatus to do this is consequently lacking.

While a distinction should be preserved between the practices of top managers who must make the decisions and those of the staff who are responsible for gathering the information on which the decisions are based, it is fair to say that both are engaged in a continuing progress of digesting and condensing information of all types, written as well as verbal, bearing on the determination of priorities, and on decisions relating to the allocation of resources for national health programmes.

The managers need to receive information about every aspect of the national health effort to allocate resources fairly. The range is wide: from epidemiological data on disease prevalence, maternal and child health, pollution and sanitary engineering, population planning, health education and many more facets of the public health to the quality of physician training, and, of course, the status of research targetted at the solution of the country's health problems. Further, since these problems transcend national frontiers, the health programme manager needs to have comparative and related information about these aspects in other countries in the same region, or engaged in closely related pursuits.

The management of national health programmes requires both cognitive and statistical information. Statistical information services are essential for planning, and for measuring progress toward established goals; cognitive information is essential for understanding the relationships among programme goals, for adapting methodologies for problem solving, and for understanding the technical implications of health programmes; the two are thus complementary.

Cognitive information may be conveyed orally or in printed form. Either way, the information required by management must be refined, aggregated and condensed. The requirements of new information so valued by the researcher may have some meaning for the staff assistant, charged with summarizing it for a status report, but the health programme manager has time only for the summary. It goes without saying that the summary, to be useful, should be in the vernacular.

In many countries the report is replacing the journal article as the vehicle for informing health programme managers, and this raises problems for the developing countries that lack the machinery for acquiring and utilizing reports issued by other governments concerned with similar problems, or by international technical cooperation agencies. Newer countries, without archives of accumulated experience, feel the lack of the ability to assess and select from the information the reports make available to them.

### 6.4 Can HERIS be multi-purpose?

Keeping these divergencies in information needs and uses in mind, let us raise a first question: can a HERIS information network be designed so that it will respond effectively to

all three sets of needs? The answer is probably not.

There are two reasons for this qualified answer. The first has to do with the divergence of the needs and the information seeking practices of the user groups. The researcher needs to learn of and acquire access to the individual increments to biomedical knowledge produced globally. The programme manager has little or no concern for the individual increments; what he requires are summaries. The practitioners fall somewhat between; while respecting journals for current news, they make heavier use of digests and manuals, and prefer them in the vernacular. This diversity of need makes a single mixed service administratively difficult, if not impossible, at the international level.

The second reason has to do with the managerial problems inherent in defining the objectives, organizing, budgeting, and evaluating a programme with heterogeneous characteristics. An information service must be designed and justified by its ability to meet the needs of a defined group of users; it cannot be planned to be all things to all people.

It would seem appropriate, therefore, for HERIS to concentrate on a limited set of objectives that would optimize the contribution which the World Health Organization can make to the strengthening of national health programmes in developing countries. The priorities assigned by WHO's Member States to primary health care, to achieving a goal of health for all by the year 2000, the distance yet to be travelled to achieve this goal, and the richness of WHO's experience in cooperating with Member States in organizing their health services all strongly suggest a concentration of efforts on information services designed to improve the management functions of planning, implementing and administering national health programmes.

#### 7. What should the scope of HERIS be?

Scope may be defined in terms of several dimensions. The most familiar of these is the extent of the subject matter to be covered; other factors used to delimit the content of an information system include the types of publications, the countries of origin, and the languages to be admitted or excluded.

##### 7.1 Subject scope:

The subject scope of HERIS is, of course, a direct function of the needs of its users; a research scientist can make little use of information intended for a health programme planner, and conversely. Different groups of users, however, have different bases for ordering their universes: medical educators classically look to academic disciplines, medical researchers to emerging interdisciplinary fields, clinicians to specializations in practice. Health programme management, however, lacks such established categories, so useful elsewhere in the health professions, to define its information universe. Law, economics, engineering, agriculture: these and many more represent areas of knowledge from which they may have occasion to draw, in addition, of course, to their knowledge of human health and disease. In fact, it may well be difficult to identify an area which should a priori be excluded from an information system intended for their use.

Under these circumstances, it would be wise to borrow a concept from a closely related proposal, that advanced for the proposed United Nations Development Sciences Information System (DEVSI<sup>2</sup>). The DEVSI proponents, noting that socio-economic development constitutes a "mission" involving thousands of areas of activity, defined its scope as information generated by and used in the development process including programme diagnosis,

<sup>2</sup> DEVSI: The Preliminary Design of an International Information System for the Development Sciences. Ottawa, International Development Research Centre, 1976.

identification of needs, elaboration of plans, development and operation of programmes and projects<sup>3</sup>, assessment and evaluation of results. This suggests an attractive solution to defining the scope of HERIS: publications which are generated by or useful in the above functional activities as they relate to the national health programmes of developing countries are to be considered in scope. It will be noted that this definition in terms of purpose does not preclude documents from the fields of biomedical research and the health practices; it does, however, require a determination that they should be related to the national health programme.

