A study of national health research systems in selected countries of the WHO Eastern Mediterranean Region

Egypt, Islamic Republic of Iran, Morocco, Pakistan and Sudan

World Health Organization
Regional Office for the Eastern Mediterranean

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Executive summary

With a view to developing innovative and effective strategies for strengthening national health research systems in the Region, the WHO Regional Office for the Eastern Mediterranean and the UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR) decided to support a detailed and systematic situation analysis of health research in five countries: Egypt, Islamic Republic of Iran, Morocco, Pakistan and Sudan. This was to follow up on the Declaration and Action Plan adopted at the International Conference on Health Research for Development, held in Bangkok, Thailand, 10–13 October 2000. The studies were carried out during 2002 and 2003 and it was anticipated that situation analysis would lead to a nationwide dialogue among the stakeholders, leading to a consensus on the future strategic direction and governance of health research in these countries.

The studies in the five countries were largely descriptive in nature. Information was collected in several areas: the existing set-up for science and technology; mechanisms for the governance of health research; development of research policy; priority-setting; ethical review mechanisms; research output of institutions and scientists; research training programmes; dissemination and utilization of research results and funding for health research. The methods employed for collecting information included the administration of questionnaires, structured interviews, focus group discussions and workshops, bibliographic surveys and reviews of existing relevant documents.

In order to harmonize the objectives, methodologies and possible outcomes of the five studies and to enable the investigators to learn from each other, the WHO Regional Office for the Eastern Mediterranean convened two meetings of the country teams, one at the beginning of the study and

the other half way through its implementation. A summary of the findings was presented at the Seventh Intercountry Meeting of the National Officers Responsible for Health Research held from 15 to 17 December 2003 in Lahore, Pakistan.

The final reports submitted by the country teams varied in the degree of detail and information provided. This publication summarizes the main findings from each of the five studies under the four functions of a national health research system: stewardship, financing, creating and sustaining resources and producing and using research.

The reports clearly indicate the uniqueness of the health research system in each country, reflecting to a great extent their historical and cultural background and their political and economic situation. They confirm the belief that any efforts to strengthen the system should build on or modify what exists, rather than try to create something from scratch.

The concept of a national health research system seems to have been accepted, but steps to operationalize it have yet to be taken in any of the countries. Also, the base of stakeholders continues to be narrow and largely restricted to the producers of research. Concerns about ethics in health research exist in all the five countries and steps are being or have been taken to safeguard the interests of human subjects participating in health research. Priorities for health research, whether derived through a formal mechanism or through consensual agreement between experienced researchers, exist in all of the five countries.

The situation analysis has highlighted the absence (in Pakistan and Sudan) or the inadequate development (Egypt, Islamic Republic of Iran and Morocco) of an integrated, well designed and functioning national health research management information system, whether on its own or as part of a broader national science and technology/research and development information system. However, from the

information collected it appears that a well developed infrastructure for health research exists in all the five countries and research is carried out both in specialized centres and in academic institutions. Training programmes for researchers, short-term methodologically oriented and long-term leading to acquisition of postgraduate degrees, exist in all counties except Pakistan, where such programmes are not well developed and where retaining motivated and productive researchers poses a special problem. As anticipated, detailed tracking of funds for health research could not be carried out, but funding for health research per se did not seem to be a problem, except for Sudan.

Although the results of research carried out in each of the countries were being published mostly in local journals, their impact on policy or programme implementation seems to be negligible except to some extent in the Islamic Republic of Iran. None of the countries have an institutional mechanism for screening research results to identify those suitable for policy or programme implication and forwarding them in an appropriate form to policy-makers The five countries, as well as others in the Region, could learn from their mutual experiences and use the results to broaden the base of stakeholders and to take steps towards developing and strengthening the structure of the health research system unique to their respective countries. New ways have to be found to improve the existing coordination mechanisms, for example by improved networking using modern means of communication between research institutions and the linkage between the demand and the supply side. Apart from improving the quality of research, there is a need to strike a balance between the research and development or biomedical type of research and policy and system oriented research. The studies have also highlighted the need to improve the managerial capacity at different levels in the health research system.

1. Introduction

Following the publication of the landmark report of the Independent Commission on Health Research for Development in 1990 and the technical discussion at the Forty-third World Health Assembly (May 1990) on the role of health research in the strategy for health for all by the year 2000, serious efforts were undertaken by international development funding agencies, multilateral organizations and major international health research funding organizations to further examine and promote the role of health research as an important contributor and as a tool for health development.

Some significant events that took place during the 1990s included the International Conference on Essential National Health Research held in late 1990, which was followed by the creation of a task force on health research for development in 1991. The Council on Health Research for Development (COHRED) was created in 1993 and took over the work initiated by the task force. In 1993 the World Bank's annual report dealt for the first time with health. As a direct outcome of this report, an Ad Hoc Committee on Health Research Relating to Future Intervention Options was established under the auspices of WHO. This Committee reviewed the health needs and related priorities for research and development in the low to middle income countries and published its report in 1996 [1]. Amongst its recommendations was the need to create a mechanism to review global health research needs, assess research and development opportunities and to monitor resource flows for health research. It also updated the earlier estimates by the Independent Commission regarding disparities in research expenditures on health problems of developing countries.

According to 1992 estimates, of the US$ 56 billion spent globally by the public and private sectors on health research,

less than 10% is devoted to diseases or conditions that account for 90% of the global disease burden — the so called 10/90 gap. In June 1997, the Global Forum for Health Research (GFHR) began its work. Its central objective was to help correct the 10/90 gap and focus research efforts on the health problems of the poor. This was to be achieved by improving the allocation of research funds and by facilitating collaboration between partners from public and private sectors. Through its annual meetings the GFHR provides a platform for stakeholders to review the global health research situation and priorities. It has initiated much needed analytical work on methodological aspects of priority-setting and ascertaining resource flow. A GFHR report [2] estimated that the global funding for health research in 1998 had risen to nearly US$ 74 billion and that 21 developing countries (15 from Latin America, 4 from India, and the others from South Asia and Turkey) had financed 3% of this total.

In the late 1990s, four major international agencies involved in health research: WHO, World Bank, GFHR and COHRED, felt that it was time to take stock of the global, regional and national initiatives in health research. The need was all the more pressing as much of the Commission's vision had yet to be fulfilled. While some countries had been able to develop their research capacities, many others continued to face problems. On the whole, developing countries had not been able to integrate health research into a systems approach. Research continued to be fragmented, specialized, sectoral and poorly coordinated and quite often not focused on needs and priorities of national health systems.

The International Conference on Health Research was held in October 2000, in Bangkok, Thailand to review the status of global health research. This landmark meeting was preceded by intensive preparations including consultations with countries and regions to obtain their views on health research and solicit ideas on critical issues for the coming

years. The outcome of the conference was an action plan that proposed a set of goals, visions, values and principles on which health research in a country should be based [3]. The plan identified five areas in which to focus strategies for strengthening national health research: knowledge production, capacity development, governance and financing and national focus.

Following the conference, a key meeting was held in Cha-am, Thailand, in April 2001, to examine the national health research system as a concept and to explore ways in which such systems could be strengthened to better address national priorities [4]. This meeting identified several reasons for adopting a systems approach to health. First, a systems approach would improve the coordination of the currently fragmented and uncoordinated health research and thus avoid duplication and inefficiencies. Certain research requires collaboration and linkage between different disciplines and research organizations and a system would be able to facilitate the required synergy between these entities. A systems approach would also better align health research with national health priorities. Most research outputs are not translated into changes in the health policy or programmes, or into the desired health and equity outcomes. This indicated a need for a more systematic application of research findings in policy, planning and delivery, as well as systematic links between researchers and users of research. Finally, a systems approach was needed to develop research capacity and to mobilize resources for research. Health research in many countries was unethical, unfair, unaccountable and not transparent and therefore, countries needed to develop a systems approach for setting rules, procedures and standards and to regulate themselves within expressed values and principles.

It was also felt that a systems approach would allow the national health research system to develop meaningful and productive linkages and interaction with three closely

connected systems, i.e. the health system, the education system and the science and technology system. Improved interaction would facilitate an optimum development of health research responsive to national needs and prevailing values.

The meeting at Cha-am was critical in emphasizing that action should begin at the country level, initially by countries themselves carrying out a situation analysis of their health research system in a non-threatening mode. A situation analysis reinforced the principle of working with and identifying areas for strengthening the existing system, rather than designing the system from scratch.

2. Background to the study

The Declaration and the Action Plan adopted at the International Conference on Health Research held in October 2000 in Bangkok, Thailand, provided a vision and strategic framework for further development of health research in developing countries. The Cha-am meeting provided a conceptual framework for national health research systems and defined strategies for strengthening them. In view of this, and in order to design innovative and effective modes of collaboration for strengthening health research in Member States in the Region, TDR decided in early 2001 to fund a small number of studies dealing with the analysis of national health research systems, initially referred to as research mapping grants.

The purpose of these grants was to enable the selected countries to carry out a comprehensive and systematic analysis of the current situation of health research in their respective countries. This was to be done with a view to initiating a nationwide dialogue among the stakeholders which would lead to a consensus on the future strategic direction of the national health research system and to

recommendations for its effective and efficient governance. The analytical exercise was to focus on the identification of the key producers and users of health research. It was to gain an improved understanding of their roles and linkages, the processes involved in prioritizing and in conducting health research, the research outcomes and products, particularly in terms of quality, dissemination and use, specially in reducing inequalities in health and the overall environment of health research and the role of the private sector and civil society in supporting research.

It was appreciated from the outset that the experience from the studies, when completed, would lead to an improved understanding of approaches and methodologies (including the development of indicators) for assessing the performance of national health research systems. However, it was clear that the purpose was not to rank the countries according to the performance of their national health research systems.

Health and health research authorities in Egypt, Islamic Republic of Iran, Morocco, Pakistan and Sudan were approached for their interest in carrying out these studies. The selection of these countries was based on their having an active health research programme and a history of long-term collaboration in this field with both the Regional Office and TDR. All the countries agreed to participate and subsequently submitted detailed proposals that were reviewed by the Regional Office and TDR and also by external reviewers.

In January 2002 the Regional Office convened a regional workshop with a view to finalizing the framework and harmonizing the objectives, methodologies and expected outcomes, of the proposals. It provided a useful opportunity for the country teams to present their proposals and to interact with each other. It also served as a stimulus to representatives from other countries in the Region that had not submitted a formal proposal, to undertake a similar exercise. The participants agreed that the framework should encompass a

holistic view of national health research systems and include analysis of:

- the perspective of policy-makers, health planners and managers and the community, including an understanding of the current national policies and legislation covering research and mechanisms for creating demand for research;
- researchers and research institutions including a profile of researchers, institutional mandates and activities for research;
- research outputs, such as reports and publications and the utilization of research findings for policy-making, programme implementation and technology development;
- funding mechanisms, such as identification of funding resources and their allocation according to national priorities.

A second meeting of the country teams was held in February 2003 to review the progress made by the country teams in their analysis of the respective national health research systems. On this occasion the teams were oriented on the basic methodology for tracing and measuring funds for health research and development in middle-income countries with a view to streamlining the allocation of funds according to national priorities. The participants also agreed on a format for submitting the final report.

All the countries completed their study by the end of 2003 and presented a summary of their final reports at the Seventh Intercountry Meeting of National Officers Responsible for Health Research held from 15–17 December 2003, in Lahore, Pakistan.

3. Objectives of the studies carried out in the five countries

Even though, as stated above, an attempt was made to harmonize the objectives of this analytical study across the five countries, each country team formulated its own general and specific objectives. For example the Egyptian group saw their goal as "to help formulate an evidence-based priority driven health research plan in Egypt aiming at advancement of health related scientific knowledge and equitable health promotion". The general objective of the Iranian study was simply "the situation analysis of national health research systems in the Islamic Republic of Iran". The Moroccan study aimed to analyse the health research system, its various functions: piloting, capacity building, manpower, financial and material resources production and management of produced knowledge and its environment. In the case of Pakistan the general objective was to "map the existing health research system, to identify its strengths and weaknesses, and suggest measures for making the system more dynamic and responsive to the information needs of the overall development of the country and specifically to the needs of health policy and planning". The general objective in the case of Sudan was "to critically assess the current situation of health research and to develop appropriate mechanisms for enhancing and improving health research in the Sudan".

Similarly, the specific objectives were stated in different terms. However, all the teams included an analysis of:

- development of research policy;
- institutions involved in health research;
- priority-setting;
- funding for research;
- research outputs of institutions and researchers and the publication, dissemination and utilization of results of research;
- health research training programmes;

- environment affecting the research process;
- the extent to which ethical review process was developed;
- identification of areas covered by health research (Sudan had the specific objective of covering the least developed and the poorest segments of the community).

4. Methodologies used for studying the national health research systems in the five countries

Basically, all the studies were descriptive and cross sectional in nature. The sampling frame was different for each country reflecting the size of the health research infrastructure. The tools employed for collecting information included a mix of techniques, such as questionnaires, structured interviews, focus group discussions, workshops and the perusal of existing documents. Each country team adopted a unique approach to collect and analyse data.

In Egypt the eight members of the research team acted as a steering committee and met on a monthly basis. Three eminent scientists, all former ministers of health, acted as consultants. A project office was established at the premises of the Egyptian Community Medicine Association, in Cairo and equipped with secretarial staff and telephone and e-mail services. It was attempted to include all health research institutions in the country, including those located for administrative purposes, under the Ministries of Higher Education, Scientific Research and Health and Population. Civil society organizations conducting health research were also included.

The country was subdivided into seven geographical regions and in each region a representative was nominated to visit the research institutes in that region and collect the required data. A large number of institutes exist in the greater Cairo area so the responsibility of data collection was assigned

to members of the steering committee living in the Cairo area. Similarly in the case of large medical faculties a faculty member was assigned to collect the data from the other faculty members.

Three questionnaires were designed by the steering committee. The first, to be completed by the head of the institute, was to gather information on the institute's research capabilities, on the existence of an ethical review committee, on evaluation techniques and about the source of funding for research. The second questionnaire was to be completed by the researchers in the institute and the third was used for collection of data from the national databases from the Academy of Scientific Research and Technology and from the Institute of Postgraduate Studies and Research, University of Alexandria. The questionnaires prior to being used were field tested and reviewed in a workshop. Data cleaning, coding and entry were carried out at the Assiut University.

Apart from the data collection exercise, the steering committee organized eight workshops. Three of these were for representatives (248) from the different regions, one was held for 23 representatives of civil society organizations and another for 163 representatives of 26 drug research and manufacturing institutions. The remaining three were held for the staff of the Egyptian Organization for Biological Products and Vaccines (103 participants), the National Organization for Drug Control and Research (103 participants) and the National Research Centre (18 department heads only). In summary, a total of 684 persons representing 121 institutions took part in these eight workshops. Topics covered during the workshops included priority-setting mechanisms, defining and monitoring research activities, networking and teamwork, capacity building, and community involvement in planning, execution and funding of research.

In the Islamic Republic of Iran, twelve prominent researchers, selected because of their executive position or

because of their involvement in research dealing with one of the specific objectives of the study, were invited to attend a briefing session. During the session one person was selected to carry out data collection and analysis dealing with one of the objectives under the direct supervision of the principal investigator. An additional researcher was invited to join the team to coordinate the individual studies and their findings.

