RESEARCH FOR HEALTH

PRINCIPLES, PERSPECTIVES AND STRATEGIES

WORLD HEALTH ORGANIZATION
1993
The twentieth century has witnessed a population explosion (middle curve).
Early survival rates (left) showed high infant and continuing mortality.
Our goal is increased survival for all age groups (right).
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Foreword

This document is the product of an investigation carried out by the Advisory Committee on Health Research (ACHR) in response to World Health Assembly resolution WHA43.19 requesting the Director-General to «develop further a clearly enunciated health research strategy for WHO in order to translate the research goals, priorities and programmes into coherent and coordinated action in support of health for all.» The report is a first step in this direction, and extends the work previously done by the ACHR and published in 1986 (WHO/RPD/ACHR(HRS)/86). Amplification of the concepts and implementation of the principles and policies will follow, with subsequent reports specifying the planning and programmatic implications of the present strategic options.

While acknowledging the previously endorsed health research strategy, the committee broadened the scope of its enquiry to include considerations such as the current economic environment, global problems of critical significance to future health, the changing scene of science and technology, as well as issues related to infrastructural and research capacity. In doing so, it was supported by the work of several subcommittees and task forces which actually contributed in shaping up the structure of this study.

The report is also the reflection of a dialogue between the global and regional components of the ACHR system,
on the one hand, and the Governing Bodies of WHO on the other, both at global and regional levels. The target audience which the Committee had in mind consists of policymakers and the scientific and donor communities, as well as service providers.

We wish to acknowledge with thanks the efforts of all ACHR members and participants, and specifically those who chaired the various sub-groups – Professor T. M. Fliedner, Professor M. Davies and Professor B. McA. Sayers, who organized two meetings in Salisbury, U.K., to examine certain aspects of this work (such as technology, behaviour and economics), and subsequently to discuss its overall presentation. Special thanks are also due to Professor B. Osuntokun, immediate past Chairman of the ACHR, whose thoughtful contributions permeate the whole text.

Further developments of health research strategies necessarily constitute a dynamic process, and it is hoped that this document on principles, perspectives and strategies will facilitate the planning of future research initiatives.

Professor M. Gabr (Chairman, ACHR)
Dr B. Mansourian (Secretary, ACHR)

December 1993
1. A world in transition

Current trends in the health situation of the world make it imperative that new ways be found to improve community health. Deficiency diseases and infectious diseases are still highly prevalent, particularly in the tropics. No solution is yet in sight to the HIV pandemic; even though the epidemic may have peaked in some countries, this is not the case in many others. Tuberculosis, once believed to be under control in developed countries, has now become a scourge in both developed and developing countries, partly due to the HIV pandemic and partly to the drug-resistance of Mycobacterium tuberculosis. Cancer is a major cause of death in poor as well as rich countries. Although mortality rates due to cardiovascular diseases are falling in some developed countries, they are rising in many developing countries.

Many parts of the world are undergoing both demographic and epidemiological transitions, so that differences in the patterns of health and disease between developed and developing countries are becoming less distinct than they were three or four decades ago. Non-communicable disorders have become major causes of disability and death in most countries of the world. Unforeseen health problems are arising as a consequence of new and changing economic situations, rapid industrialization and damage to the environment.
1.1 A research strategy appropriate to the world’s health situation

All these factors cry out for innovative epidemiological approaches and methods, fresh indicators for the study of health status, and research into such issues as intersectoral action, monitoring and forecasting, and the behavioural aspects of health. Problems that militate against improving the health of specially disadvantaged groups, such as mothers and children or inner city communities, require solutions that will entail the application of new knowledge.

Resources for health care are being squeezed even while the costs of delivering health care are rising – partly as a result of high-cost technology. The effect is to create gross inequity within countries, but particularly between the developing world and the industrialized countries. More than ever before, judicious use of effective and efficacious technology is called for, with justice and equity as the guiding principles.