#### 7.2 Types of publications.

The determination of the types of publications to be included would in like manner depend on the degree to which they carry information serving the above purposes. While monographs and journal articles are used in this context, the so-called "gray literature" of unpublished studies, surveys, mission reports, narrative and administrative project and programme reports issued by governmental, inter-governmental and private agencies tend to be more heavily used for national programme planning and administration. In the related field of population, for example, a recent<sup>4</sup> sampling of the literature showed that 59% of the materials on Chile and 71% of those on Korea were of this fugitive type, while the DEVSIS study estimated that 60% of the literature on development was unpublished.

The extent to which other information services provide access to the content of the publications is more significant than the format of the publication in determining its inclusion or exclusion.

#### 7.3 Limitation by origin.

Should the content of HERIS be limited to the publication of the developing countries? The answer is no. While the principle of strengthening the interchange of experience among the developing countries themselves in accordance with the 1978 Buenos Aires Declaration on Technical Cooperation (TCDC) should be translated into an active interchange of health programme information, and while the study of the population literature referred to shows that 56% of the Chilean and 70% of the Korean items were of indigenous origin, the materials produced by the public and private technical cooperation agencies and of national and international bodies in the industrialized world are too valuable to be excluded. An effort should be made, therefore, to enlist the cooperation of all countries in providing input for HERIS. Furthermore, HERIS should have the capability of utilizing the information products of the large international information systems which cover topics serving health programme development purposes.

#### 7.4 Language scope.

The question of limitation by language is more critical to the conceptualization. Unlike areas of biomedical research, where practices conducive to the use of a limited number of "international languages" have evolved, the field of health programme development has no such tradition. Its practitioners are not widely schooled in foreign languages and prefer vernacular tongues. Yet these are inadequate vehicles for communicating beyond their own borders and outside their own linguistic groups. Furthermore, the costs of translation, even selectively are unupportable for an international system.

<sup>3</sup> Freely adapted from the DEVSIS categories. See Annex 9 of the DEVSIS report for a carefully developed set of definitions to be used in the application of the categories to document selection.

<sup>4</sup> Radel, D. and Imkui. Identifying and Obtaining Population Literature in Developing countries. Overview: The International Journal of Population Libraries 4: 1976, 16-21; 37-40.

Pragmatically, the problem, as in the case of diplomacy and commerce, boils down to organization by linguistic areas (as in the case of Latin America), or to the designation of a limited number of languages to be used for the inputs and outputs of HERIS. While this latter solution may exclude some materials prepared for domestic use, it will at least advance the purpose of TCDC.

The following types of published information, therefore, should be considered as potential input to HERIS:

1. Health journals and monographs published in the developing countries, and not currently indexed or abstracted by the international services.
2. Selections from the health journals and monographs indexed, abstracted or cataloged by the international services.
3. Reports and non-formal literature issued by the Member States, and by the international and national technical cooperation agencies, governmental and private.

It will be noted that reliable data concerning the volume of publication in each of the three above categories are lacking. Partial data do exist: WHO's study of African journals tallied 103, and BIREME's count of Latin American journals 131 titles beyond those included in the MEDLINE data base. In neither case, however, do the titles have a consistent publication record, nor is there a breakdown of the number of original contributions contained in them. The initial global collecting effort for IDRC's SALUS data base uncovered 4 000 items from the non-formal literature (later weeded), PAHO Library has a collection of over 5 000 reports, and WHO 200 000 unpublished documents. No information exists, however, on the current rates of production for either the indigenous journals or the report literature, and, of course, the volume of uses made of the international services depends entirely on the number and character of the requests made.

#### 8. HERIS and other related information services.

##### 8.1 What should be HERIS's place among existing information systems?

A general principle applicable to information systems and services in all fields is the avoidance of unnecessary duplicative processing. This principle underlies the emphasis on voluntary cooperation stressed by Unesco's UNISIST Programme, and the efforts of the Inter-Organizations Board for Information Systems to harmonize the specialized information programme of UN agencies.

Over the past 25 years, the industrialized countries have developed a plethora of information systems and services, both computerized and manual, covering both broad and specific areas of biomedical research, clinical medicine, biological and chemical research, pharmaceuticals, hospital administration, health planning, population, nutrition, and many other cognate fields. While many of these were undertaken to satisfy the needs of the developed world, a number of them attempt to achieve global usefulness by making their information resources available to the developing countries. The availability of MEDLARS through WHO and the PAHO-sponsored Regional Medical Library (BIREME) in South America are examples.