Two focus group discussions and 231 individual interviews were held involving 206 researchers, 15 executive managers and 10 national policy-makers. Six surveys were carried out to collect the views of researchers and faculty members on the issues connected with the study. In addition, a review of all available relevant documents was carried out.

The study sample consisted of policy-makers in the health and research sectors, researchers, faculty members of universities of health sciences, deputies of research in the provinces, directors of academic research centres, nongovernmental organizations, health related industrial companies and staff in management and planning organizations.

In Morocco, a steering committee was established to supervise the implementation of the study. It was composed of 14 members drawn from the Ministry of Health, the four faculties of medicine, the National Institute of Hygiene, Institute Pasteur, and the National Health Administration Institute. Before embarking on data collection the study team methodically identified the sub-dimensions or variables for each of the four functions of the national research health systems, the information sources and the methods for collection of information.

The methods used for collecting information were interviews, focus groups or workshops using the strengths, weaknesses, opportunities and threats (SWOT) analysis approach, separate questionnaires for institutions and

projects, perusal of documents and data searches to identify health research publications.

Eighteen interviewers were selected and trained. Structured interviews were held with 21 heads of organizations in charge of coordination and of research institutions and with representatives of nongovernmental organizations. Eight focus group/think-tank workshops were held involving a total of 94 participants. All institutions that were likely to do research were targeted and investigated except in Casablanca where the team used a purposive sampling method, using the range of research being conducted by them as criteria. Forty-seven institutions completed a detailed questionnaire. Questionnaires were also completed on the activities of 367 health research projects carried out between 1997 and 2001. Isolated activities not included in structured research projects, as well as routine data collection types of activities, were not included. A bibliographic study of papers published by Moroccan researchers in indexed journals between 1990 and 2002 was carried out. Around 20 documents on research in Morocco were examined. Prior to preparation of the final report a workshop was held to present the findings of the analysis and to obtain feedback from some of those who had participated in the study.

In Pakistan, data were collected through a survey of health research and health-related research institutions, interviews with key informants, and seminar discussions as well as through a search of literature and review of existing documents. Focal points were identified in the Pakistan Medical Research Council's research centres in each of the four provinces; due to the size of Punjab province two focal points were identified, one for the northern part and the other for the southern part. The focal points of the provinces were trained to administer the institutional questionnaire that sought information on the mission and objectives of the

institute, staffing pattern, information sources, budget, laboratory and other research facilities and details of research activities (research proposals developed and implemented, funds generated, publications etc).

Some of the key informants included participants in a seminar on health research systems, researchers with doctoral qualifications acquired abroad, who had previously been interviewed as part of another study funded by COHRED on the evaluation of research capacity development in Pakistan, and health managers and heads of institutions who had been interviewed for a European Commission funded concerted action project.

Documents on health and science and technology policies of the government, together with results of various health surveys, health research directories and other government reports relevant to national health research activities were examined.

In Sudan, the national team, composed of eight senior members of the health research establishment, decided to split the analytical work in three areas: analysis of the institutions involved in health research; the publication, dissemination and utilization of the results of research; the volume and impact of health research directed towards solving the problem of the least developed and poor communities.

For the first two study areas all the institutes in the country engaged in health research, including those in the health-related sectors (34 in number), were investigated, as were 14 of the 21 medical colleges (7 had been recently established so no research was being carried out). Ten interviewers were selected and trained to collect the information from the institutes using pre-coded questionnaires. Information was collected on functions of the institutes, such as documentation, dissemination and utilization of research, training activities, funding sources,

contributions of the community and the private sector and on the work environment and facilities for research.

Of the senior health policy-makers and managers, 11 directors of key directorates and of national programmes were interviewed using guidelines that were used to highlight research activities and the utilization of results for policy-making and/or programme implementation.

For the third area of analysis, the study team used an innovative approach. Five health problems (malaria, kala-azar, mycetoma, tuberculosis and endemic goitre) were identified as affecting marginalized communities. Considered a priority according to the national list of priorities and the annual statistical list, they were known to be associated with underdevelopment and poverty and had been investigated by the local research institutes. Subsequently, key published papers originating from the results of research carried out in Sudan on the prevention, diagnosis or treatment of these diseases were identified. All doctors present in the surgical and medical wards of seven major hospitals (known to receive the highest number of cases suffering from these five diseases) on the day of data collection were interviewed to determine if they had read the papers and, if so, whether they agreed or rejected the findings.

The questionnaires, guidelines for interviews, reports of focus group discussions and of workshops, details of sampling and statistical handling of collected data can be found in the final reports submitted by the country teams and can be made available for reference purposes.

5. Results

5.1 Parameters of analysis

About the time the analytical studies of the national health research systems were being planned the Department

of Research Policy and Coordination (RPC), WHO Headquarters, Geneva, launched a health research system performance assessment initiative as a means for generating information and analysis on the status of health research and eventually strengthening national research capacities.

Following a comprehensive literature review and an extensive consultation process, with more than 100 individuals from at least 40 countries actively contributing during 10 consultations and forums between March 2001 and June 2003, a conceptual framework and foundation for a health research system was published [5].

The framework proposes that the health research system has two complementary intrinsic goals: the advancement of scientific knowledge and the utilization of knowledge to improve health and health equity. It also proposes that the functions of an effective health research system include stewardship, financing, creating and sustaining resources and producing and using research. Each function is defined by several key operational components. A short description of the main attributes of these four functions is as follows:

- Stewardship: this includes definition and articulation of a vision for a national health research system; identification and adherence to appropriate health research priorities; setting and monitoring of ethical standards for health research; and monitoring and evaluation of a health research system itself.
- Financing: the securing of research funds and their allocation according to the vision and agreed priorities and accountable disbursement of funds is a central function of health research systems.
- Creating and sustaining resources: this deals with bringing new researchers and institutions into the system and further developing and sustaining the existing human and physical resources to conduct, absorb, and utilize health research as well as providing

appropriate facilities and a favourable and conducive environment for research.

- Producing, synthesizing and utilizing research: this refers to the publication of the results of research in scientific publications. It also includes communicating and promoting the utilization of research to inform health policies, strategies and practices within the health system.

As a component of this initiative, and again following extensive discussions, a set of core indicators had been drawn up as a standard to measure the functions of a well functioning health research system. A set of descriptive variables had also been identified to measure the different functions desirable from different country perspectives. The Islamic Republic of Iran and Pakistan had also taken part in a pilot study sponsored by WHO headquarters to test methods and indicators for analysing their health research systems. Therefore, in order to ensure some degree of comparability, the results from the five countries have been presented under the headings of the four functions but without using similar indicators.

5.2 Stewardship

Egypt

The research institutions included in this analysis belonged to several ministries, each of which has its own policy and plans for research. The Academy of Scientific Research and Technology, which is the leading science and technology institution in the country, comprises many research councils including one for health. The Academy of Scientific Research and Technology develops its own five-year plans for research and has long experience in evaluating proposals, contracting research and in monitoring research activities.

According to data received from the research institutes, about half of them have ethical committees for reviewing research proposals. Two-thirds of the remaining half reported following ethical standards in the research being carried out.

Several committees concerned with ethics exist in Egypt. In 1991, Al-Azhar University was the first in the country to establish an ethical committee. In 1996, a national committee on bioethics was established by a decree of the Minister of Higher Education and Research. It meets every month and its members are high ranking scientists drawn from different fields. It has a broad remit, is responsible for harmonizing national policies on bioethical issues, undertakes studies on a variety of ethical issues and has published several documents. Assiut University established an ethical committee in 2001, and in 2003 ethical review committees were established at the Cairo University National Research Centre and in the Ministry of Health and Population.

No formal process exists at the national or regional level for periodic priority-setting for health research. However, the research carried out in the institutes and by graduate students indicates that they deal with the country's major health problems.

At the institutional level a mechanism exists for the monitoring and evaluation of health research. The Academy of Scientific Research and Technology nominates mentors for periodic evaluation of its research projects. The research of individual researchers pursuing a postgraduate degree is evaluated through degree stewardship by supervisors and referees while permanent scientific committees of the Supreme Council of Universities judge the research performance of faculty members. Most externally funded research requires the researcher to submit regular progress reports, which are judged by mechanisms unique to each funding body.

In conclusion, it appears that there are a number of national agencies involved in funding and implementing health research, each with their own agenda and priorities. There is thus a need for all these agencies to pool their resources to produce a national master plan to meet the health research needs of the country. In this way the public funds would be focused on national priorities with little duplication of effort. Due to its eminent position the Academy of Scientific Research and Technology could be entrusted with coordinating the efforts for developing a master plan. Preparation of the master plan would also provide an opportunity to enrol stakeholders that are currently involved in the national health research system.

Islamic Republic of Iran

In order to identify bodies, roles and recent trends in policy-making, the national team examined relevant records and undertook structured interviews with 30 directors of medical research centres, 16 vice-chancellors of health in medical universities, 11 executive managers in the Ministry of Health and Medical Education, 4 persons in charge of policy-making, some current and former undersecretaries for research at the Ministry of Health and Medical Education and the current and former director of the medical commission of the National Research Council.

The following organizations are currently active in policy-making:

- The Islamic Consultative Assembly (Parliament);
- The Supreme Council for Cultural Revolution (headed by the President of the country); the function of the Council is to define broad policies in the field of higher education and culture;
- The National Research Council, which was appointed by the Supreme Council for Cultural Revolution in 1988 (though it has been in existence since 1975) and is the

chief policy- making body in the field of research. It exercises this role mainly through setting priorities;

- The Department of Research and Technology at the Ministry of Health and Medical Education;
- The Management and Planning Organization, responsible for compilation of the country's five-year economic, social and cultural development plans including setting the broad strategies for science and technology development;

The Department of Research and Technology at the Ministry of Health and Medical Education is the body that implements the policies through the Medical Commission of the National Research Council. The Department and to a lesser extent the research secretaries of the medical universities in the provinces are responsible for executive planning to realize the national health research policies.

It was interesting that during interviews with respondents different views were expressed about the extent to which policies influenced implementation plans. Some of the constraints included: inconsistency in policies; instability in administration; lack of conformity between policies and available facilities; lack of communication between researchers and policy-makers and the absence of suitable implementers for the policies. The national team felt that these would be resolved when a wide range of senior health professionals, with their deep understanding of health needs and of disease burden, were involved, because policies are evidence-based. However, there was no hard evidence to indicate this.

An attempt was made to define how a priority-setting mechanism was conducted in the universities, in research centres, in executive departments, how different stakeholders contributed to the process, what information resources were used, how consensus was achieved and what criteria were applied to set priorities. Data were collected from responsible persons from the aforementioned institutions and department

using a questionnaire based on COHRED module for priority-setting [6] with some modifications.

At the national level, three major priority-setting exercises took place during the previous decade. The National Research Council in 1993 conducted a poll of researchers and executives to determine criteria for setting health research priorities. This resulted in 18 criteria including items such as improvement of the public's health and of the environment and hygiene; improve productivity; fundamental values; long-term economic development; increase scientific and technological capacity; meet the country's needs.

The second exercise was undertaken by the National Research Council on three separate occasions in 1991, 1995 and in 1999 when a ranked list of health research priorities was compiled based on the opinions of researchers, experts and executives. The criteria used were: strategic and economic capacity building; maintenance and improvement of the health and well being of people; the improvement of scientific and technical capabilities; fundamental values and the utilization of local means and resources. In addition to the above, a priority disease had to fulfil further criteria: high prevalence and severity; the problem resolvable through existing means, falls with the framework of the national and Ministry of Health and Medical Education policies and was in line with international health care policies.

The third exercise was carried out by the Department of Research and Technology in the Ministry of Health and Medical Education in 1996 and was based on opinions of 43 researchers, experts and executives expressed during a two-day workshop. It used the following criteria: size and severity of the problem; public need; applicability; greater productivity and economic justification.

Of the 45 universities surveyed, 28 had conducted at least one priority-setting exercise. Those that had not carried out an exercise stated that their priorities were the same as

stated by the research secretariat of their parent ministry. Of the 53 research centres, 21 had never conducted a priority-setting exercise, 8 had used problems within the health research system as the basis of setting priorities. Fifteen out of 25 executive departments had conducted a priority-setting exercise. The remaining ten indicated that their priorities corresponded to those set by the Ministry of Health and Medical Education secretariat for research.

The study team concluded that at the national level, in the absence of wide dissemination of appropriately collected data, priority-setting based on the consensus opinion of a large number of knowledgeable experts can steer research in line with national interests and community needs. At the peripheral level, priority-setting is mostly based on local needs and issues. However, it should be noted that qualitative and quantitative techniques have not been used in these settings and the criteria used were diffuse, the one most frequently used was feasibility.

Regarding ethical aspects of health research in the Islamic Republic of Iran, the stress laid on religious and moral values in the country has underscored a need to apply appropriate measures to maintain human dignity and worth; thus medical ethics hold a lofty place. The creation of a centre of research in medical ethics in the department of cultural, legal and parliamentary affairs, in the Ministry of Health and Medical Education was a response to this need. This centre convened an international congress of medical ethics in 1993. It has published 30 books, including a comprehensive textbook of medical ethics that is used in all the medical schools.

The medical ethics research centre initiated a programme to enact a code of medical ethics to protect individuals from possible risks in medical research. A code of practice of 26 principles has now been established for medical scientists using human subjects for research.

Until 1988 the ethical aspects of research grants were assessed along with their scientific aspects by a single body, usually the institutional research board. In that year the Ministry of Health and Medical Education established a national committee of ethics in medical research. Its members include the undersecretary of research at the Ministry of Health and Medical Education, head of the National Research Council, head of the medical ethics research centre, a clergyman familiar with medical issues, two nationally well known scientists, an epidemiologist, a non-professional person familiar with accepted rules and mores of the society and a lawyer. A year later, the regional committees of ethics in medical research began to be established at medical universities and research centres. So far, ethics committees have been established in 38 out of 44 medical universities. The research centres follow the directions of the appropriate committees at the universities. By the end of 2002, 682 projects had been reviewed by the regional committees, about 95% had been approved and only one project was sent to the national committee.

A system for monitoring and evaluating health research exists in the country and involves the National Council for Research, Management and Planning Organization, the Under-secretariat for Research and Technology in the Ministry of Health and Medical Education, universities of medical sciences, medical research centres and international organizations for research funded by them. In 2000 the Under-secretariat for Research and Technology in the Ministry of Health and Medical Education was assigned the task of monitoring and evaluating the research activities of the medical universities. This is carried out twice a year, the reports are analysed and the universities receive written feedback. The points raised in the feedback are followed up during the subsequent evaluation. Items that are monitored include an assessment of the membership and functioning of

the ethics and research council, the approval process, the number of domestic multi-centre projects, collaboration with industry and other government departments, the number of proposals received and approved, the number of projects completed and reports duly submitted to funding bodies and details of training courses held.

There is a separate committee attached to the Ministry of Health and Medical Education that regularly assesses the quality of medical journals in the country.

In conclusion, an elaborate system was in existence to carry out the different operational components of the function 'Stewardship'. However, there was a need for clear articulation of the vision and goals of health research as perceived by the senior policy-makers in the country. These then should be made known to all the medical universities, research centres and researchers. In due time the monitoring and evaluation system could be improved by incorporating the indicators currently being developed and tested by WHO.