The frontiers of knowledge are constantly being pushed back as a result of advances in research relevant to health care and health services development, particularly in cell biology, including genetics, biotechnology, the neurosciences and the physical sciences. Such advances vitally need to be identified and systematically evaluated. Moreover, the gross deficit in the use and availability of information needed for carrying out research in developing countries requires urgent attention.
Besides WHO's special programmes such as TDR, HRP, GPA, etc., all of WHO's regular programmes have research components which are essential for the successful fulfilment of the WHO's Ninth General Programme of Work. WHO's objectives in HFA are still far from being achieved, and it is in that context that health systems research merits special emphasis as a tool for adapting knowledge that will help to improve health services and solve health problems. Potential contributions of new knowledge that could imply better health for individuals and communities may come from the biological, agricultural, physical, social and environmental sciences.

Especially in developing countries, therefore, the development of an adequate research capacity is essential if solutions are to be found to the great public health problems that confront the world as we move towards the 21st century.

WHO's Advisory Committee on Health Research (ACHR) has the mandate to advise the Organization and then to translate health-related research results into action that will improve the health of communities and individuals, and to identify the needs for improved methodologies and new knowledge. The ACHR system also serves as the science watchdog of the WHO, and is required to assist the Organization in bringing WHO's research needs to the attention of the World Health Assembly (WHA), Member States, the scientific community, donors and NGOs. For example, the ACHR guided and co-promoted the Technical
Discussions at the WHA in 1990 which culminated in the 43rd WHA Resolution on «The Role of Health Research» and in the adoption of wide-ranging and specific recommendations on health systems research, nutrition research, the implications for health of research in the biological and physical sciences and research capability strengthening.

The objective of the present research strategy update is to define the role and direction of health-related research in the context of the world situation outlined above, so as to enable WHO to achieve its defined objectives as contained in the Global Strategy for HFA and the Ninth General Programme of Work.
1.2 Restatement of the current strategy

Diseases due to Maladaptation

«Tool-making animals have existed for a few million years; creatures physically similar to modern man for about 300 000 years; and the human subspecies for 60 000 years. On this time-scale the intervals in which the major changes in conditions of life have occurred are very small: 10 000 years since the end of the hunter-gatherer period and the beginning of agriculture, and 300 years since the onset of industrialization... There has not been time for genetic adaptation, so that modern man is exposed to the hazards of industrial life with the genetic equipment of a hunter-gatherer. The maladaptations that have resulted from recent economic and industrial developments must be added to the deficiencies and hazards that were predominant during the evolutionary period as postnatal determinants of sickness and premature death.» ¹

Consequently, a fourfold classification of the predominant influences on health would include: Prenatal diseases determined at fertilization (e.g. single gene defects and chromosomal aberrations); prenatal diseases determined after fertilization (e.g. the result of hazards associated with early embryonic development); postnatal diseases due to deficiencies and hazards (diseases of poverty); and postnatal diseases due to maladaptation («diseases of affluence»).²
A document entitled «Health Research Strategy for HFA 2000» was presented for information to the Executive Board in January 1986, and eventually set the conceptual framework for WHO’s current Health Research Strategy. That document’s main conclusion was as follows:

«Disease is not an inescapable attribute of the human condition; except when determined at or soon after fertilization, it results essentially from unhealthy ways of life and can be prevented if those ways can be changed. For almost the whole of his existence, man – like other living things – was unable effectively to control his environment or limit his reproduction, and the chief causes of sickness and death were deficiencies of basic resources or hazards arising from competition for them. These are still the predominant causes of diseases in developing countries.