In addition, the information systems and services under development by United Nations Agencies in fields related to health (e.g., industrial toxicology in the International Labour Organization, POPINS in the UN Department of Economic and Social Affairs, and the WHO

information services) in accord with the UN dedication to the New International Economic Order, involve the developing world directly in their planning, operations, and services.

## 8.2 Orientation of the related systems.

Both the large international and the national information systems and services established by the developed countries historically gave priority to the communication of the results of research to other researchers. Examples are:

MEDLARS/MEDLINE covers approximately 2500 research and clinical journals selected by quality criteria. CATLINE, its related system, covers monographs. Its comprehensive index product, the Index Medicus, is also repackaged by computer to produce specialized indexes to 28 research fields.

EXCERPTA MEDICA, is composed of sections of abstracts from papers in 2 400 journals representing research and clinical specialities. Like MEDLINE, its machine readable data base has extensive use for the retrieval of citations to the published research literature.

MEDINFORM, an international system under development by the member states of the Council for Mutual Economic Assistance (CMEA), has a comparable orientation to research and clinical practice.

SCIENCE CITATION INDEX, a large data base through which citations to individual papers may be traced.

In addition to these, there are hundreds of specialized information services, some computerized, some not, which serve the specialized research and clinical interests of the developed countries. Examples are:

- Health Planning (HEW)
- Rehabilitation (HEW)
- Smoking and Health (HEW)
- Psychological Abstracts
- Biological Sciences Information Systems (BIOSIS)
- Alcohol and Drug Abuse
- Schistosomiasis
- Medical and Veterinary Zoology
- Helminthological Abstracts, etc.

To the extent that such systems and services report on research conducted on topics and problems of direct concern to the health programmes of developing countries (e.g., new chemical agents for the control of schistosomiasis or advances in the treatment of tropical diseases) their coverage should be considered desirable for HERIS.

The distinguishing characteristic of these services, whether intended for a research or a clinically oriented community, is that they cover the formal literature, the published journals, monographs, proceedings, symposia, etc., which constitute the open, established communication structure of the health sciences and professions. Even when MEDLARS/MEDLINE recently expanded its data bases to health planning and administration with the cooperation of the National Health Planning Information Centre and the American Hospital Association, it concentrated on the published journal literature, an important, but not exclusive, component of the literature of health programme administration.

In contradistinction, there is no one single service which attempts comprehensive coverage of the unpublished, informal literature of health administration. There are a number of partial services at both national and international levels, and there are a number of existing and planned services for fields of social development related to health. Some of these are described below:

### 8.3 Information resources and services in the field of health.

8.3.1 World Health Organization. This is probably the most comprehensive information resource potentially available for the support of national health programme development. It has ready access to the formal literature relating to health in existence. With its active work in the development of statistical controls for health programmes, it is impossible to envisage HERIS without the active participation of WHO headquarters and regional offices.

8.3.2 Pan American Health Organization. Among the WHO Regional Offices, PAHO has taken an initiative in organizing a computer-based-information service for the 5 000 unpublished consultant and conference reports it possesses relating to Latin American health programmes. Experience gained in establishing this prototype activity should be studied carefully.

8.3.3 International Labour Organization. ILO operates computer-based information services in two specialized areas of concern: rehabilitation of the physically handicapped, and occupational safety and health. In addition, its Integrated Set of Information Systems (ISIS) has been widely used by other intergovernmental agencies.

8.3.4 National governmental agencies involved in technical assistance programmes, such as the Ministry for Overseas Development (UK), the Stiftung für Entwicklungsländer (FRG), and the (US) Agency for International Development. The latter, now in the process of automating its files of project reports, estimates that of 2 000 technical assistance projects supported since 1974, over 500 relate to health programmes in developing countries. The American Public Health Association, an AID contractor, has another file of 500 reports from expert missions concerned with primary health care and low cost health delivery in developing countries, while the American Council of Voluntary Agencies for Technical Assistance operates an information clearing house for information about private non-profit organizations providing services in developing countries in the fields of medicine and public health.

Of particular relevance in the field of health planning and services are the activities of the group of representatives of health information services who met in Bielefeld, FRG, in 1978<sup>5</sup>. While the group consisted of participants from industrialized countries (The National Health Planning Information Center, US; the Deutsches Krankenhausinstitut and the Institut für Dokumentation und Information über Sozialmedizin und Öffentliches Gesundheitswesen, FRG; the Department of Health and Social Security, UK) their conclusions based on a close acquaintance with the health programme management literature have relevance to the HERIS concept.