Morocco

Prior to embarking on a study of the main stakeholders in health research the study team outlined the functions and roles of the bodies involved in the national system of scientific and technical research. The national system of scientific and technical research is guided by different elements, such as the pronouncements of His Majesty the King, reports of special commissions, five-year plans, and the creation of a special programme for the support of research. The Permanent Inter-Ministerial Scientific Research and Technical Development Committee (PISRTDC), presided over by the prime minister, is the most important policy-making body. It suggests to the government the directions needed for promoting scientific research, for ensuring coordination and for follow up of research activities carried out by various government departments. It suggests how resources should be allocated to

different programme areas. The Ministry of State in charge of Scientific Research acts as the secretariat for PISRTDC and is responsible for developing and implementing government policy in the field of scientific research.

The Ministry of Higher Education, Professional Training, and Scientific Research develops and implements government policy in the field of higher and university education. The encouragement and establishment of fundamental and applied research is included in its mandate. The Hassan II Academy of Sciences and Techniques is a nongovernmental body under the authority of the King. It is responsible for promoting scientific research in national priorities and enabling scientific and technical research to be integrated into the national and international socioeconomic environment. The Mohammed VI Arabic Language Academy is responsible for planning and implementing a project aimed at improving the use of Arabic in different fields of science and daily life.

There are 15 universities, including some 70 faculties and schools and 4 university research institutes, and about 20 non-professional training establishments.

In addition there are 15 public research establishments under the guardianship of 10 ministerial departments. These include: the National Centre for Scientific and Technical Research under the administrative charge of the Ministry of Higher Education, Professional Training, and Scientific Research; the National Centre for Nuclear Energy, Sciences and Techniques and the University Institute of Scientific Research.

There are about a thousand research units located in around 118 establishments belonging to all sectors and of which 79% belong to the institutions of higher education. There are also 16 multidisciplinary and horizontal thematic networks of scientific research that were set by the Ministry of Higher Education, Professional Training, and Scientific

Research to steer research towards themes that have an impact on national development.

The national health research system is a part of this complex, interlocking system of scientific and technical research in Morocco. A written definition or articulation of a vision for a national health research system was not available. However, the people interviewed held the view that a health research system should have an identity that distinguishes itself from the national scientific and technical research system, and should be guided by a research policy derived from national health policies and priorities. The Ministry of Health should have a strong leadership role without 'suffocating' institutional and individual initiatives. The system should be well integrated with different entities acting independently yet connected through networks, multidisciplinary teams etc. It was felt that the research should be rigorous and regulated, guided by professionalism and ethical principles. It should be financed by public sources but also open to financing from the private sector and with international cooperation.

The study revealed that there were 60 institutions carrying out health research. Of these, 47 provided information on their research projects. According to the remit of the Ministry of Health, the responsibilities of its various departments does not specifically include carrying out or supporting research except for the Department of Financial Planning and Resources which is responsible for defining the sanitary direction of the country, to carry out sectoral and intersectoral studies for assessing the health situation and for promoting research. Some of the activities of the Department of Epidemiology and Disease Control with its responsibilities for evaluating the epidemiological characterization of the population can be classified as research.

Regarding international collaboration in health research, the international and multilateral organizations represented in

Morocco are not involved, except for WHO, as health research was not a component of their mission. Within the technical cooperative programme with France, priority has been given to developing poles of competence set up by the Ministry of State in charge of Scientific Research and the National Centre for Scientific and Technical Research. There is also an agreement between the National Centre for Scientific and Technical Research and the National Medical and Health Research Institute (INNSERM) of France.

Health research is carried out in two broad categories of institutions: research establishments that are also involved in teaching and training and are situated in the health services and those that carry out research and come under the universities and other sectors. The first group consists of the faculties of medicine, Pasteur Institute of Morocco, the National Hygiene Institute, the National Health Administration Institute, the National Centre for Reproductive Health and the National Oncology Institute. The second group includes certain centres that are exclusively research based, such as the National Centre for Scientific and Technical Research.

Within the health sector and according to the health planning document of the Ministry of Health for 1999 to 2003, research is considered as supporting public health activities, specifically for evaluating therapeutic efficacy and the control and prevention of epidemics. There is no functioning coordination mechanism for health research at the national level. However, 'coordination of research' is a stated function of some of the institutes such as the Pasteur Institute of Morocco and the Rabat and Casa university hospital centres. Temporary or informal coordination mechanisms are set up at institutional levels to facilitate implementation of research projects.

In the absence of a central coordinating body, priorities for health research have been identified by different bodies,

such as the life sciences committee established by the Ministry of Higher Education, Professional Training, and Scientific Research, the Ministry of Health and various institutes only in the context of their respective five-year plans. The directors of the institutes interviewed for this study were critical of this way of arriving at priorities without adequate preparation and involvement of all the concerned stakeholders. The priorities listed in the 1999–2003 plan of the Ministry of Higher Education, Professional Training, and Scientific Research include research on infectious and emerging diseases, genetic diseases, in traditional medicine and medicinal plants and on health and environment. The latest plan of the Ministry of Heath for 2004–2007 describes health research development as one of 11 strategic directions and proposes development of research on health systems and encouragement of regional research in collaboration with universities and specialized institutions.

There is no central system for monitoring and evaluating health research. A committee, based at the National Centre for Scientific and Technical Research, has been set up to evaluate research projects submitted for public funding through the different thematic scientific research support programmes. No formal mechanisms exist for follow up and evaluating the results of completed projects.

Ethical committees for biomedical research, created respectively in 1989 and 1987, exist in the Faculty of Medicine of Casablanca and Rabat. The Department of Epidemiology and Disease Control in the Ministry of Health was also known to provide ethical advice on conduct of epidemiological surveys. However, the study showed that no institutional mechanism existed at the national level for review of research proposals involving human subjects from an ethical standpoint. Neither have any national guidelines been prepared and issued. The scientists interviewed appreciated

the need for an ethical review mechanism at the national and institutional level.

Pakistan

In Pakistan, health research and health research-related activities are carried out by a large number of institutions, most of which are located in the health sector or the science and technology sector. However, there are others in the education, including the recently established Higher Education Commission, food and agriculture, population welfare and social sectors. Some research activities are also carried out by medical education, training and service institutions under the armed forces and by the nuclear medicine and oncology centres, established by the Pakistan Atomic Energy Commission.

Under the Pakistan Government's rules of business, the Federal Ministry of Health has the mandate for national planning and coordination in the field of health, for matters related to health professional training and education, vital health statistics and coordination with external agencies and has the administrative control of the Pakistan Medical Research Council (PMRC). The Ministry of Health has had the administrative control of PMRC since its inception in 1962 (except for 1972 to 1997 when PMRC was under the administrative charge of the Ministry of Science and Technology). However, stewardship of health research is not explicitly mentioned in the functions assigned to the Ministry of Health. The PMRC, being the lead agency in the national health research system, could be considered to be performing stewardship functions on behalf of the Ministry of Health.

The PMRC has developed collaboration with undergraduate and postgraduate medical institutions through establishing research centres with the assumption that, as these academic institutions have the human resources with a potential for engaging in health research, provision of

additional facilities, for example technical, laboratory, and secretarial, will promote the involvement of staff and students in undertaking health research. For a variety of reasons the establishment of these centres has not achieved the results expected of them. The Council maintains active linkages with policy-makers, planners and senior health managers through their representation in its Board of Governors and Executive Committee, and with the academia and health professionals through their participation in various technical committees and panels. Dissemination of information is achieved through the publication of a quarterly medical journal, annual reports, monographs and the organization of biennial medical research congress.

The Ministry of Science and Technology was established in 1972 and has several large organizations for research and development under its administrative charge. The national science and technology policy formulated in 1984 led to the establishment of a high powered commission on science and technology, headed by the prime minister, as the most important decision-making and coordinating body in the science and technology sector. The principal body for policy-making, planning and coordination in the science and technology sector is the Ministry of Science and Technology. The Pakistan Council of Science and Technology, which also serves as the secretariat for the National Commission on Science and Technology, assists the Ministry in formulation of policy and provides recommendations for the development and application of science and technology in the country.

During 2000 and 2001 the National Commission on Science and Technology undertook an evaluation of research and development organizations in the country, including those in the health sector. The evaluation of health sector institutions highlighted the following issues and deficiencies:

- The heads and senior faculty members of the institutions evaluated were generally found to be either unaware or

not very clear about the objectives, vision, mission and goal of their respective institution.

- A very small number of researchers/professionals with doctoral qualifications were found in the 44 institutions evaluated. Of the 116 candidates known to have been sent abroad for doctoral studies in health related subjects under the Ministry of Science and Technology capacity building programme 1985–1993, only 14 were found to be working in the surveyed institutions. None of the 13 candidates who had acquired doctorates in oncology under the programme were found to be serving in the Nuclear Medicine and Oncology Centres or any of the other institutions.
- A large number of posts (20%–42%) requiring higher qualifications were lying vacant.
- Library and communications facilities were extremely limited in all institutions.
- None of the institutes had adequate biomedical engineering facilities for repair and maintenance of their equipment and were dependent on the suppliers of the equipment or the private sector for this facility.

There are other major entities dealing with promoting and financing science and technology-related activities. The Pakistan Science Foundation was established in 1973 by an act of parliament as an autonomous body to promote and finance science and technology activities that have a bearing on the socioeconomic needs of the country. A National Commission on Biotechnology was established by the Ministry of Science and Technology in November 2001 with the objectives of monitoring new developments in biotechnology at the national and global level and to take steps for the speedy introduction and promotion of biotechnology at all levels of the government.

Regarding performance of research itself, research and development is being carried out by about 58 autonomous

and semi-autonomous organizations attached to the Ministry of Science and Technology and to various public sector ministries and departments.

Nearly all of these organizations have policy documents and plans, and statements about their national vision for research and development in their fields of responsibility, in their charters. However, as far as health research is concerned, there is no explicit vision or a national policy for health research formulated by all the stakeholders in the national health research system.

The PMRC has used data from a national health survey carried out with external assistance some years ago to determine priorities for health research. A more recent exercise was the organization of a seminar held in February 2001 to identify broad priority areas for health research. The Council was then working with different groups to develop disease specific priorities in the areas identified. Priority-setting has been attempted at provincial or at a still lower administrative level.

Regarding the existence of national ethical guidelines and of national and institutional ethical review mechanisms, the PMRC has established a National Bioethics Committee, which will develop guidelines for ethical review of research proposals and terms of reference for institutional bioethics committees. A private medical institution (Aga Khan University) has already taken a lead in establishing an institutional ethical review committee to examine a research proposal prepared by staff and students.

The PMRC, as a major funder for health research has its own internal system for monitoring and evaluation. It underwent a self-evaluation in 1995 and its centres were included in the Ministry of Science and Technology funded evaluation of the research and development organizations and institutions undertaken in 2001. However, formal mechanisms

for periodic monitoring and evaluating of health research at the national level are not in place.

In conclusion, it appears the situation of health research in Pakistan, in spite of a countrywide well-distributed infrastructure, has not kept pace with the significant developments that have occurred in the science and technology sector. Furthermore, the need and importance of health research as a tool for health development does not seem to have been fully recognized at a strategic national policy-making level. There is an absence of strong leadership and the base of stakeholders in health research is narrow. The PMRC has had difficulties in realizing its goals. This is mostly due to the chronic lack of financial resources and the constraints imposed by the imposition of government rules and regulations that have sharply restricted the recruitment and retention of qualified and productive researchers. The prevailing research environment is hardly conducive even for the well-qualified scientists to be productive.

Sudan

In Sudan, a National Research Council was established in 1970 under the Ministry of Higher Education and Research, with five specialized research subcouncils including the Medical Research Council. In 1972 the Medical Research Council established under its auspices an Institute and a Hospital for Tropical Medicine. In 1991 the National Council for Research became the National Research Centre and the subcouncils were renamed institutes. Within the health sector, the Institute for Tropical Medicine continued to exist.

In 1998, the Federal Ministry of Health upgraded its health systems research unit, which was established in 1996, into a fully-fledged Research Directorate. This directorate is guided by a multidisciplinary Research Council whose membership includes all the Directors in the Federal Ministry of Health, representatives from the State Ministries of Health,

medical school individual researchers, nongovernmental organizations and the community. The Research Directorate is responsible for formulating research policies and workplans, following up their implementation, facilitating collaboration between health and related sectors and ensuring optimal use of resources available for health research. It is also responsible for setting priorities.

The Directorate of Research, with support from COHRED, carried out an extensive priority-setting exercise during the late 1990s. A national health research conference was held in September 2000 where the outcome of the priority-setting exercise was presented. The conference endorsed the priorities identified and recommended that due attention be paid to capacity strengthening for health research, ensuring a commitment to the priorities commitment, to supporting operational research and promoting the utilization of research findings. By and large, the research priorities of most of the institutes included in this study coincided with the national priorities. However, it was found that communication on issues concerning priorities for health research, between the Directorate of Research, Federal Ministry of Health, State Ministries of Health and research institutes was weak. This meant that there were priorities identified by the Federal and State authorities that were not included in the list of priorities of the research institutes.

Soon after the conference a national ethical committee for health research was established. The universities of Gezira, Juba and Khartoum have research committees that receive research proposals for technical as well as for ethical review.

More recently a new Ministry of Science and Technology has been created and this may lead to a certain amount of restructuring of the organization of scientific research in the country. The country report did not mention its impact on the current set-up for health research.

5.3 Financing

Egypt

According to the estimates given by the national team, nearly two-thirds of the resources for health research are derived from national and external sources and about 14% is obtained each from the Academy of Scientific Research and Technology and the Ministry of Health and Population. The percentage of funds allocated by the Academy to the Medical Research Council during its five-year plans (starting 1982–1987) has varied, from 1.81% (EGP 1.8 million where US$ 1 is approximately equal to EGP 6.0) during the plan period 1992–1997 to 12.43% (EGP 2.4 million) during the plan period 1987–1992. No data were provided about the subventions from the Ministry of Health and Population. The paucity of data on financial resources underscore the need for carrying out a separate study on resource flows for health research by a group specially dedicated for this purpose.

Mechanisms to ensure transparency and accountability of research funds are clearly covered in the by-laws of the Supreme Council of Universities and through the national legislative mechanisms.

Islamic Republic of Iran

The flow of funds for financing health research from government resources increased substantially over 10 years from IRR 6982.2 million in 1991 to IRR 328 931.9 million (US$ 1 = IRR 8000) in 2001. Allocation from non-government sources (private companies, scientific associations and nongovernmental organizations) constitutes only a small proportion (3%–6 %) of the total funds for health research. In fact the contribution from non-government sectors decreased from 5.9% in 1991 to 2.7% in 2001.

The allocation to health research as a proportion of the total annual spending on health care and nutrition rose from

0.9% in 1991 to 2.5% in 2001 (Table 1). Funding for health research as a proportion of overall national allocations for research in general decreased from 8.93% in 1999 to 7.6% in 2001.

The proportion of total public funding for health research allocated to research priorities in the health system during the period 1997–2001 was found to be 5.76%. An explanation for this rather low figure was not provided in the report.

Health research funds in the government sector are distributed through medical universities, research centres, ministries and other governmental organizations. Between 1991 and 2001 the proportion of funds distributed through medical universities and research centres increased with a proportionate decrease in the funds distributed through ministries and other government organizations.

Morocco

At the macro level the share of GDP devoted to scientific research was 0.3% in 1998 and rose to 0.7% in 2002. The establishment in 1998 of Thematic Scientific Research Support Programmes (PROTARS), which run for 2 years and consist of around 28 research themes on which applications are invited, has provided additional resources for scientific research in the country. The allocation to health research projects has varied from 17 888 000 to 3 000 000 Moroccan dirhams (MAD), (US$ 1 = MAD 8.2) constituting 47% to 10% of the total amount available in each of the preceding four funding cycles of the thematic support programmes. The analysis of the national health accounts carried out in Morocco indicated that expenditure on training, research and education was around 1.3% of the total national health expenditure.