«In developed countries during the last few centuries, it has been possible to exercise a considerable degree of control of the environment – in relation to health, particularly by increasing food supplies and improving hygiene – and, for the first time in human experience, the advances were not lost because of rising numbers. These advances have led to the decline of diseases (chiefly the infections) due to deficiencies and hazards; but, ironically, they have resulted in a new pattern of noncommunicable diseases attributable to profound changes in the environment and in behaviour.»²
It was with these fundamental considerations in mind that the research strategy of WHO was devised, primarily in the light of the commitment to substantial progress in health by the year 2000, and particularly in countries where the need is greatest. It addresses the following issues:

(a) Control of diseases associated with poverty and environment. The research needed is essentially of the health systems type, as the effective measures are well-known: sufficient and safe food; clean water; adequate sanitary facilities; fertility regulation; immunization and treatment of common infections. Individuals and communities have important roles to play in relation to their own health behaviour and to ensure implementation of the required measures. The aim of research should be to assist administrations and communities to achieve these advances as directly and quickly as possible.

(b) Control of diseases, both infectious and noncommunicable, specific to the tropics. These diseases do not respond adequately to the relief of poverty and the measures referred to under (a), and they should be attacked with all the resources – laboratory, clinical, epidemiological and socio-economic – that can be brought to bear on them.

(c) Control of diseases associated with epidemiological and demographic transitions. This requires
investigation of the environmental and behavioural influences which have led to the noncommunicable diseases now predominant in developed countries and beginning to rise in the developing world. In some, the major influences (tobacco, alcohol, occupational hazards, etc.) are already known, and the research required is predominantly concerned with behaviour; in others the influences are unknown, and research is needed into disease origins.

(d) Treatment and care of the sick, and the disabled. Even on the most optimistic assumptions about disease prevention, it will be necessary to make extensive provision for the treatment and care of the sick. For this we must rely mainly on biomedical research (which, of course, also contributes powerfully to the preventive measures). Although modest financially, WHO's contribution will continue to be important since it aids biomedical research and technology in many ways, particularly by ensuring that, as new knowledge becomes available, it is widely known and quickly applied.

(e) Delivery of health services. The critical determinants of health should be addressed through health services which are relevant to local needs and cultures, and which aim to cover entire populations, particularly the most vulnerable groups. The challenge facing WHO in the field of health systems research is to join with policy-makers and commu-
nities in assessing needs, planning, financing and implementing programmes, and evaluating them in terms of coverage, efficiency and effectiveness.

The application of these principles will differ between regions and between countries within the same region, according to many variables: the nature of the predominant health problems; the present level of health; economic resources; cultural, political and religious traditions. The aim should however be common to all: to focus research where it will result in rapid advance towards the Health for All goal.

Without neglecting the care of the sick, the strategy places the emphasis on achieving health through prevention of disease. This approach in the short- and medium-term does not overlook the long-term objectives which WHO has always set for itself, based on recognizing health as a state of complete physical, mental and social well-being. Attaining these objectives necessarily depends on advances in society which may largely lie outside the scope of health administrations, particularly the alleviation of poverty; access to balanced nutrition; universal education; full and rewarding employment; and, most important of all, avoidance of war in all its forms.
2. Health needs as a guide to research needs

The WHO definition of «health» recognizes that it is a complex concept and cannot be regarded simply as the absence of overt disease or disability. Other aspects that must be taken into account include quality of life, protection against biological and psychosocial health-damaging assaults, the intensity and nature of risks to health, the presence of health defects and health-relevant deficits.

Hitherto, only limited attention has been given – when identifying sources of harm to health or the means to promote health – to determining priorities for research or formulating health research strategy. Economic and psychosocial influences on health, for instance, need clearer elucidation, while understanding behavioural factors – both health-promoting and health-damaging – may provide an important basis for influencing community health.

That is why this research strategy update highlights the need for multidisciplinary research that embraces economic interactions with health, tackles psychosocial, cultural and behavioural factors relating to health, and clearly recognizes the need for new developments in methodology.
2.1 Research needs and new methodologies

Three issues that arise in the context of health-related research need clarification:

a) Established professional techniques must be applied in order to acquire information about needs, identify technical means, and make effective use of those means to meet those needs. Not all of these might be regarded as research in the sense of seeking or extending knowledge and capability, yet their application calls for the allocation, use and evaluation of resources.

b) Methodological innovations or developments may be needed to acquire appropriate information, decide priorities, allocate resources and put research findings into effect.

c) Where new knowledge is required in order to solve existing or emerging problems, goal-specific or strategic research is unavoidable.