### 8.4 Information resources and services in fields related to health.

Examples include:

<sup>5</sup> Strengthening Information Services for Health Planning: Report of a Working Group on Mechanisms for Improving the International Exchange of Health Planning Information, June 13-15, 1978. Washington, D.C., Pan American Health Organization, 1978.

Population information<sup>6</sup>: The most ambitious proposal has been that of the UN Department of Economic and Social Affairs that commissioned a study of the feasibility of an information system or network for the population sciences<sup>7</sup>. Without making an estimate of the total volume of literature of use to national population planners, the study accepted the Radel and Kim findings that 2/3 of the population literature of two developing countries was of the fugitive, informal type, and that no less than 1/3 was published outside the countries. POPINS has yet to be activated, but other population information systems of regional scope are operational. These include:

Economic and Social Commission for Asia and the Pacific (ESCAP) Clearing House Information Section, with which the WHO Library/Regional Documentation Centre on Human Reproduction, Family Planning and Population Dynamics of the Regional Office for South East Asia cooperates. Latin American Population Documentation System (DOCPAL) under the Latin American Demographic Centre (CELADE) of the UN Economic Commission for Latin America (ECLA) with the assistance of the (Canadian) International Development Research Centre, DOCPAL is in the process of accelerating and mechanising its document collection and processing programme.

In health-related fields, other UN sponsored information systems attuned to the needs of developing countries exist. In the agricultural sciences, for example, the Agricultural Research Information Service (AGRIS) sponsored by the Food and Agricultural Organization, processes information from developing countries in such fields as nutrition and the zoöneses. AGRIS is one of the prototype "territorial formula" systems to which individual member countries contribute their publication products through "focal points" and from which they draw. The merged results are used to publish an international index "AGRINDEX", and are converted to magnetic tapes for searching.

The International Referral System for Sources of Environmental Information, managed by the United Nations Environmental Programme (UNEP), with the cooperation of national centres in member states, conducts a referral service to guide users to sources of information, rather than to publications. Of significance to developing countries' health programmes, it maintains an international register of potentially toxic chemicals, and serves as an access point for information on such topics as air and water pollution.

Returning to population information, in the ESCAP region a 1955 Conference in Bandung, Indonesia drew attention to the need for closer association between demographic research and population information services. ESCAP fostered the development of national population information centres in such countries as Indonesia, Thailand, Pakistan, Korea, and the Philippines.

Similarly, CELADE's regional population information network depends on multiple national centres in such countries as Cuba, Haiti, Dominican Republic and Costa Rica. Although not so well developed or coordinated, a number of national population centres are emerging in Africa.

The United States has several major centres which collect and disseminate population information from developing countries. Among these is POPINFORM, funded by AID and located at Johns Hopkins University. POPINFORM cooperates with the National Library of Medicine to furnish the data base for the latter's POPLINE. The Population Index, located at Princeton

<sup>6</sup> See Radel, D.J. and Konoshima, S. Professional and Technical Information for Population Programmes. Honolulu, East-West Communication Centre, 1977.

<sup>7</sup> Towards a World-Wide Information System in the Field of Population. Study prepared for the POPINS Interim Steering Committee ... and Report of the Interim Steering Committee to the United Nations Department of Economic and Social Affairs, New York, January 1977.

University, is traditionally a major source of population information, as is the Technical Information Service (TIS) of the Carolina Population Centre. POPINFORM and TIS generate machine-searchable data bases; The Population Index is searched manually.

9. Identifying desirable services and products.

In the planning of any information system or network, an a priori decision, however hypothetical, must be made on the character of the services and products the system is to create. This decision is a result of close examination of the question: given an agreement on the community of users to be served, and on the scope of the universe of information that best serves their purposes, what kinds of information products and services should be selected, as a basis for planning?

A planning decision on this point directly affects a determination of the functions the system is to perform, the organizational requirements for its performance and, of course, the resources necessary for its operation.

Publications useful to the governmental development programmes are concerned with group objectives: the assessment of trends, diagnosis of problems, establishing policies and developing and assessing plans, programmes, and projects. Public administration is not an academic testing ground for new theories and research findings, nor for personal recognition by peers. Publication, therefore, tends to become depersonalized; individual units proffering experimental information, as in the case of research, are less useful than consolidations of accepted and applicable knowledge.

To this must be added the acknowledged fact that administrators lack time, patience and practice to read multiple (and occasionally conflicting views) for the purpose of weighing evidence; they prefer dependable summaries of the view, facts, and experience bearing on the problem to be decided.

Therefore, it would be difficult to justify a system that attempts to collect, process and preserve individual units of administrative information in the same fashion as research or clinical information rather than providing for a selection, consolidation, and summarizing process for the purpose of health programme management.