Table 1. Basic indicators of health research funding 1991–2001 (Iranian Rials)

Year	Nationwide funding for health research	Funding for health care and nutrition	GNP	Funding for health research as % of total health care funding	Funding for health research as % of GNP	Funding for health research as % of GDP	Funding for health research (US$ million ppp)
1991	6982.2	774 689.0	50 569 900	0.9	0.01	0.01	20.9
1992	12 438.3	1 105 886.9	62 977 200	1.1	0.02	0.02	30.2
1993	45 548.2	1 890 413.9	95 069 400	2.4	0.05	0.05	89.5
1994	31 008.5	2 563 122.4	124 498 000	1.2	0.02	0.02	49.3
1995	46 014.3	3 016 500.8	171 743 200	1.5	0.3	0.03	59.2
1996	103 560.4	4 789 189.5	237 759 700	2.1	0.04	0.04	107.8
1997	104 626.9	5 686 520.5	279 781 900	1.8	0.04	0.04	88.1
1998	133 191.1	6 725 968.5	317 665 200	2.0	0.04	0.04	90.8
1999	184 566.7	8 369 529.1	426 423 800	2.2	0.04	0.04	101.8
2000	206 067.9	10 188 952.5	570 006 400	2.0	0.04	0.04	91.9
2001	328 931.9	12 914 867.2	665 524 100	2.5	0.05	0.05	118.8

GNP Gross National Product

GDP Gross Domestic Product

PPP Purchasing power parity

Through the institutional survey the study was able to collect fairly detailed information on 367 research projects in 47 institutions. Out of 367 (83%) projects 306 had received financing of some sort. Out of these 306 projects, only 154 had provided information on the amount of funds received. The grand total of the funds received by these 154 projects was MAD 50 274 000 with the budget per project ranging from MAD 5000 to MAD 4 80 000 and an average of around MAD 326 450. With respect to the sources of financing, international support predominated (37%), followed by public financing (29%), mixed financing (28%), private only (3%) and other sources another 3%.

The distribution of financing for research projects was also analysed according to the category of the institution (Table 2), showing that a little over one-third of the funds were allocated to the exclusive research centres, followed by faculties of medicine and pharmacy and to university hospitals (15%), faculties of sciences (14%) and central administration (14%).

Table 2: Distribution of finance volumes according to institution type (*n*=154)

Institution type	Total (thousand MAD)	Global total of finance (%)	Accumulated (%)
Exclusive research centres	19 200	38	38
Faculties of Medicine and Pharmacy/University	7 710	15	53
Faculties of science	7 104	14	67
Central administration	6 952	14	81
Essentially but non-exclusively research institutes	3 191	6	78
Training and research institutes and schools	2 511	5	92
Science and technology faculties	2 373	5	97
International organizations	610	1	98
Faculty of law	325	1	99
Nongovernmental organizations	188	0	—
Military hospitals	110	0	—
Total	50 274	100	100

The distribution of funds according to disease categories was also analysed and is given in Table 3.

Table 3. Distribution of finance volumes according to the theme categories

Theme categories	Total (thousand MAD)	%	Accumulated (%)
External causes of mortality and morbidity	10 488	21	21
Infectious and parasitic diseases	9708	20	41
Organization of health services	6779	14	55
Diseases of the nervous system	5350	11	66
Diseases of the respiratory system	3252	7	73
Endocrine, nutritional and metabolic diseases	3198	6	76
Leukaemia and diseases of haemopoietic tissues and other organs	2755	6	85
Tumours	1419	3	88
Health-influencing factors and reasons for resorting to health care	1240	2	90
Plants	1173	2	92
Diseases of the genitourinary system	1045	2	94
Diseases of the eye and its accessory organs	1035	2	96
Diseases of the circulatory system	495	1	7
Pregnancy, labour and puerperium	400	1	98
Other	364	1	99
Congenital malformations and chromosomal abnormalities	289	0	—
Mental and behavioural problems	175	0	—
Diseases of the digestive system	100	0	—
Diseases of the musculoskeletal system	50	0	—
Total	49 315	100	100

It can be seen that over half (55%) of the funds were for research on external causes of mortality and morbidity, infectious and parasitic diseases and the organization of health services, stated to be priority themes, and about 27% for the so called chronic diseases while only 1% of funds were for research related to pregnancy, labour and puerperium. When the funded projects were analysed according to the broad categories of the type of research, it was found that nearly half of the projects were of applied nature and where clinical and epidemiological research predominated. Research on health care systems constituted about 10% of the projects.

Pakistan

Funding for health research and related activities is divided between different administrative entities. As with many other developing countries it is difficult to get estimates even of the total funding.

While the allocation for health research grew from PKR 96.771 million for 1988–1989 to PKR 177.555 million (US$ 1 = PKR 58) for 1994–1995, it still remained a small proportion of the overall government allocation for science and technology (Figure 1).

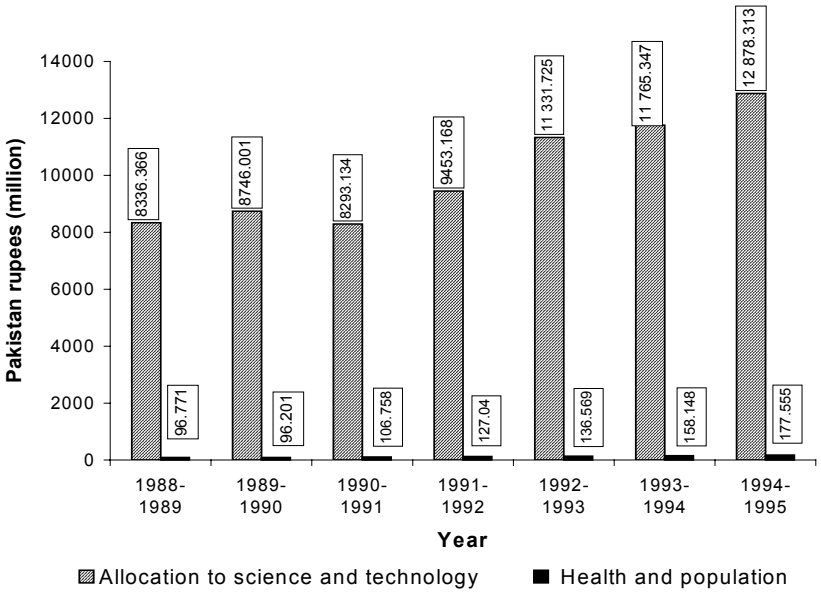

Figure 1. Allocation to health and population out of science and technology funds

The PMRC receives a regular annual grant from the government. Since 1997 this has been through the budget of the Ministry of Health. The trends in the allocations to the PMRC from the Ministry of Health's budget for the last 25 years are given in Figure 2.

The total public sector expenditure on health during 2002 and 2003 was PKR 28 814 million, amounting to 0.78% of the GDP. The corresponding figures for the year 1996–1997 were PKR 18 342 million and 0.75%. The national health expenditure as a percentage of GNP was 3.5% in 1999.

From time to time the council receives a block allocation from the government for funding research in specific priority areas. During the period 1994 and1998 a sum of PKR 70 million (US$ 1.8 million at the exchange rate at that time) was made available for health systems research from the World Bank and International Development Association funded Family Health Project 2. The PMRC invited proposals and helped researchers develop them through orientation and proposal development workshops. By the end of the project period, 105 proposals had been developed but only 35 were

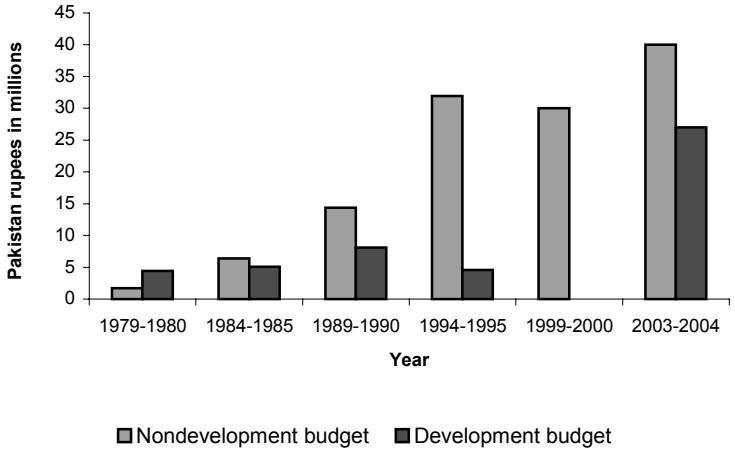

Figure 2. Trends in the allocations to the PMRC from the Ministry of Health budget (1979–2004)

approved for funding by the project's independent technical committee at a total cost of PKR 25 million. This experience underscored the lack of capacity to absorb a large infusion of funds.

Another externally funded health programme that had an allocation for research was the Child Survival Programme and the Acute Respiratory Control Programme. Under the former, a four-year research capacity development project was implemented with the Harvard Institute of International Development where many different projects were developed and funded.

An important piece of legislation was introduced in 1978, under which the Ministry of Health has been collecting a levy of 1% on the gross profits of the country's pharmaceutical industry for research on drugs. This levy is credited to a central drug fund. The utilization of this fund has been minimal because it is insufficiently advertised by the concerned department in the Ministry of Health which insists on keeping the fund restricted to drug research only; even so funding has been provided to about half a dozen projects.

Sudan

The country report does not provide any quantitative data on the current or recent allocations for health research. In general the funding of health research is said to be poor and many of the research institutes included in the analysis suffered from a lack of funds. The main sources of funding are the government, followed by United Nations agencies, regional agencies and lastly the private sector. Regarding local sources: of the 26 research institutes investigated 13 received government funding, 9 from private sector including corporations, 3 from the local community and one from nongovernmental organizations. Eight institutes received funding from United Nations agencies, 4 from regional agencies (not specified), one each from the European Union

and the World Bank and another one from an international nongovernmental organization. The source of research financing for departments in the universities was meagre (again no figures have been provided) and only less than one fifth of the departments received some financing from their respective universities. Hardly any contribution was forthcoming from the federal or state ministries.

5.4 Creating and sustaining resources

Egypt

Using questionnaires and interviews the Egyptian team collected information from 42 out of the 49 health research institutions (reasons for non response from seven institutes were not given) and from 9403 researchers. Presumably these researchers were working in or were associated with the 42 institutes included in the sample. The proportion they constituted of the total human resources currently engaged in health related research in the country, or how this compared with the situation five or ten years ago, was not mentioned.

About half the institutions have current research plans and slightly less than half have future research plans. Nearly 80% of the institutes have access to the internet. No information was provided in the final report on the existence and maintenance of research facilities appropriate to the mandate of each of the institutes. Presumably they were considered adequate. An analysis of the specialties of researchers working in these institutes showed that the majority belonged to public health, tropical diseases, parasitology, microbiology and paediatrics, followed by pharmacology, obstetrics, medicine and surgery. Nursing was least represented.

The fields of research in the different institutions were classified as communicable diseases, noncommunicable diseases, risk factors, clinical, experimental, pharmacological

and health systems research. An analysis of research, carried out during the past five years in the institutes included in the sample, showed that 12 (28.6%) of them had been engaged in research on communicable diseases, 7 (16.7%) on noncommunicable diseases, 2 (4.8%) on risk factor-related research, 6 (14.3%) on clinical research, 1 (2.4%) on experimental research, 2 (4.8%) on pharmacological research, and 12 (28.6%) on health systems research. Figure 3 shows the fields of research being carried out by researchers included in this analysis. The majority were involved in clinical and experimental type of research. Information on the fields of research projected during the coming years showed that the quantum of research in communicable diseases and in health systems research would be around the current levels while risk factor related research was expected to grow. This is as expected because the share of disease burden due to noncommunicable diseases is likely to grow.

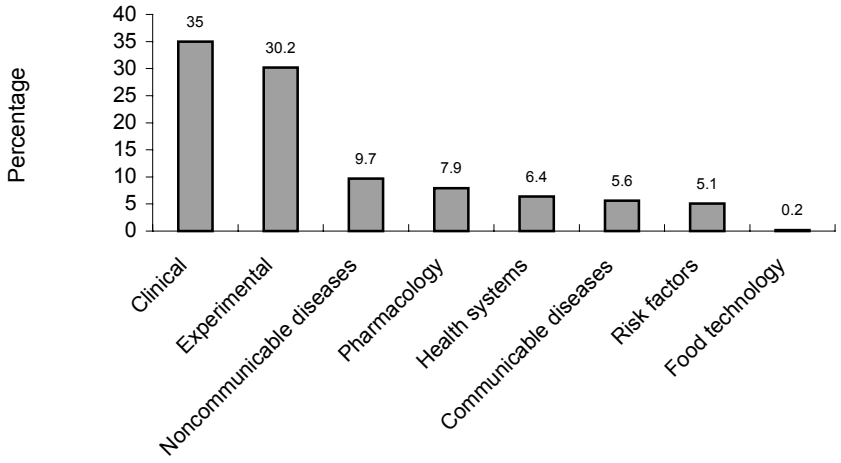

Figure 3. Fields of health research in Egypt, 1997–2001

Table 4. Number of researchers according to qualification

Scientific degree	Number	%
Doctoral degree	3314	35.2
Master degree	2852	30.3
Diploma	821	8.7
Bachelor	2416	25.7
Total	9403	100.0

Table 4 shows the number of researchers according to their qualifications. Figure 4 compares the fields of research being carried out by researchers pursuing a postgraduate degree (masters or doctoral) with those not pursuing a degree. It appears that the degree-oriented research was approximate to that not aimed at a degree, except that degree-oriented researchers were carrying out more clinical research. When degree-oriented researchers (3440) were classified according to the region where they were pursuing their research, 1117 (32.4%) were from Upper Egypt followed by 1044 (30%) from Greater Cairo.

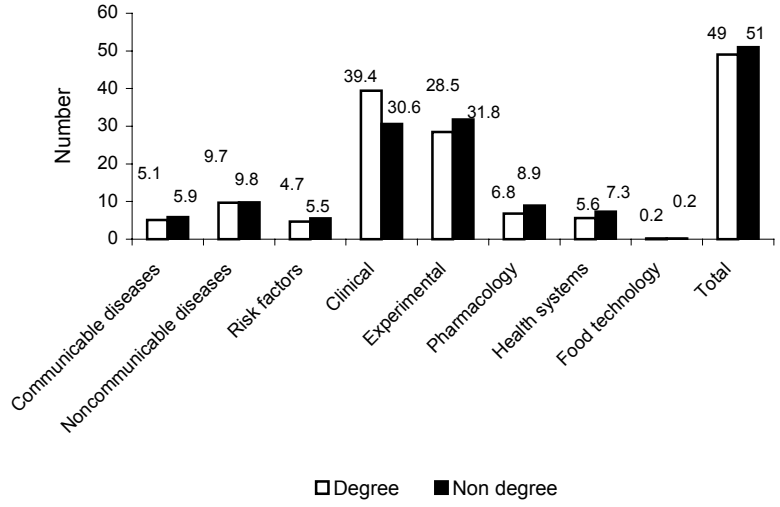

Figure 4. Fields of degree-oriented research versus non-degree research in Egypt, 1997–2001

Table 5. Degree-oriented research in the universities compared to that of the Ministry of Health and Population, Egypt, 1997–2001

Research fields	Universities		Ministry of Health and Population		Total	
	Number	%	Number	%	Number	%
Communicable diseases	151	4.93	26	6.99	177	5.15
Noncommunicable diseases	306	9.99	24	6.45	330	9.61
Risk factors	145	4.73	18	4.84	163	4.75
Clinical	1282	41.85	74	19.89	1356	39.48
Experimental	787	25.69	194	52.15	981	28.56
Pharmaceutical	214	6.99	21	5.65	235	6.84
Health systems	177	5.78	14	3.76	191	5.56
Food technology	1	0.03	1	0.27	2	0.06
Total	3063	89.17	372	10.83	3435	100.00

Table 5 compares the fields of degree-oriented research in the universities compared with those being carried out by staff in the institutes under the Ministry of Health and Population. Most of the research by the Ministry of Health and Population is of an experimental/interventional nature whereas in universities the majority of research is clinical.