Gathering information about health problems, health care facilities, and the efficacy and effectiveness of health care delivery is vital for planning the best provision of health care when resources are limited. The use of advanced information technology may be justified in view of
the scale and importance of the information sought. Methodological developments may then be needed before the system is designed or the equipment chosen and installed; the failure of some information systems in developing countries has proved to stem from taking insufficient account of cultural and behavioural factors.

The need for new indicators is self-evident in view of all the elements that have a bearing on health. Such elements as quality of life, risks due to environmental hazards and exposure to stress, violence or health-damaging behaviour can be observed and even measured. Their effect on health can rarely be expressed mathematically or modelled conventionally, but is usually expressed in terms of «knowledge,» i.e. statements of fact observed or expert belief. Modelling may be possible, but it depends on the use of new forms of representing information, and new methodologies. Similar arguments apply when indicators are required for other health-related or socio-economic variables that cannot be directly observed or measured, and so have to be «indicated.» Consequently new forms of indicators, and new ways of systems modelling will need to be developed in the near future. They will be particularly important when the impact on health of activity in other sectors of the economy has to be established.
2.2 Techniques for the utilization of knowledge

There is another generic issue. Whenever a research solution leads on to an intervention in order to influence the quality or impact of available health care, consequences beyond those immediately targeted will inevitably follow. This should be understood, preferably in advance of the intervention itself. Interventions sometimes lead to very complex consequences: across domains and across sectors. This is the reason for realistic «modelling» of a system: the consequences of the intervention can be tried out on the model.

However the present technology for modelling is wholly inadequate for the kind of socio-economic system that health planners have to handle. It is obvious that quantitative data and relationships are required for econometric-type analysis; when observational and factual «knowledge» about the system can also be incorporated, a substantial advance in capability will occur. The technology for representing «knowledge» – in the form of textual statements – by computer is well-established and so is the means for making logical inferences using textual knowledge. Research using computational logic will be the key to designing new types of indicator and to modelling and understanding socio-economic systems; it will extend system modelling from mathematical formulae into the domain of «knowledge-based» systems that are much closer to real life than the models at present available.
3. Relevance of the economic environment to health

Affordable health care is everywhere dictated by economic factors – at the macro-level through the allocation and distribution of national resources; at the meso-level through the use made of those resources; at the micro-level through the impact of family budgets on health care. National policy, often driven by international forces, dictates the resource allocation for health in the light of national economic needs, but it is recognized – in turn – that the health status of the population may influence the nature and pace of economic development. Limiting the resources made available to the health care delivery system not only increases the problems of managing the health system itself, but also demoralizes the personnel who operate the system.

3.1 Consequences of structural adjustment

The impact of national policies on health is a central issue. It is particularly significant where structural socioeconomic adjustment policies have been put into effect, since these have a major social impact, including on health. In fact, their damaging effects on health hit hardest at the household level and on those least able to resist them.
When policies of adjustment take effect, three types of consequence may follow in the health sector: a direct effect on health (e.g., a shift from foodcrops to export products will have a negative impact on nutrition); deterioration of health services because resources no longer flow; lower rewards and incentives for personnel in the health sector leading to a descending cycle of lower morale and, subsequently, lower standards.

Accordingly, much more needs to be known about the effects of adjustment, people’s attitudes to those effects, means of ameliorating the consequences for the most needy, and the design of administrative structures to face up to the changed economic scene. For example, what distinguishes countries that have coped successfully with the consequences of adjustment from those that have not? How important are the determinants of organizational behaviour at the managerial level?