To recapitulate:

- ... the character, functions, and size of the information flow in HERIS are determined by the requirements of the users and the nature of their uses
- ... the disparity of user requirements among researchers, practitioners, and programme managers suggest concentration on a single group
- ... priorities set by the World Health Assembly for the attainment of higher health levels by the year 2000 suggest concentration on programme management information
- ... health programme managers require summarized or compacted information rather than a register of individual contributions
- ... the sources of the information to be acquired and digested are both the formal and the non-formal literature, and are to be found in the developing and the developed countries alike.

The balance of this paper is concerned with a proposed mechanism for collecting, digesting, and applying information of value to the planning, establishment, and management of country health programmes.

#### 10. Regional Health Information Analysis Centres (RHIAC).

It is proposed that the functions of collecting, digesting, and summarizing information of value to the management of country health programmes should be made the responsibility of a limited number of analysis centres organized in conjunction with the WHO Regional Offices. Such Centres would serve the country health programmes in the region by preparing summary reports on topics determined by the country programme managers, in consultation with the WHO Offices, to have priority in the development of national and regional health programmes.

To do this, the Centres would collect information as follows: a) the journal and book production of the region; b) the mission reports, conference proceedings, studies demonstrations, evaluations, etc. conducted by the countries themselves, and by representatives of technical cooperation agencies, public and private, operating within the region, and c) selective dissemination of information (SDI) or ad hoc search searches of the international bibliographic data bases relating to health (MEDLINE, Excerpta Medica, MEDINFORM, etc.).

The products of the Centres would consist of a) "Current Contents" type listings, produced by photo offset from the journal and book contents pages for circulation both within and outside the region, b) commissioned information digests, the principal product, for distribution within the national health programmes, and, c) derivative and supportive training materials for the training of the national para-medical and health professions.

The personnel of the Centres would consist of a small (6 to 8 person) permanent staff, headed by a highly qualified health administrator, and "floating" staff of experts. The latter would be qualified consultants from the member states, from the Regional Offices, from other inter-governmental, governmental private health programmes selected for their expertise in the questions under investigation.

These functions and some of the optional approaches to conducting them are amplified below.

##### 10.1 The concept of the information analysis centre.

The basic concept of an agency to collect specialized published information for the purpose of analysing, evaluating, and digesting it in summary reports is, of course, far from new. Industrial information officers in the United Kingdom and other developed countries do this regularly. The Soviet "branch" information system depends heavily on the analysis of reports of foreign technological development for its technology import.

Two recent developments have, however, added new dimensions to the concept. During the 1960s the U.S. Department of Defense and the U.S. National Bureau of Standards supported the development of "information analysis centres" which functioned in fields of high technology to evaluate results of developmental work in the physical sciences and engineering to arrive at most acceptable values in the properties of matter and its behavior. This focussed fresh attention on a cooperative evaluation effort in the natural sciences.

In more recent efforts to apply cooperative evaluation to socioeconomic fields, the World Federation of Engineering Organizations (WFEO) conducted a feasibility study for Unesco's UNISIST Programme on the use of information data banks for the selection of appropriate

technology by African states<sup>8</sup>, and the National Science Council of Sri Lanka in collaboration with Unesco organized a Symposium on Information Analysis and Consolidation held in Colombo in September 1978. Members of the Symposium pointed out the great values of evaluated and consolidated information for developing countries, pointing out the valuable contribution made by existing institutions in a number of agricultural fields: cassava, rice, coconut, rubber, food industry, irrigation.

The term "Information Analysis Centre" represents, in short, a more highly institutionalized form for conducting a traditional function, that of selection, evaluation, and summarizing of information bearing on a specialized field or problem. These functions are precisely the ones required to reduce the vast amount of information being generated in the field of health into forms which can be readily assimilated in the promotion of country health programmes.

Some considerations and options relating to the role of Information Analysis Centres in the proposed HERIS Programme are noted below:

#### 10.2 Should they be established on a regional basis, or national or global one?

This question presents a first set of options for further investigation.

In the industrialized countries, the urgency of need, the critical mass of information being generated, and the level of available fiscal and human resources justify the establishment of Information Analysis Centres at the national level. While these conditions may obtain in some of the more advanced of the developing countries, especially in industrial fields, this is the exception rather than the rule.

Establishment at the global level may offer some economies in the use of scarce manpower, and in the production of reports and bibliographies. On the other hand, single global centres would be remote from most of the countries whose programmes they are intended to serve, and less sensitive to their needs.

Establishment at the regional level, on the other hand, would benefit from shared interests where they exist: cultural, ethnic, linguistic and political backgrounds, disease entities, and health programme environments. Further, their establishment would be materially simplified by association with the existing Regional Office machinery, which also serves these common interests.