The national team analysed the fields of research being carried out both by degree-oriented and non-degree-oriented researchers, according to topics. It showed that among the communicable diseases diarrhoea was the most common topic, followed by hepatitis and schistosomiasis. In the field of noncommunicable diseases, most of the researchers were focusing work on topics connected to reproductive health followed to a lesser extent by cancer, psychiatry and occupational hazards. Similarly, in the field of risk factors for noncommunicable diseases, dietary habits was the commonest topic followed by environmental risk factors, lack of exercise and tobacco consumption. In the broad field of health systems research, nearly 82% of the research was in the area dealing with management, followed by research on topics dealing

with social sciences and only 2% focused on health economics. The analysis on the researchers mentioned was not broken down according to gender so it was not apparent whether there were any differences between the two in the selection of research areas or topics.

Under the function 'Creating and sustaining resources', no information was available on the drain of qualified health personnel (within or outside the country) and on whether there were any problems in retaining motivated and productive researchers on public sector salaries. Also missing in the report was any mention about the linkages and interactions between the various research institutes and the existence or otherwise of functioning research networks within the country.

Even though no systematic priority-setting exercise appears to have been undertaken at the national level, the analysis of the type of research being carried out in institutions and by researchers does indicate its relevance to national health problems.

Islamic Republic of Iran

The national team investigated the background of researchers, limitations on research, capacity-building in the health research system and networking. They used questionnaires, interviews and perused existing documents. Nearly all health research in the country is being conducted in medical universities and other institutions affiliated to the Ministry of Health and Medical Education. Table 6 gives a breakdown of the staff in the medical universities and institutions according to their academic rank and by age and sex.

In 2001, of the 11 024 research faculty staff in the medical universities and organizations affiliated to the Ministry of Health and Medical Education, 68% were men and 32% were women. Most of the researchers, 37.6%, were under the age of 40, 33.5% were between 40 and 49 years, 19.3% between 50 and 59 years and 4.6% were 60 years and above. Faculty

members were surveyed in 42 medical science universities and institutions. Eight universities were later withdrawn from the study, as they were small educational centres rather than universities. A 5% sample was drawn from the eight large universities and from the rest of the universities half were chosen and 10% of their population was selected as a sample of the population. The response rate in Tehran province was 60% but in the rest of the country it exceeded 90%.

A number of respondents in the institutions expressed their satisfaction about the quality of various training courses that had been offered in the field of research methodology during the last three years. Regarding access to information and to the internet, all researchers thought that on an average 33.8% of the requested journals were available in the relevant university or research centre library. From the sample, 18.4% of researchers felt that they had access to at least three quarters of the journals needed, 85% of the researchers had access to Medline on CD and to other related data banks and a similar proportion had access to the internet at work. Nearly 62% had access to the internet both at work and home. Only 3.7% had no access to the internet. There was very little communication between domestic researchers and foreign scientists.

The national team also investigated rules, incentives, values and socioeconomic conditions that facilitated or constrained the research process. They did so by personal interviews and postal questionnaires in a survey of 2% of faculty members and researchers in health-related fields. A large number and wide variety of responses were obtained through these two means. They could be summarized as: the inability or unwillingness to work together; lack of means necessary to carry out research; restrictive financial and administrative regulations, lack of university autonomy and weak management of scientific affairs. A major constraint was the researchers' own low expectations that their findings would be applied.

Table 6. Faculty makeup (by academic rank) of medical universities in Islamic Republic of Iran (academic year 2001–2002)

		Professors	Assistant professors	Fellows	Lecturers	Senior tutors	Tutors	Unspecified	Total
Medical universities	Tehran	164	423	2647	1370	17	—	13	4634
	Other provinces	100	293	2569	1642	68	3	35	4710
Ministry of Health and Medical Education-affiliated bodies		2	10	133	67	—	—	—	212
Ministry of Health and Medical Education total		266	726	5349	3079	85	3	48	9556
Non-affiliated medical universities		18	49	793	596	3	—	9	1468
Total		284	775	6142	3675	88	3	57	11024

Regarding capacity-building in the health research system, the study attempted to obtain information on courses about research training (methodology, statistics and epidemiology) and the kind of dissertations that were being prepared by postgraduate students during the year 2000 to 2001. Review of the data from nine medical universities indicated that there were 4 to 6 credits for research training and 6 to 8 credits for courses on introducing fieldwork. A review of 337 residency dissertations in four faculties (Ahwaz, Hamedan, Mazandaran and Tehran) showed that 90% were applied, 7.4% were fundamental/applied and 2.4% were purely fundamental.

During 1997–2001, the number of students admitted in doctorate and masters degree programmes with a health research component, were respectively 44 and 216.

The national team carried out a detailed analysis of the functions and duties assigned to the organizational entities (executive organizations, research centres, researchers, funders, managers and users) involved in health research within the country to determine the nature and degree of cooperation and coordination between them. The Department of Research and Technology at the Ministry of Health and Medical Education and the offices of vice-chancellors for research in the medical universities play a critical role in ensuring harmony and cooperation between medical universities and research centres. The researcher's contact with the university department of research only occurs if the budget for their research proposal exceeds 15 million Iranian rials. For projects with lower budgets the relevant department intercedes. In all universities, it is the university research council that makes final decisions on approving projects. Thus it appears that through a system of cross representation in committees guiding research in universities and research centres, there is a lot of cooperation and coordination.

Regarding the role of research centres, their goals include cooperation between the different centres and the executive bodies within the country. In research centres affiliated to medical universities, the vice-chancellor for research is a member of the governing council of the centre. At research centres that are not financially independent the vice-chancellor for research of the affiliated university acts as the sponsoring agent. Joint projects between universities and research centres and collaboration in training activities further cement the relation between these two organizational entities.

Currently there are five 'official' research networks in the country, functioning under the supervision of the Department of Research at the Ministry of Health and Medical Education. The networks deal with molecular medicine, biotechnology, herbal medicine, reproductive health and cardiovascular diseases. The other networks are 'unofficial' and include joint programmes with foreign universities and research institutes.

Morocco

The Moroccan report includes a detailed analysis of the 367 research projects implemented over the last five years in the 47 institutes included in the institutional survey. Table 7 shows the distribution of projects by institutional category.

The faculties of medicine and the university hospitals, which constituted 17% of the institutions, contributed to around one-third of the projects, followed by the faculties of sciences with 21%. About 53% of the projects, were initiated by individuals (most of whom were based in universities) versus 36% that were initiated by institutions themselves (mostly administrative bodies). Information on the research themes covered by the projects has already been mentioned under the section on 'Financing').

Table 7. Projects and financing by institution categories

Institution categories	Number of projects	Financed projects		Non-financed projects	
		No.	%	No.	%
Faculties of medicine and University hospitals	123	79	64	44	36
Faculties of science	76	73	96	3	4
Institutes and centres carrying out research	43	39	91	4	9
Science and technology faculties	36	27	75	9	25
Research only institutes and centres	28	27	96	1	4
Central administration	27	27	100	0	0
Training and research institutes and schools	13	13	100	0	0
Law faculties	7	7	100	0	0
International organizations	6	6	100	0	0
Nongovernmental organizations	4	4	100	0	0
Military hospitals	4	4	100	0	0
Total	367	306	83	61	17

The type of research projects carried out by the institutes surveyed tended to match their nature and mandate. In other words, the faculties of medicine and university hospitals work very little on health systems on which research is mostly carried out by central (health) departments

Regarding the alignment of research projects with national priorities (as given in the last 5-year planning document of the Ministry of Higher Education, Professional Training, and Scientific Research and also evident from the data shown in Table 7) 43% of the projects corresponded to research priorities and 52% could be considered as part of the health programmes. However, there was a poor relationship between them since only 18% of the projects corresponded to both health and research priorities.

While collecting data on human resources for health research, the country team encountered some ambiguities and problems in defining who was considered a researcher. The

workforce employed by the higher education and research institutions outside the health sector does research in areas other than health and it was difficult to know what proportion was involved in health research. On the other hand, professionals who do research in institutes, like the Pasteur Institute and the National Institutes of Hygiene and Health Administration, are not recognized as researchers and have a different status. In other words, there was confusion between administrative status and the job done or the status of the professional.

A total of 11 268 researchers in 136 institutions were surveyed. Some of the constraints faced by the researchers are:

- the lack of health researcher status for those working in non-university establishments and the fact that openings in faculties of medicine are closed to them;
- lack of recognition for scientists recruited by the Ministry of Health and poor integration;
- inability of clinicians to participate in research because of heavy workloads;
- meagre support for researchers to take part in conferences and for continuing education;
- difficulty in forming multidisciplinary teams needed for certain areas of health research;
- internal and external drain of qualified health personnel;
- difficulty in establishing dialogue and links between diverse but potential health researchers, such as between biologists and clinicians and between researchers based in universities and in Ministry of Health establishments;
- lack of horizontal mobility for researchers;
- poor orientation of dissertation subjects to public health problems and to the epidemiological transitions that the country is undergoing.

Investigation of the opportunities provided by institutions for research training showed that 36 out of the 41 institutions surveyed offered research training of various

types. Training for Diplôme d'études supérieures approfondies (DESA), Diplôme d'études supérieures spécialisées (DESS) and for doctorates was being provided respectively by 50%, 53% and 64% of the institutions. In addition, short-term training such as seminars, regular courses and certificates are offered by 83%, 44% and 25% respectively. The ongoing research projects were also considered as an important source of training. Of the 367 projects surveyed, 40% gave training in research methodology and 33% offered placements.

Two networks were in existence. One dealt with aromatic and medicinal plants and the other with neurogenetics. These two networks bring together some 20 teams consisting of about 180 researchers from a dozen different disciplines.

Interviews with heads of institutions included in the survey revealed that three-quarters of them were satisfied with the equipment in their institutes but felt that lack of maintenance was a problem. Of the institutes 86% had a documentation centre that was being managed in two-thirds of the cases by documentation specialists. The average number of subscriptions to international journals was 40 and ranged between 0 and 200. Access to computer and internet was available in nearly all institutes.

In conclusion the Moroccan researchers did not appear to face any problem with research equipment and access to information.

Pakistan

In 1947 when Pakistan became independent there were only two undergraduate medical colleges within its territories. However, by the end of the 1960s several other medical colleges and institutions had been established and in the 1990s there was a further expansion in the number and range of medical institutions and colleges when the private sector

entered the field of medical education. The armed forces have established many institutes and the Pakistan Atomic Energy Commission has so far set up 27 nuclear medicine centres. However, not all these institutions have either ongoing research or the potential for undertaking it. As a means to promote research, the PMRC has established research centres in nearly all the public sector undergraduate medical colleges and postgraduate medical institutions and at the National Institute of Health, Islamabad.

As mentioned under the methods section information was collected from a total of 261 institutions. Table 8 shows their distribution by province and type. The majority (190) of these were public sector institutes, 37 were private sector profit generating and 34 were private but not for profit institutes. For the purposes of analysing the findings of the institutional survey, the institutes were categorized as:

Table 8. Distribution of institutions surveyed by province and type

Province	A	B	C	D	E	F	G	H	I	Total
Baluchistan	1	—	2	—	8	1	1	1	8	22
Federally Administered Tribal Areas (FATA)	—	—	—	—	3	—	—	—	—	3
North-West Frontier Province (NWFP)	15	—	7	6	40	5	3	2	39	117
Sindh	5	4	3	—	9	—	3	2	5	31
Punjab	11	1	14	1	27	—	5	2	12	73
Islamabad	1	—	—	—	1	—	1	—	12	15
Total	33	5	26	7	88	6	13	7	76	261

A: Universities and departments

B: Postgraduate medical institutions

C: Undergraduate medical colleges

D: Nursing colleges

E: Hospitals

F: Provincial and district health centres

G: Pakistan Atomic Energy Commission's nuclear medicine centres

H: PMRC's research centres

I: Other research institutes and centres.

- Category A: undergraduate and post graduate teaching and training institutes including the PMRC research centres (60);
- Category B: centres of excellence in specialized areas of medicine (3);
- Category C: institutes of public health (3);
- Category D: institutes/centres of nuclear medicine and oncology established by the Pakistan Atomic Energy Commission (13);
- Category E: allied institutes including institutes in the public and private sectors that were largely carrying out training and providing medical services and some research (146).

The following are some of the salient findings from the institutional survey.

- As an indicator for judging the potential for research leadership, the qualifications of the current heads of the institutes surveyed were determined. Of the heads of the institutes in category A, 52% had a higher medical degree and 11.5% had doctorates. Only 29% of the heads of allied institutes in category E had doctorates and 8.7% had higher medical degrees. The survey indicated that the vast majority of faculty members in clinical sciences had higher diplomas in their speciality, but in the basic sciences there was a shortage of well-qualified faculty members.
- Regarding the clarity about the objectives and functions of the institutes, only 18.3% in category A had adequately formulated objectives with 5 institutions mentioning research as one of them. In the same group the clarity of functions was present in only 11.7%.
- In category A, computers were available in 48%, 40% had access to internet and 58% had their own websites while in category E the corresponding figures were 44%, 48% and 18.2%.

- All of the institutions had allocated large spaces for their libraries. However, only one of the institutions in category A had a substantial (320) number of journals and had access to Medline. The number of journals in the rest varied from 0–100 and none had modern information technology (IT) facilities installed exclusively for library use. The library in the head office of the PMRC is being developed as a health information resource centre with support from the information technology division of the Ministry of Science and Technology.
- Well-equipped laboratory facilities were present in most of the institutions but their utilization for research was minimal. None of the institutes had adequate facilities for repair and maintenance of equipment.
- Nearly all the institutes of different categories had national linkages. Those in category E had the lowest linkages (53.4%). Except for the centres of excellence and institutes of public health, about one fifth to a quarter of institutes in all categories had international linkages. The nature of these linkages and the extent to which they were research-oriented has not been spelled out in the report.
- The budget of the institutions did not include any allocation for research directly or indirectly.

The National Institute of Population Studies (NIPS) and the National Office of the Population Council in Pakistan were carrying out health research but were not included in the survey. The NIPS was established in 1990 under the auspices of the Ministry of Population Welfare and is responsible for providing demographic and health indicators to monitor population planning activities and to provide research based support to population welfare and the reproductive health programme. The activities of the National Office of the Population Council (a large United States based

nongovernmental organization) include using research to improve understanding of the impact that reproductive health and gender have on population. Research is seen as a basis for improving programmes.

Regarding the position of human resources for health research, Figure 5 shows sectorwise distribution of the available manpower for science and technology in Pakistan according to data compiled by the Pakistan Science Foundation in 1998. Medical scientists constituted only 7% of the science and technology manpower. The shortage of researchers is not because of any lack of efforts to develop research capacity in the country, which has been promoted and supported by national and international organizations. From 1985 to 1993, the Ministry of Science and Technology, under a government-funded programme, financed 1125 scientists training for doctorates in universities abroad. Among these were 116 enrolled for doctorates in health and health related sciences.

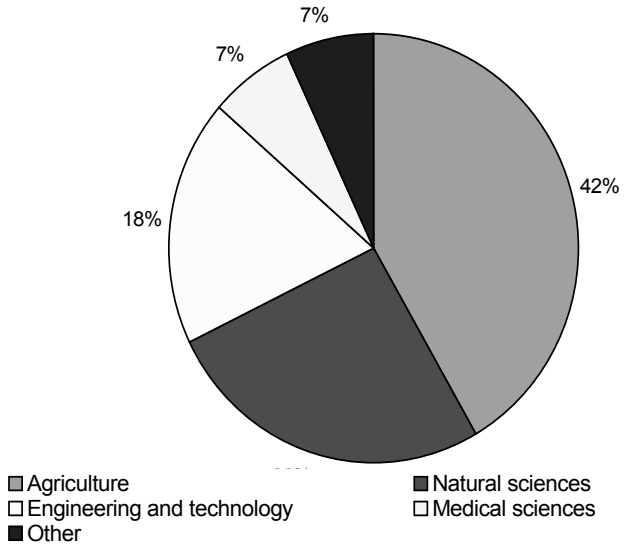

Figure 5. Sectorwise distribution of science and technology manpower *n*=14 576

The PMRC had undertaken a study to evaluate the impact of research capacity development programmes of the country. The study surveyed the health sector institutions for scientists with doctorates from universities abroad and identified 54 such professionals, 4 of whom were women. They had an average of 5.7 years job experience before being sent abroad for training for an average period of 4 years. These researchers had an average of 15 publications per person and have trained an average of nine students per researcher since returning to Pakistan. The respondents indicated a lack of academic liberty and incentives to sustain their research efforts and recommended autonomy in work and provision of facilities to stimulate their contributions. The study reflects the complex issues facing highly trained researchers who have returned to Pakistan and are attempting to pursue their careers [7].

Sudan

Using questionnaires and interviews, the national team investigated 28 out of the 34 national institutes engaged in health research, 159 departments in 14 universities with some ongoing health research and covered 15 directorates and programmes in the Federal Ministry of Health.

Of the 28 institutes covered in this study, 14 were research and clinical institutes, 12 were involved in health-related research and 2 were postgraduate training centres. All the research institutes shared similar objectives. Apart from carrying out research, they provided training and service in their mandated area of expertise. Research was being carried out in areas such as biomedical, clinical, epidemiological, health systems research, genetics, herbal medicines and zoonotic diseases. The majority of institutes were small establishments. Only 5 (18%) of the institutes had more than 9 departments, 10 (36%) had only 2 departments and the remaining 13 had between 3 and 8 departments. The

Table 9. Number and qualification of researchers in research institutes, Sudan 2002

Number of researchers	Number and percentage of institutes
Up to 10	15 (53.6%)
11–20	4 (14.3%)
21–30	4 (14.3%)
31–40	2 (7.2%)
Above 40	3 (10.7%)
Qualification of researchers	**Number and percentage of researchers**
Bachelor of Science	18 (15.7%)
Masters degree	44 (38.3%)
Doctorate	53 (46.1%)
Total	115 (100%)

distribution of researchers according to their numbers and professional qualifications is given in Table 9.

Three-quarters of the institutes kept their records in computers. Nearly all the institutes had library facilities. Access to the internet was available in 19 out of the 28 institutes and 13 had their own websites.

Out of 14 universities 159 departments were investigated. Slightly less than half conduct health research. The majority of the departments were engaged in basic, clinical and epidemiological research. A small number were involved in social and economic research. Of the departments, 69% had their own library and only a third subscribed to periodicals, 60% of them had access to the internet and about 20% had established websites. The background of researchers shows that a third each were staff, postgraduates and undergraduates. Lack of funding and the absence of an environment conducive to research prevented the staff from being more actively involved in research. Their main contribution to research was their supervision of postgraduate students.

Figures on the output of health researchers (masters and doctors) produced per year were not provided. However, more than 50% of the university departments organized

courses in research methodology for their undergraduates. About 9% of the departments taught more than 60 hours of research methodology.

Regarding collaboration with other institutions, 22 out of 28 institutes had collaboration with institutes abroad while 24 collaborated with other institutes within the country. The nature of collaboration included participation in joint research projects, joint publications, training, financial support and networking. No information was given about functioning networks within the country.

On account of the politico-economic situation prevailing in the Sudan over an extended period, the country is known to have suffered from a massive drain of qualified health personnel. With the improvement in the political and economic climate, there is an impression that this situation is being reversed with most of those returning joining the private sector. However, no reference was provided in the report in this respect.

5.5 Producing and using research

Egypt

According to the analysis of the national team, nearly all (96.7%) of the research carried out by individual researchers is published. Most (89.2%) of the results are published in local journals, 7.3% in international and 3.5% in regional journals. Regarding the means of disseminating the results of research, nearly 70% of the institutes hold annual scientific conferences. Apart from this there were few means for disseminating results of research to fellow scientists in different institutions in the country.

In the opinion of the heads of institutions included in this study, research on communicable diseases and health systems research was most likely to have an impact on health development. However, no mention was made of any

mechanism or strategy to promote the utilization of research to inform health policies and practices within the health system. The local newspapers and magazines do publish health-related articles as a means of informing the public on significant health problems and issues but no data were provided in this respect.

Islamic Republic of Iran

A survey was carried out of the database of research projects maintained by the Department of Research and Technology, Ministry of Health and Medical Education, for 1999 to 2001. Figure 6 shows the distribution of research studies for the three years. The database classified the registered projects as epidemiological, health systems research, fundamental, manufacturing, clinical trial or unspecified. Of the studies 20%–38% were related to basic science and 14%–16% were in the field of health systems research.

In terms of methodology used, an attempt was made to classify the studies for the period 1999 to 2001 as case-control, experimental, descriptive, cohort or unknown in nature. It was found that the commonest type of study was descriptive (50%–62%), followed by experimental. Case-control and cohort studies were the least common.

Interviews were held with a group of highly productive researchers, who had completed on average a dozen studies during the preceding five years, to solicit their views on the classification of research studies. Most of them agreed with the need for classifying studies but less than half agreed with the current classification. This group was also asked about sources to identify the need for research. According to them the most important source for identifying research needs were the respondents themselves, their colleagues and their students.

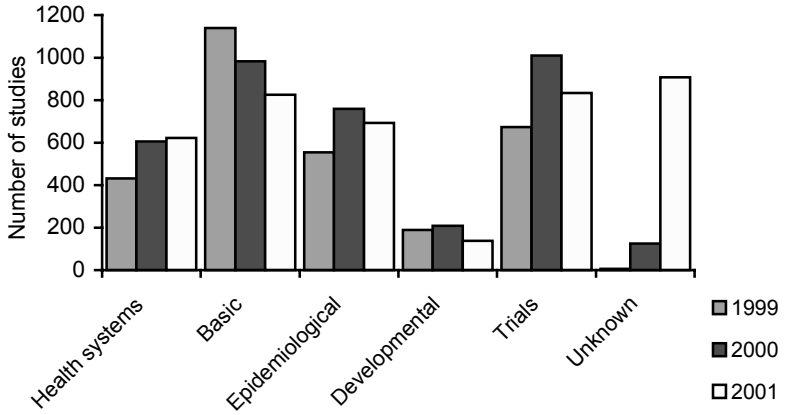

Figure 6. Distribution of research study type (1999-2001)

Regarding dissemination and utilization of research results, according to information obtained from the medical journals' commission, the number of licensed journals has increased from 25 in 1997 to 69 in 2001. All these journals are peer reviewed but none of them is indexed in ISI although 5% of the journals are being cited by other databases. The total number of articles published increased from 888 in 1999 to 2169 in 2001.

In order to obtain an idea of the type of articles being published, a survey of articles published in the autumn of 2000 showed that out of a total of 250 articles, 17 were reviews, 204 were original research papers and 29 were case reports.

The ISI and PubMed databases were used to determine the number of articles whose authors were residing in the Islamic Republic of Iran. In 1992, 61 articles were published in PubMed indexed journals with an average impact factor of 1.131 ± 0.940. This figure rose to 178 in 1999 with an impact factor of 1.407 ± 1.046. The number of articles published in ISI indexed journals was 107 and 206 for the years 1997 and 2001

respectively. To assess the communication of research results in communication media, it was found that during one year, 17.4% of magazines (frequency of publication not specified in the report) had a constant column or section on health issues. In addition there were 16 radio and 11 television programmes that discussed health issues.

To promote utilization of research results, the government recently (October 1999 and October 2000) issued decrees about establishing policy-making councils for applicable research in medical universities in order to promote public health related research whose results could be applied readily

Information was obtained from the companies registration bureau about the inventions patents registered in the country and abroad. In 1997, 84 inventions were registered locally and 172 abroad; the corresponding figures for 2001 are 529 and 352. There was no evidence to indicate the proportion of inventions based on research results.

The national team was able to identify 13 research studies that led to an improvement or changes in the health system. Also, about 20 national guidelines for use in the health system have been reformulated based on outcomes of locally conducted research.

Morocco

A bibliographic study was done to try to determine the number of papers published between 1992 and 2001 by Moroccan researchers and papers on Morocco in medical and health sciences journals that were indexed by the main international databases e.g. Medline, Popline and BDSP (Banque de Données Santé Publique**)** and the local databases of the Institut National Administration Sanitaire (INAS) Swiss Agency for Development and Cooperation (SDC). The number of publications per year retrieved from the three above-mentioned international databases is shown in Table 10.

The common methods for disseminating results, as determined by the analysis of the project questionnaires, were reports (77%), presentations in national (52%) and international conferences (50%) and publishing in peer-reviewed journals (45%). National publications were considered a means of dissemination by only 7%. This could be due to the number, quality and frequency of publication of national journals. The Moroccan Wide Area Network (MARWAN) has provided researchers with another opportunity for disseminating results.

Data on the utilization of research results showed that 184 patents were registered during the first eight months of 2001 compared to 174 during the same period of the preceding year. Of the registered patents 30% were in the medicine and hygiene sector. According to an analysis of the data collected through a project questionnaire, 89% of the respondents said that they used the results of their research. Of the 232 projects surveyed, results were used in 43% to develop new technology or a new intervention.

A recent national study on capacity-building strategies in health showed that 'there was a fairly evident link between the data produced by research and the impact on the formulation of health strategies and policies' [8]. International recognition of research facilitates the utilization of results. This was borne out by the perusal of documents and through interviews. Some of the programmes where results were utilized included family health and infant health programmes.

Table 10. Development of a bibliography on Morocco by year and database

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Total
MEDLINE	42	30	41	39	41	49	66	82	91	44	525
POPLINE	51	101	77	67	70	73	98	83	57	43	720
BDSP	27	23	22	20	22	20	26	36	50	35	281
Total	120	154	140	126	133	142	190	201	198	122	1526

According to those interviewed the utilization of research findings was not systematic and seemed to depend on several factors, such as the existence of a financial backer or where the research was carried out in response to expressed needs. There were other factors, such as a lack of collaboration with decision-makers, the poor quality of produced data, poor diffusion of results in an appropriate format for decision-makers, the absence of a mechanism for interaction between researchers and administrators and poor links between training and research.

Pakistan

There are 35 medical journals that are indexed with Medical Literature Indexing Services of Pakistan (MEDLIP). Of the 35 journals, three are indexed by Index Medicus and PubMed.

Information was compiled from different sources about articles published by Pakistani authors during 1992 and 2002. It was found that a total of 21 336 papers had been published in national and international health and biomedical sciences journals, 1118 articles had been published in international journals and 1686 in Pakistani journals that are indexed.

In order to obtain an idea of the productivity of researchers, an attempt was made to determine the number of articles published by staff in the institutes included in the institutional survey, during the past three years. Information provided in this respect was incomplete in most cases. However, based on what data was reported, there was a wide range (1–685) in the number of publications. The mean (SD) numbers of publications reported from medical institutions and PMRC centre, centres of excellence, institutes of public health, Pakistan Atomic Energy Commission (PAEC) centres and by allied institutions were respectively: 43.38 (107.82); 50 (28.28); 36 (1.41); 17.33 (19.13) and 95.93 (151.45). Considering their small number (3 each), the staff in the centres of

excellence and the institutes of public health seemed to be more productive than in the other institutes.

The 'research to policy' link was explored in the Concerted Action Project funded by the European Commission and conducted from 1999 to 2001. This was a study involving nine countries that was coordinated by the Department of Tropical Medicine and Hygiene of the University of Heidelberg, Germany. The study found that in the recently formulated policy of giving autonomy to teaching hospitals and decentralizing authority to the district level, information and research had no role in either the adoption or implementation of the policy. According to the senior level decision-makers interviewed for the study, the policy had been adopted simply because the existing system was not working satisfactorily.

A large number of conferences are held in the country hosted by some of the institutions included in the survey and by professional societies and provide an opportunity for scientists to present their research results.

Sudan

The information collected about publishing and dissemination of research findings showed that the commonly used methods of dissemination were publications, conferences and the mass media. The majority of research institutes resorted to publication in an international or a local journal as a means of disseminating research findings, as well as presenting the results in scientific conferences. However, the total number of articles published was limited because staff in institutes and university departments experienced great difficulty in publishing their results, even in local journals, due to the poor quality of research conducted, lack of funds, and the high cost of printing materials.

Results of studies carried out by the institutes were conveyed to the Federal Ministry of Health, to donors where

applicable, to fellow scientists and to the community. However, interviews with senior staff in the Ministry of Health indicated that it was only when research was initiated and commissioned by them that the results were used in decision-making. It was felt by the health managers that researchers outside the Ministry of Health seldom involved them and tended to work in isolation. Only a few health managers admitted receiving research reports. As in so many other developing countries there is obviously a gap between researchers, policy-makers and health managers, so research has not served as a tool for health action.

Regarding the results from the study carried out by the country team on the utilization of results from five key publications addressing the problems of the poor and underdeveloped communities (malaria, leishmaniasis, tuberculosis, mycetoma and endemic goitre), only a small number of respondents had read the articles. The articles listed above had been read, respectively, by 10%, 5.5 %, 13.7%, 31% and 11.4 %; the reason given for not reading was non-availability of the journal in which the article was published.

In a parallel study 54 qualified laboratory technicians, most of whom had graduated during the last five years, were asked about the direct agglutination and its value in diagnosing leishmaniasis. This test had not been heard about or performed by 37%; only 5.5% had theoretical knowledge and practical training about the test. A connected observation was that this test was not introduced in referral hospitals in areas endemic for leishmaniasis.

6. Commentary on the findings of the studies in the five countries

6.1 Introduction

The studies of the national health research systems in five countries of the Region clearly indicated the uniqueness of the system in each of the countries and reflected their historical and cultural background as well as their political and economic situation. The purpose of this chapter is to make some general observations and to recapitulate and highlight the differences between some of the salient findings from the five countries.