On balance, while these options should be further explored, it would appear desirable to establish the Health Information Analysis Centres in conjunction with the WHO Regional Offices. Since the Centres would be providing like services, and should be in a position to exchange them, they should also be associated in some form of a network. The relationships of the elements in this network are explored below.

#### 10.3 How might the centres relate to the Regional Offices?

Programmatically, the Centres would constitute an important resource for the conduct of country health programmes, and the pursuit of the Health/2000 goals. To the extent that the implementation of the Programme is regionalized, the information resources supporting them should be administratively and fiscally the responsibility of the Regional Offices. The

<sup>8</sup> Feasibility study: data bank services in Africa. Paris, Unesco, 1975. (SC/UNISIST/Adv. Com. II/INF.3)

Centre's ability to associate with and perform for the programme is critical; neither a "free-standing" establishment, nor establishment geographically isolated from the individual country health programmes, is likely to prove workable.

#### 10.4 How might the centres relate to the Member States?

The member states represent at once the primary beneficiaries of the RHIAC services and products and one of the principal producers of information to be analysed. It is therefore essential that the closest of cooperative relations be established between the two. Necessary areas are:

10.4.1 Programming: RHIAC manpower resources will of course be limited, and priorities must be set among the topics to be analysed and reported on to the individual country health programmes. It follows that there must be negotiation between the Centre (and perhaps the Regional Office) and the responsible officials in the Member States to determine by mutual agreement the priority topics to be reported on for the year ahead.

10.4.2 Manpower: The RHIAC will need regularly to recruit professional project leaders (or authors) from qualified and experienced individuals in Member States. In addition, the RHIAC will offer training to personnel in Member States who will be responsible for the supply of informational materials. The RHIAC will also maintain a registry of qualified experts for short-term consultancies.

10.4.3 Supply of documents: The RHIAC will have two major communication needs. These are the supply of publications and documents from Member States for purposes of analysis, and some form of bibliographic listing so that the literature produced by one Member State can be made known to another. Alternatives for the latter device are explored later. Both needs require a regular and effective collection mechanism within each Member State; the mechanism should be associated with the country health programme and/or the health ministry.

10.4.4 Newsletter: The RHIAC would publish a newsletter for distribution in the Member States that would serve the following purposes:

- a. it would invite the attention of the country health programmes to such significant events as the publication of outstanding reports, programmes undertaken in other regions, announcements of projects, programme evaluations, etc.
- b. it would serve to link the regional RHIAC through information exchange.
- c. it would serve as a continuously updated guide to other information resources of use to the member states.

#### 10.5 How might the centres relate to the WHO headquarters?

The WHO headquarters would have three broad areas of concern in relation to the establishment and operation of the RHIAC. These are:

- a. provision of broad guidelines for the development of the RHIAC programme, including basic policy considerations;
- b. promotion of liaison between and among the RHIAC, through sponsoring conferences and promotion of technical standards to the extent that they may be required;

- c. serving as a central resource, both for the informational materials and services they may require, as well as for locating manpower expertise for special assignments.

In general, the RHIACs would look to the WHO headquarters for promotional and logistical support, as well as for coordinating their efforts to resolve programme problems, and to the Regional Offices for administrative and fiscal support.

#### 10.6 The RHIAC main sources of information.

The information required by the RHIAC for processing falls into three general categories: that generated in the Member States themselves, that generated by the public and private technical cooperation agencies of the developed countries, and that captured by the international information systems in the field of health. While different modes of accessing this information might well be tested, it is suggested that approaches along the following lines may be found productive:

10.6.1 Literature generated by the developing Member States. This consists of the formally published literature (journals, textbooks, pamphlets, etc.), and of the non-formal or "gray" literature. It is proposed that each ministry or country health programme appoint a liaison representative, that appropriate legal authority be provided for his responsibility, as well as training in procurement, and that he should be made responsible for the procurement and shipment of indigenous health information materials to the regional centre.

Alternatively, the individual could be trained in the cataloging, indexing, and listing of the materials, and that these lists rather than the publications themselves be forwarded. Options for the character of the resulting publication are considered under "RHIAC Products", but it may be said here that three considerations argue for the materials themselves: their relatively low cost; the problem (even with training) of standardizing the bibliographic centres, and the length of training required.

It is probable that both publicity and unflagging effort will be necessary within the countries to acquire the unpublished reports of studies, missions, conferences, demonstrations, etc. from their sources.