Largely on account of the two meetings of the investigators, organized by the Regional Office, the broad approaches and methodologies employed by the five sets of investigators were similar. However, the degree of detail provided for the different components of the functions of the national health research systems varied. The Iranian and Moroccan reports were quite detailed. The institutional affiliation of the country teams and the limited degree of involvement of representatives of other stakeholders in planning and executing the studies indicates that they were largely the work of 'producers of research'.

While the studies were being implemented, work on the development of indicators for assessing the performance of national health research systems was ongoing under the aegis of the Department of Research Policy and Promotion, WHO headquarters. Therefore the results are largely descriptive and though described under the four functions of national health research systems they have not been reported in a strictly uniform manner using the same variables or indicators. This is not considered as a shortcoming of the study as a whole. The purpose of this study was neither to develop a detailed methodology for assessing the performance of national health research systems (including development and testing of

indicators), nor to compare results from the five countries using certain pre-determined criteria. It was primarily a research capacity-building exercise undertaken to describe the process of research planning and prioritization, the identification and performance of key actors in health research and the overall environment of research. It was expected that the individual studies would lead to increased involvement of potential stakeholders and a greater appreciation of the need to adopt a systems approach for national health research.

The tasks of collecting valid information on items such as institutional facilities for health research, human resources engaged in health research and their distribution on research projects were made difficult because, apart from Egypt (Egyptian National Science and Technology Information Network) and the Islamic Republic of Iran (Department of Research and Technology in the Ministry of Health and Medical Education) there was no functioning information system where such current data were readily available. It is hoped that the data collected during the present study could be used as a basis for setting up a modern information system for national health research systems.

6.2 Stewardship

A well-defined and articulated vision for a national health research system does not seem to exist in any of the five countries. The senior scientists interviewed in Morocco presented an interesting set of attributes of a vision. The amount of time and effort involved in preparing a statement of vision and getting it approved at the highest policy-making level of the government must be balanced against the ultimate usefulness of such a statement, given that in most countries the planning documents of ministries responsible for science and technology, higher education or health do contain some statement of goals. Perhaps when mechanisms, such as national forums for health research, involving all stakeholders

are established they will be in a better position to formulate such a visionary statement.

Different types of 'mechanisms' or 'administrative entities' for coordinating health research at the national level exist in all the countries except for Morocco. These entities are the Medical Research Council under the Academy of Scientific Research and Technology in Egypt; the Department of Research and Technology in the Ministry of Health and Medical Education in the Islamic Republic of Iran; the Pakistan Medical Research Council affiliated to the Ministry of Health in Pakistan and the Department of Research in the Ministry of Health in Sudan. Their effectiveness in formulating health research policy and plans and in generating funds on the basis of information provided in the country reports has to be assessed in their national context and compared with the performance of similar mechanisms for coordinating research in other sectors such as agriculture. However, it is worth mentioning that the absence of a national coordinating body in Morocco did not seem to impede the development of health research and the performance of its institutions and researchers.

The administrative entity responsible for the national coordination of health research in the Islamic Republic of Iran, Pakistan and Sudan is situated in or affiliated with the Ministry of Health. Their country reports do not comment specifically on the advantages or constraints imposed through this close association with the national Ministries of Health. However, with the exception of the Islamic Republic of Iran, it does not appear that the PMRC in Pakistan or the Department of Medical Research in the Ministry of Health in Sudan, have any significant role in influencing health policy or strategic decisions on health programmes in their respective countries. At the same time, none of the reports mention specific requests from the ministries of health for commissioned

research to be carried out by the research institutes directly or through the national coordinating body for health research.

It is possible that some sort of formal process for health research planning exists in all of the five countries. If so, it would span from the central policy-making level to the preparation of detailed implementation plans and their execution at the institutional and individual researcher level and subsequent evaluation. However, it was not explicitly described in the reports except to some extent in the report from the Islamic Republic of Iran. In Egypt, half of the institutes reported having research plans. In the absence of a national coordinating body in Morocco, planning for health research was very much decentralized.

Priority-setting in Sudan has been carried out using a methodology developed by COHRED involving a number of stakeholders. The Islamic Republic of Iran has undertaken three exercises on priority-setting based on the consensus opinion of a large number of experts. A formal exercise using a well-defined methodology has not been carried out in Egypt, Pakistan and Morocco. The PMRC in Pakistan has used data from a national health survey to determine health research priorities. In Morocco, a Life Sciences Committee under the Ministry of Higher Education, Professional Training and Scientific Research identified certain priorities during the preparation of the Ministry's five-year plan.

The Global Forum for Health Research has come up with a matrix approach for determining health research priorities based on a combination of the five step approach proposed by the WHO Ad Hoc Committee on Health Research Relating to Future Intervention Options in 1996 and the methodology developed by COHRED based on the essential national health research approach [1]. It has yet to find wide acceptance in developing countries. Here too, one must balance what would be involved in poor countries for arriving at a set of national research priorities using

complicated and not widely accepted methodologies against simpler approaches, such as those adopted in the Islamic Republic of Iran. It can be assumed that as the quality of national health and health research data improves, and as more stakeholders get involved in national health research efforts, priority-setting would be carried out more methodically and efficiently.

In the area of medical ethics, Egypt and the Islamic Republic of Iran have made substantial progress. Both the countries have active research programmes in this field; a number of documents have been produced, including guidelines for reviewing research proposals involving human subjects, and there are committees for medical ethics at the national and, in the case of the Islamic Republic of Iran, regional level. Furthermore, institutional committees are being established in universities in Egypt. In Morocco, while ethical review committees exist in two of the leading faculties of medicine, no institutional mechanism or guidelines have yet been developed at the national level. In Pakistan, a National Bioethics Committee is being established that will develop guidelines for review of research proposals and terms of reference for institutional bioethics committees. A national ethical committee also exists in Sudan and the research committees in the three oldest medical schools now also review proposals from an ethical point of view.

Systems for monitoring and evaluating health research of varying degrees of sophistication exist at the funding or institutional level in all the countries. Among the five countries they are better developed in the Islamic Republic of Iran.

From the reports it appears that stakeholders in national health research systems continue to be limited to those funding and those producing the research; there was no mention of plans or of steps to be taken for broadening the base of stakeholders. This is a serious drawback and needs to

be rectified for an optimal development of national health research systems. Each country needs to think of indigenous ways to involve more stakeholders and to devise a mechanism, such as a national forum for health research, to debate priority issues.

The reports, particularly from the Islamic Republic of Iran, Morocco and Pakistan, described the national set-up for science and technology but did not mention how resources and skills in fields such as the biotechnology and information technology, available in the science and technology sector, are being tapped for expanding health research activities and capacity-building.

Networking among health researchers exists to some extent, as in the Islamic Republic of Iran and Morocco, but the concept of partnership amongst national institutions, within the same or in other sectors, is not yet widely practised. Similarly, viable and productive mechanisms for national health research systems to interact with the two closely related but much bigger systems, those of higher education and scientific research and technology, have yet to be developed.

6.3 Financing

Anticipating the difficulties in collecting information on resources for health research, a day-long workshop on 'Measuring resource flows in health research' was included in the second meeting of country teams organized by the Regional Office from 25 to 27 February 2003. In spite of the introduction of this important function of national health research systems, the information provided by the five countries on health research financing is limited. Of the five countries, the reports from the Islamic Republic of Iran and Morocco provided, relatively speaking, more information on financial flows for health research. The report from Sudan had the least amount of quantitative information.

From the figures provided, it appears that allocations for health research increased considerably over the past 10 to 15 years in the Islamic Republic of Iran and Pakistan (allocations to PMRC). However, only in the Islamic Republic of Iran has the reported allocation for health research reached and even exceeded the recommendation of the Independent Commission on Health Research (1990), that countries should invest at least 2% of national health expenditure to support essential national health research and a long-term strategy of building and sustaining research capacity.

Information on allocation of financial resources to health research priorities was included in the reports from the Islamic Republic of Iran and Morocco. In the case of the former, a clarification on the low level of allocation (5.76% during the period 1997 to 2001) was not provided. In Morocco, nearly 55% of funds were allocated for the diseases and areas that were considered research priorities by the Ministry of Higher Education and as spelled out in their last planning document.

The main source of funds for health research continues to be the public sector. Reference was made in the reports from the Islamic Republic of Iran and Sudan to funding from nongovernmental sources. In the Islamic Republic of Iran it constituted only 3%–6% of the total funding. In Sudan, considering the economic situation, it was remarkable that nearly half of the institutions surveyed reported receiving funding from private sources, including the community. Limited, as with Pakistan, or no information was provided on external funding. It is known that sometimes substantial funds for research are included in bilaterally or multilaterally (World Bank) funded health projects and programmes which occasionally are not directed to national health research priorities.

Tracking financial flows for health research is difficult and time consuming and the information in this respect is

scattered and difficult to access. Also the instruments for measuring health research resource flows are not uniform or standardized and those that are currently available are not particularly suitable for use in most of the developing countries. However, it is critical to ascertain and monitor investments in health research to allow countries to better allocate funds on national priorities and to reduce inequities.

6.4 Creating and sustaining resources

The Egyptian report provided succinct definitions of a researcher and of a research institute. The Moroccan report gave the definitions of various categories of researchers and elaborated on difficulties in the practical application of these definitions. As expected, there was considerable variation in the depth and range of information on researchers in the country reports. The report from Egypt provided quite substantial information on academic qualifications of researchers, the subject of their specialization and a comparison between those serving in the university and those serving in the Ministry of Health establishments. The report from the Islamic Republic of Iran supplied a breakdown of researchers according to their academic rank and by sex and age, which was not done in the data from Egypt. The Moroccan report only provided the academic qualifications of the principal investigator of the research projects surveyed and the report from Pakistan only indicated the qualifications of the heads of various institutes included in their study, which indicates a serious lack of well-qualified teachers in basic medical sciences.

From the information available in the reports from Egypt, Islamic Republic of Iran and Sudan it was possible to relate, albeit roughly, the number of health researchers to the total population of the country, i.e. 9403 health researchers (35% with doctorates) for a population of nearly 67 million in the case of Egypt, 11 024 researchers for a population of nearly

65 million in case of the Islamic Republic of Iran and 115 (46% with doctorates) for a population of 31 million in the case of Sudan. In the absence of additional and better quality data it was not possible to relate these figures to the workforce either in the science and technology or health sectors. A survey in Pakistan by the Pakistan Science Foundation showed, however, that health researchers constitute about 7% of the total science and technology manpower.

Facilities for research training, both short-term and long-term leading to the acquisition of a postgraduate research degree are well developed in Egypt, Islamic Republic of Iran and Morocco and to a lesser extent in Pakistan and Sudan. Development of human resources for health research, especially at advanced levels, and provision of an enabling environment, including a suitable remuneration, appears to be a particular problem in Pakistan and Sudan.

The issue of the drain of qualified health personnel, though important, is complex and it is difficult to obtain even reasonable estimates. Thus, it is understandable that none of the five countries reported on this issue.

The institutional infrastructure for research in all the countries is a mix of faculties of medicine and biological sciences, and postgraduate and other specialized institutes engaged in teaching and some research. Limited research is carried out by staff involved in the delivery of health services funded by the public sector. Institutes or centres totally dedicated to an aspect of health research are nonexistent. The centres established by the PMRC in undergraduate and postgraduate medical training institutions in Pakistan are an innovation but their performance so far has not matched their expected outcomes. The private sector is now becoming quite involved in medical education especially in Egypt, Pakistan and Sudan. It is expected that in time the already existing private training institutions, those being established and their staff will become involved in health research, thus providing

additional institutional and human resources to the national health research systems.

Two-thirds to three-quarters of the institutions covered by the surveys in the different countries were considered to have satisfactory facilities for research. Maintenance and upkeep of equipment was a problem in all the five countries. Access to journals in libraries is a problem in most of the institutions in Pakistan and Sudan. However, computers and internet connections are widely available. Access to information was not considered a serious constraint in any of the countries.

The country reports, with the exception of the Moroccan report and to some extent the Egyptian report, did not include any analysis of the proportion of institutional and/or human resources deployed for carrying out research on priority areas or on various disease categories.

Networks and partnerships between institutions belonging to the same or different sectors within the same country, as well as those between developing countries or developing and industrialized countries, are becoming an increasingly useful and productive means for capacity building and research. The Islamic Republic of Iran reported five national networks and Morocco two. No mention was made of the existence of national networks in the reports from Egypt, Pakistan and Sudan. All the countries mentioned that some of the institutions surveyed collaborate with institutions abroad (in Sudan 22 out of 28 institutions surveyed reported such collaboration), but the nature of such collaboration was not elaborated so whether it is meaningful and productive is not known.

6.5 Producing and using research

Publication of results in scientific journals and presentations at scientific gatherings were stated to be the commonest ways of disseminating results. For Egypt, where

nearly all research carried out is published, mostly in local journals, results of a bibliographic survey were not included in the report. In the Islamic Republic of Iran the number of licensed journals more than doubled over the preceding five years with a corresponding increase in the number of articles published. Similarly, the number of articles published in ISI indexed journals nearly doubled from 1997 to 2001. There are also regular health-related columns in magazines and programmes on the television and radio.

A bibliographic survey in Morocco showed that health researchers have been publishing, on average, 150 articles per year in internationally indexed journals over the past 10 years. This is quite impressive considering the relatively small size of the country as compared to the other four. In Pakistan, of the 35 local journals 3 are indexed. A survey of publications over the past 10 years showed that a total of 21 336 papers were published, of which 118 articles were in international journals and 1686 in the locally published indexed journals.

A detailed survey of medical journals and of problems encountered by researchers in getting their research published in indexed journals was outside the remit of the present study. However, efforts are being made by the relevant programme in the Regional Office to upgrade the quality of medical journals in the Region, as well as the ability of researchers to write research papers for publication.

In some of the countries research reports are sent to health authorities to utilize for information. However, a formal mechanism does not appear to exist in any of the countries for scrutinizing research reports and sending those in which the results may have policy or programme implications to the Ministry of Health for possible action. The heads of institutions interviewed in the Egyptian study felt that results of research on communicable disease and on health systems are more likely to be used by the authorities.

The decree for establishing policy-making councils for applicable research in all the medical universities in the Islamic Republic of Iran is an interesting innovation for promoting 'utilizable research'. The Iranian study reports that national research studies (references to specific studies were not given) have led to changes in the management of nearly thirteen medical conditions and have led to the revision of a number of guidelines that are used in the national health system. The close links between the researchers and health service personnel in the Islamic Republic of Iran, both belonging to the same ministry, may account to some extent for this positive experience. Somewhat similar positive experience in utilization of results of research is mentioned in the Moroccan report. The experience of both these counties in utilizing research results is worthy of a more in-depth study and possible emulation by other countries.

In Sudan, interviews with senior health managers indicated that results of research are more likely to be used in cases in which the research was specifically commissioned by the ministry. The poor availability of key internationally published medicals journals prevented health workers in the Sudan from obtaining critical information on common medical conditions on which research was carried out within the country. Thus, in countries with poor resources a way has to be found to disseminate important research findings that are published abroad.

Notwithstanding the mixed findings on the utilization of research results there remains a gap to be addressed in each of the five countries between research and policy/action.

7. The way forward

From the perspective of the sponsors the study of the national health research systems in five Member States of the Eastern Mediterranean Region was a timely and significant

exercise. It was implemented at a time when there is global interest in promoting the development of appropriate national health research systems in low and middle-income developing countries and within the Region. A renewed policy for supporting health research was endorsed by Member States (Resolution EM/RC48/R.8, October 2001). The experience gained will be shared with other countries in the Region and will provide a critical input in the Regional Office's collaboration programme in the area of health research with Member States during the coming years.

It is evident from the preparatory work done for the International Conference on Health Research held in October 2000 [3] and the subsequent analytical work being carried out by the Council on Health Research for Development (COHRED), as well as by the Department of Research Promotion and Cooperation (RPC) in WHO headquarters, that there is no single, superior model for developing a national health research system. Each country has its own system that has been established through historical development and has evolved over a period of time. This is borne out by the present study.

A major issue that emerged from this study is that while the concept of a national health research system is appreciated, it has not yet been operationalized or put into practice. This study has already sensitized a large number of producers and consumers of research in the participating countries. Each country should now use the findings of this study, with or without the support of the sponsors, to meet the challenge of putting a national health research system in place.

Development of the national health research system will need to look beyond the Ministry of Health and/or the Department of Medical Research or Medical Research Council in terms of priorities or an agenda for action and for funds. This means involving other stakeholders, such as the private

sector, including the rapidly expanding medical care and training institutions, civil society nongovernmental organizations, non-medical academic institutions, donors and foundations. The broader the base of stakeholders, the greater the likelihood of generating strong political support for national health research systems and of ultimately securing more funds. Focusing entirely on improving the functions of the existing set-up is unlikely to yield any benefit or positive outcome and is certainly not the way to proceed.

Existing national coordinating mechanisms may not be effective in bringing all the stakeholders together to make decisions on important issues such as priority-setting and allocating resources. New ways have to be found to accommodate all the stakeholders and that will allow them to participate meaningfully in decision-making

The need for a much-improved linkage between the demand side, users of research, and the supply side, producers of research, has emerged very clearly from this study. The linkage of research to policy needs to be developed and strengthened. This will need a new orientation for health researchers as well as for policy-makers and managers in health ministries. The capacity of users to articulate their research needs and to critically appraise research findings, sadly lacking at the moment, needs to be developed as a priority.

The proportion of publicly funded health research that should be allocated to meet the demands from the health policy-makers and managers or for influencing policy and health system development is a critical research dilemma and needs careful deliberation by all stakeholders in their respective countries. Obviously no single formula can be applicable to all the countries.

This dilemma also leads to the question of optimal balance between biomedical, or research and development-oriented research versus a policy/system type of research. The

goals of health research contributing to health equity need to be carefully examined in this respect. The present study provided some indications (from Egypt, Islamic Republic of Iran and Morocco) of the proportion of national health research resources (funds allocated and researchers involved) that are being used to carry out research on major disease groups and for health systems types of research. A more detailed analysis would need to be carried out to settle the question of the optimal balance between the two types of research alluded to earlier.

Finances are of course a critical component of the national health research system. Hopefully, a standardized methodology for collecting and analysing data in a stepwise fashion will become available in the near future. In most developing countries particularly those in the low-income category, application of a methodology that would require a large amount of scarce human resources to be diverted to collecting and analysing financial data would be self-defeating.

Upgrading the quality of health research management, including the development of a comprehensive information system, appears to be the top priority for action following this study. Before embarking on any programme a careful needs-assessment is required in each country in order to identify the skills that are missing or weak in the national system. Since the situation in each country is unique and as the research management capacity will need to be developed for all levels of health research systems and involving all the stakeholders, this upgrading is best carried out on a country-by-country basis rather than attempting do it on a joint regional or intercountry basis. Some of the areas in which skills should be built up or upgraded include: familiarization with systems concepts, leadership, knowledge management, priority-setting, human resource development, networking and informatics.

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Annex 1
Participants in the studies

EGYPT

Consultants to the Project

Professor Mahmoud M. Mahfouz

Professor Ibrahim G. Badran

Professor Mamdouh K. Gabr

Research Team

Professor Hammam M. Hammam (P.I.), Faculty of Medicine, Assuit

Dr Mostafa A. Habib (co. P.I.), Ministry of Health and Population

Dr Almotaz Billah O. Mobarak, Vice Minister of Ministry of Health and Population

Professor Ezzat Khamis Amin, Vice Dean, Alexandria University

Dr Salah Madkour, Vice Minister of Ministry of Health Research Sector

Professor Mahfouz Kassem, National Centre for Research

Professor Mahmoud Attia Abd El-Aty, Community Medicine, Assiut University

Professor Ahmed Mandil, Community Medicine, High Institute, Alexandria University

Field Representatives of the Project

Greater Cairo

Dr Almotaz Billah O. Mobarak

Professor Ali Massoud

Professor Laila Kamel

Professor Mahfouz Kassem

Dr Mostafa A. Habib

Professor Abdel Aziz Kamal

Dr Esmat Mansour

Dr Salah Madkour

Dr Enayat Kamel

Dr Hosni Tammam

Professor Mohsen Gadalla

Alexandria

Professor Ezzat Khamis Amin

Professor Maaly Gemaie

Professor Ahmed Abd Elwahab

Dr Salama Abdel Monim

Professor Ahmed Mandil

Gharbia

Dr Said Hammoud

Menofia

Professor Laila Shehata

Dakahlia

Professor Olfat Farag M. Ali

Professor Adel Abdel Ghaffar

Sharkia

Professor Samir M. Wassef

Qaliubia

Professor Osama Wassef

Upper Egypt (Assiut)

Professor Hammam M. Hammam

Professor Ali Zarzour

Professor Mahmoud A. Abd El-Aty

Technical Secretariat

Director Said S. Sarhan, ASRT

Engineer. Said S. I. Mousa, ASRT

Geol. Abdel Kader Omar

Engineer. Azza Abdel Dayem

Dr Amal M. Mokhtar

Statistical and Computer Team

Public Health and Community Medicine Dept., Faculty of Medicine, Assiut University

Professor Farag Mohamed Moftah

Professor Mohamed Attia Abdel El-Aty

High Institute of Public Health, Dept. of Epidemiology, Alexandria University

Professor Ahmed Mandil

Hala H. Abo Faddan, Assistant Lecturer, Assiut University

Ekram M. Abdel Kholk, Assistant Lecturer, Assiut University

Computer Technicians

Director Said S. Sarhan (ASRT)

Engineer Said S. I. Mousa (ASRT)

Mr Amr Kenawy (ASRT)

Mr Khalid El-Nomani (ASRT)

Mr Anter Abd El-Salam (Assiut)

ISLAMIC REPUBLIC OF IRAN

Consultants to the Project

Dr MM Akhundi, Director of Avicenna Research Institute
Financial resources of HRS

Dr S Akhondzadeh, Assistant Professor of Neuroscience, Department of Psychiatry, School of Medicine, TUMS
Environment affecting heath research

Dr S Asefzadeh, Vice Chancellor for Research, Qazvin University of Medical Sciences
Environment to promote coordination and collaboration health research

Dr F Azizi, Head of Medical Commission of the National Scientific Research Council Research Team
Policy-making mechanisms in HRS

Dr M Dejman, Expert in clinical research, DRT
Monitoring and evaluation of HRS

Dr AR Farsar, Consultant to the Undersecretary for Research and Technology, DRT
Priority-setting mechanisms in HRS

Dr AM Harirchi, Director-General, Centre to Coordinate Research Development coordination, DRT
General

Dr B Larijani, Endocrinology and Metabolism Research Centre, TUMS
Ethical aspects of health research

Dr K Mohammad, Professor of Epidemiology and Biostatistics, School of Public Health, TUMS
Environment to nurture health researchers

Dr MR Mohammadi, Head of National Medical Research Centre
Capacity building in HRS

Dr S Motevallizadeh, Executive consultant to the Undersecretary for Research and Technology, DRT
Financing resources of HRS; Utilization of research results

Dr M Nooraye, Assistant Professor of Community Medicine, School of Medicine, TUMS
Research fields and subjects

Research Associates

Dr S Aghakhani, Research Associate, Endocrinology and Metabolism Research Centre, TUMS
Ethical aspects of health research

Dr S Jarvandi, Executive Director, Herbal Medicine Research Institute
Environment affecting heath research

Dr A Etemadi, Research Associate, Endocrinology and Metabolism Research Centre, SBUMS
Policy-making mechanisms in HRS

Dr AA Kolahi, Associate Professor of Community Medicine, School of Medicine, SBUMS
Priority-setting mechanisms in HRS

Ms K Falahati, Research Expert, DRT
Monitoring and evaluation of HRS

Ms E Habibi, Research Expert, DRT
Monitoring and evaluation of HRS

TUMS: Tehran University of Medical Sciences;
DRT: Department of Research and Technology, Ministry of Health and Medical Education
IRIB: Islamic Republic of Iran Broadcasting Agency
SBUMS: Shahid Beheshti University of Medical Sciences

MOROCCO

The Scientific Committee

M. A Zayyoun, Coordonnateur (l'Institut National d'Administration Sanitaire, Rabat)

Pr A Maaroufi (Faculté de Médecine et de Pharmacie de Casablanca)

Dr M Khiyati (Institut Pasteur de Maroc, Casablanca)

Secretariat and Logistics

M. A Chergaoui (Administrateur des fonds)

M. A Seddiki (Logistique et documentation)

Mme C. Doughmi (Secrétariat)

Members of the Steering Committee

Dr Abdelali Belghiti Alaoui, Directeur, Direction des Hôpitaux et des Soins Ambulatoires

Ambulatoires

M. Abdelwahab Zayyoun, Professeur à l'Institut National d'Administration Sanitaire

Pr Abderrahmane Maaroufi, Professeur à la Faculté de Médecine et de Pharmacie de Casablanca

Pr Chakib Nejjari, Professeur à la Faculté de Médecine de Fès

Mr El Arbi Housni, Démographe à la Direction de la Population

Dr Jaouad Mahjour, Directeur, Direction de l'Epidémiologie et de la Lutte contre les Maladies

Dr Karima Gholbzouri, Chef de Service de la Couverture Sanitaire et l'Intégration des Activités à la Direction des Hôpitaux et des Soins Ambulatoires

Dr Meriem Khyatti, Chercheur à Institut Pasteur du Maroc

Dr Mohamed Bouskraoui, Professeur à la Faculté de Médecine de Marrakech

Professor Mohammed Hassar, Directeur de l'Institut Pasteur du Maroc

Professor Noureddine Fikri Benbrahim, Directeur de l'Institut National d'Administration Sanitaire

Professor Rajae El Aouad, Directeur de l'Institut National d'Hygiène

Dr Youssef Chami Khazraji, Chef de la Division des Maladies Transmissibles à la Direction de l'Epidémiologie et de la Lutte contre les Maladies

Enquêteurs

Dr Meriem Khyatti, Chef de département de recherche à l'Institut Pasteur du Maroc

Dr Jamila Lamani, Responsable de l'Observatoire Régional d'Epidémiologie de Casablanca

Dr Brahim Takourt, Résident au C.H.U. de Casablanca

Dr Mohamed Amine, Résident au C.H.U. de Casablanca

Dr Karima Gholbzouri, Chef de Service de la Couverture Sanitaire et l'Intégration des Activités à la Direction des Hôpitaux et des Soins Ambulatoires

Dr Mohamed Harrag, Service de la Couverture Sanitaire et l'Intégration des Activité à la Direction des Hôpitaux et des Soins Ambulatoires

Dr El Hassan Ouanaim, Service de la Couverture Sanitaire et l'Intégration des Activité à la Direction des Hôpitaux et des Soins Ambulatoires

Mr Mohammed El Majhad, Enseignant à l'Institut de Formation aux Carrières de Santé de Rabat

Dr Fatiha Guezzar, Responsable de l'Observatoire Régional d'Epidémiologie d'Agadir

Dr Abdelkader Mouzdahir, Médecin-chef du SIAAP de Larache

Dr Mohamed Koualla, Médecin-chef du SIAAP de Tanger-Azilah

Pr Mohamed Bouskraoui, Professeur à la Faculté de Médecine de Marrakech

Dr Taha Azzeddine, Responsable de l'Observatoire Régional d'Epidémiologie de Marrakech

Pr Chakib Nejjari, Professeur à la Faculté de Médecine et de Pharmacie de Fès

Dr Samira El Fakir, Résident au C.H.U. de Fès

Dr Karima El Ghazi, Résident au C.H.U. de Fès

Mr Yahya Mouqla, Enseignant à l'Institut de Formation aux Carrières de Santé de Oujda

PAKISTAN

Principal investigators

Dr Tasleem Akhtar, Executive Director, Pakistan Medical Research Office

Co-investigators

Dr Sania Nishtar, President 'The Heartfile' Islamabad

Dr Zulfiqar Bhutta, Professor of Paediatrics, Aga Khan University, Karachi

Dr Jamil Ahmed, Deputy Director, Provincial Health Services Academy, Peshawar

Data collection

Dr Jamil Ahmed, Deputy Director, Provincial Health Services Academy, Peshawar

Dr Zahoorullah, Principal Research Officer, PMRC Research Centre, Khyber Medical College, Peshawar

Mr Agha Sadruddin, Principal Research Officer, PMRC Research Centre, National Institute of Health, Islamabad

Dr Rizwan Iqbal, Senior Medical Officer, PMRC Research Centre, KE Medical College, Lahore

Dr Misbah-ul-Islam, Principal Medical Nishtar Medical College, Multan

Dr Jawad Hussein, Senior Officer, Research Officer, Punjab Medical College, Faisalabad

Dr Waqauddin, Senior Medical Officer. PMRC Research Centre, JPMC, Karachi

Dr Sultana Habibullah, Senior Medical Officer, Dow Medical College, Karachi

Mr Ijaz Alam, Statistician, PMRC Research Centre, JPMC, Karachi

Mr Jamil Ahmed, Statistician, PMRC Research Centre, Bolan Medical College, Quetta

Mr Fayyaz Pirzado, Librarian, PMRC Head Office, Islamabad

Statistical analysis

Dr Asma Badar, Public Health Officer, Heartfile, Islamabad

Mr Abdul Qayyum, Senior Statistician, PMRC Head Office, Islamabad

Mr Mohammad Kashif, Assistant Director, PMRC Head Office, Islamabad

Computer assistance

Mr Mohammad Kashif, Assistant Director, PMRC Head Office, Islamabad

Mr Ali Kashif, Computer Assistant, PMRC Head Office, Islamabad

Mr Sajjad Arjumand, Computer Assistant, PMRC Head Office, Islamabad

Design and layout
Yasir Abbas Mirza, Heartfile, Islamabad

Budget and accounts
Mr Shahid Bashir, Deputy Director Budget and Accounts, PMRC Head Office, Islamabad

SUDAN
Research Team
Professor AM EL Hassan, Principle Investigator, Institute of Endemic Diseases, University of Khartoum, Khartoum

Professor MA Awad Elkarim, Department of Community Medicine, Faculty of Medicine, University of Khartoum, Khartoum

Professor A Karim Mohamed Salih, Ministry of Science and Technology, Khartoum

Professor Al Rasheed Ahmed Abdalla, Department of Surgery, Faculty of Medicine University of Khartoum, Sudan

Dr Iman Abdella Mustafa, Research Directorate, Federal Ministry of Health, Khartoum

Dr Samia Habbani, Research Directorate, Federal Ministry of Health, Khartoum

Dr Dyaeldin M Elsayed, Council of Public Health, Federal Ministry of Health, Khartoum, Sudan

Sara Hassan Mustafa, Research Directorate, Federal Ministry of Health, Khartoum, Sudan