10.6.2 Unpublished reports issued by national and international technical cooperation agencies. Since the problem here is to learn who has issued what, three requirements are necessary: a comprehensive knowledge of the programmes of the governmental, inter-governmental and non-governmental assistance agencies operating in the region; ingenuity in tracing publications resulting from their programmes, and an informed selectivity in soliciting them from the issuing agencies. Some representative sources are noted below:

a. governmental agencies:

- Ministry for Overseas Development (UK)
- Stiftung für Internationale Entwicklung (FRG)
- Agency for International Development (US)
- Danish International Development Agency (Denmark)
- Canadian International Development Agency (Canada)
- Swedish International Development Agency (Sweden)
- etc., etc.

b. inter-governmental agencies

WHO and its Regional Offices  
UNICEF  
ILO  
UNIDO  
UN Regional Economic Commissions  
UN Population Programme  
etc., etc.

c. non-governmental agencies

American Public Health Association  
Rockefeller Foundation (as representative of private philanthropy)  
Technical Assistance Information Clearing House (TAICH)  
Appropriate Health Resources and Technologies Action Group Limited  
etc., etc.

Since technical cooperation projects are limited in time, constant change may be expected, and the ability to find out the reports being issued which bear on the health programmes of any one country or region must be cultivated. For obvious reasons, this type of procurement is best centralized in the individual RHIAC.

10.6.3 Literature published within the developed countries. Finally, the formal literature recorded by the international information systems, has much value for the country health programmes of WHO member states. These international systems in general are of two types: those concerned comprehensively with biomedicine and health, such as MEDLINE and MEDINFORM, and those handling the literature of sectors related to country health planning: population, water supply, nutrition, etc.

Most of these have by now been computerized and are able to provide selections from their data bases of two types: selective dissemination of information (SDI), and demand (or on-line) search. The former (of which the "recurring bibliography" popularized by the National Library of Medicine is a variant) provide a repetitive search service based on a negotiated formulation; the latter, a one-time search of a specified data base.

Most of these services are commercially available, and competition as well as continuous technological development has brought prices down to a level where the RHIAC should consider using them exclusively to access the literature which the developed countries produce on topics of importance to the country health programmes.

The importance of SDI or one-time search service will depend, of course, on the length and scope of the individual projects for which the information is sought. It is urged that cost data relating to the different modes of accessing multiple related data bases should be ascertained as a part of the feasibility study.

10.7 The RHIAC main activities.

The primary function of the RHIAC is to collect, analyse, evaluate and synthesize information into reports useful to the managers of country health programmes within their regions. Other functions are incidental to this.

It follows that, in addition to collecting the materials from the sources described in the previous section, they must at a minimum provide for some form of systematic access to enable their own staff to select materials relevant to their analyses. There follows the

central function of assigning the topics for study to experts, and of providing them logistical support for their work of analysis and report preparation. A third function is that of providing a professional reference (or question and answer) service to the health programmes within the regions, and a fourth that of providing a communications linkage within the regions, and with other regions. These functions are examined below:

10.7.1 Organization of materials for access. Bibliographic access to journal articles, books, and unpublished reports is accomplished through indexing (as in the case of MEDLINE), library cataloging (e.g. CATLINE), or abstracting (as in the case of IDRC's bibliographies on "Low-Cost Rural Health Care and Health Manpower Training"). Contemporary processing of information calls for the conversion of the bibliographic elements involved into machine-readable forms, which may be searched by computer, and also be used to produce published bibliographical products.

A central question is the degree of responsibility to be assigned to RHIAC for standardized bibliographic processing.

On the one hand is the opportunity they offer to contribute to the librarian's goal of Universal Bibliographic Control (UBC), a programme which has been promoted internationally by Unesco. Added to this is the interest of the developing countries to have their contributions receive wider recognition, and, of course, to have a mechanism which would facilitate technical cooperation in their health programmes. One alternative clearly is to investigate the costs and the utility of full bibliographic processing of the journal articles and reports not now provided for elsewhere. Fortunately, the International Development Research Centre, with experience in producing four issues of its recurring bibliography on Low Cost Rural Health Care, would be a source of information for such estimates. On the other hand, the primary function of the RHIAC is information analysis, not bibliographic control; they would exist to respond actively to priority information needs in country health programmes, not to build a comprehensive bibliographic resource for unspecified future needs. Further, the costs of full bibliographic processing and its conversion to machine readable form are significant (IDRC is budgeting \$70 000 per year for the processing alone), and if the processing is decentralized (as in the territorial formula systems), large scale training and coordinating efforts are required<sup>9</sup>.

As an alternative to full bibliographic processing, it is suggested that each RHIAC produce a simplified version of a "Current Contents"<sup>10</sup> type publication for its region (e.g. Current African Medical Literature: CAMEL), and that these be used (1) to provide the staff with current awareness of the publications of the region, (2) to circulate throughout the region as a part of the technical cooperation effort, and (3) to exchange with other RHIACs, and with health libraries and information centres throughout the world.

The cost of such "Current Contents" can be kept modest by limiting them initially to photo-offset copies of the contents pages of the region's journals; later features such as subject and author indexes (as in the case of Periodica, the index to Mexican science journals produced by the Centre of Scientific and Humanistic Information of the National

<sup>9</sup> It may be noted that the modest volume argues against the use of a sophisticated system. The WHO survey of African journals lists 103 journal titles not now indexed. If these average 4 issues per year, and each issue contains 6 original papers, this would produce an estimated volume of 2 472 papers per year. Similarly, of the 181 journals proposed by BIREME for the Latin American Index Medicus, 50 are covered by Index Medicus; the same arithmetic suggests that there might be a total of 3 144 original papers annually. These totals are insufficient to justify the high costs of computerizing.

<sup>10</sup> Name registered as a TradeMark by the Institute for Scientific Information, Philadelphia, PA.

University of Mexico) can be added. The latter require input typing of the title and author information, which of course, adds to the cost.

Subject arrangement of the journal titles in the list, as in the case of the original Current List of Medical Literature, and as used by the IDRC bibliographies would provide adequate subject access for the modest volume of publication, and the non-formal literature could be added as appendices to the subject sections.

Announcement lists of this type would appear to satisfy multiple requirements simultaneously: the need for a quickly produced record of the health publications of the countries in the region, a rough listing by subject for the use of the Centre's professional analysts, and quick communication to others outside the region. Their use for retrospective search is obviously limited.

10.7.2 Information analysis and preparation of reports. Each Centre would have a small (2-3 person) permanent professional staff, qualified to undertake the analysis and digesting of incoming information on the selected topics, and of assisting experts employed on short time assignments. The latter might be seconded from the Regional Offices, from WHO headquarters, from the countries in the region, or from public and private technical cooperation agencies. The Centre would maintain a register by topic of qualified, available individuals.

Depending on the complexity of the task, they would work individually, or in small teams on their assigned topics, reviewing the literature already available in the Centre, searching the international systems for additional references, and drafting reports for review. Each report might take between 3 and 6 months to prepare. Review would be accomplished jointly by representatives of the country requesting the report and by officials of the Regional Office. Publication of the report (as, for example, a unit of the WHO Technical Report Series) would be optional, and would depend among other factors on the degree of interest in the topic shown by other countries in the region, and by other regions.

Initially, the Centre would not undertake responsibility for the making of microfiche copies of the documents received and/or used in the reports as a regular function. Should a steady demand for copies develop, a decision might be made either to reconsider, or to arrange with a regional medical library to undertake this function. In the meantime, individual photocopies might be made on request.

10.7.3 Reference service. While a widely advertised question and answer reference service might detract from the Centre's primary responsibility of preparing reports, the assemblage of superior information resources on problems of concern to country health programmes, and the presence of highly qualified experts (even on a temporary basis) will create an opportunity which many member states will find hard to resist. It is therefore proposed that the Centre offer a question and answer or reference service on topics within its competence and its capabilities. The service could be provided via telex, cable, correspondence, radio or other convenient and inexpensive medium.

10.7.4 Communications. The Centre will be used and its services and products have an impact on the country health programmes only to the extent that its services are effective and visible. One advantage of the question and answer service noted above is that of serving as a continuing reminder to the using countries that the Center is actively assisting in their health programmes.

It is proposed that each Centre publish a Newsletter which would contain information about the studies currently undertaken, specialized health information resources received by the Centre, or available to it, notices of "breakthroughs" in particular fields, news of

demonstrations, evaluations, etc. The UNIDO Newsletter of appropriate industrial technological needs and offers comes to mind as a model.

10.7.5 Potential research and training functions. Should a regional health programme research or a training effort emerge as a component of the Country Health Programme development, the Centre's resources of information and of expert manpower will constitute major assets for their development and operation. This possible contingency should be monitored for future programme development of the RHIAC.

10.7.6 Manpower: The Centre would employ the following on a continuing basis:

<u>Director</u>	Responsible for overall administration, negotiation of agreements, representation of Centre with member states, planning, budgeting, recruitment, etc.
<u>Secretary and Administrative Assistant</u>	Responsible for supporting Director in day to day operations of the Centre.
<u>2 Senior Scientists</u>	Responsible for studies, analyses, and the drafting of reports.
<u>Junior Professional Assistant</u>	Responsible for assisting the two, senior scientists, for producing the Current Contents and the Newsletter
<u>Librarian</u>	Responsible for the filing of information materials. Assists in the production of the Current Contents and Newsletter.
<u>2 Typists/file clerks</u>	File maintenance; typing of reports; correspondence

The annual budget for the permanent staff would approximate \$150 000.

In addition, as previously noted, as the developing programme requires, expert professionals would be recruited for short-term employment. Some of these may be seconded by their organizations; others would be given short-term contracts as consultants.