It may be possible to identify most of the significant influences on health from outside the health sector, and such information could be used to design integrated policies that target the most effective services to those most in need, by the most appropriate allocation of funds expenditures both within and outside the health sector. External social and cultural factors may be determinants of demand for health care services; for instance, the absence of health services in rural areas may be one factor that tends to drive people to the cities. Various models of health care systems are in existence but, whatever the specific system adopted, effective monitoring is needed.
3.2 Health and national economic development

In order to achieve targets for meeting health needs in the light of costs, priorities have to be determined. Health needs and circumstances alter dynamically and so do the demands imposed on the health care service. As national circumstances alter, the process must be repeated and must be as dynamic as the system driving it. A taxonomy of needs must therefore be established, and the consequences of intervention in the health sector also need to be classified. This is why modelling, if at all feasible, is important since it provides a means of testing for such consequences and for the effects of intersectoral interaction.

The relative efficiency of different kinds of health sector expenditure in terms of improving health does need to be measured, but the methodology is not available. For example, in the national context, the distribution of resources, functions and activities between public and private sectors or between PHC and hospital care, the influence of user fees and insurance schemes, equity and the protection of the poor – all these call for investigation in both developed and developing countries.

Determinants of health need not only originate in the health sector; there are numerous multisectoral contributions. For instance, economic factors affect health through social provision, housing, availability of suitable food, quality of nutrition and so on; industrialization influences
health through the availability and nature of employment, environmental effects, consumption or creation of foreign currency for health- or nutrition-related purposes and perhaps through the provision of health-related products. Conversely, health affects other sectors. Superficially even, health is a factor in the physical and mental quality of manpower, in the sickness-absence record in employment, as well as in the consumption of resources that could otherwise be used for economic or social development. Hence the interactions should be investigated, in order to provide a rational basis for forecasting, planning and resource allocation at the national level, within all the sectors including that of health.

There is a time lag between interventions and disturbances in large-scale economic and societal systems and the consequences that they produce. In this sense, the system is dynamic and hence long-term monitoring and trend assessment are important.
4. Global problems and global solutions

Research for development

Global development problems result from complex interactions between natural and man-made systems, with biological, environmental and socio-behavioural factors playing a major role. Several components and trends are of special relevance: population dynamics, mobility and migration, urbanization, industrialization, employment, energy, environment, food supply and nutrition, social behaviour, new and evolving diseases and – more generally – the interaction between development and health.

The past decade has seen rapid and often unpredictable changes in the global political situation, world socio-economic conditions and the environment, as well as demographic and epidemiological transitions. For example, rapid aging of the population and changes in lifestyle and the environment account for the increasing prevalence of cancer, cardiovascular disease, diabetes, accidents, suicide, dementias and other chronic conditions. The double burden in developing countries of communicable diseases and «diseases of affluence» is being aggravated by the spread of the AIDS pandemic and the resurgence of such ancient scourges as malaria, tuberculosis and cholera. Many of
these health problems transcend national boundaries, calling for global solutions which require coordinated and intensified research.

Demographic growth remains a priority issue (Figure 1), since under the United Nations' medium-variant projections, world population is expected to reach 6000 million by the end of the century and to exceed 7000 million in 2010. The age structure of the world population is changing rapidly and the older population is growing faster in the developing than in the developed countries (annual growth rate of 3% compared to 1.8% during the period 1985-1990). Attempts to check the rate of population increase have not so far led to satisfactory results. Research on health education and other aspects of population control is vital.

The finite nature of natural resources, indiscriminate storage of industrial wastes leading to pollution (e.g. nuclear), the widespread use of aerosols causing ozone depletion, and carbon dioxide emissions producing the greenhouse effect – all these are well-publicized examples of global problems which transcend national boundaries. Research is needed on behavioural and social impacts of industrialization and on the introduction of new technologies in both developing and industrialized countries.

The issue of energy usage is linked with the process of industrialization and technology development. Politicians and the scientific community face various technical and ethical issues which require further investigation.
In addition to health hazards resulting from individual behaviour (smoking, alcohol abuse etc.), thousands of environmental contaminants are being encountered, particularly in occupational settings. Methodology needs to be developed further in order to assess the impact of low doses of contaminants typically found in the ecosystem.

With regard to food supply and nutrition, two dimensions need to be investigated here: first, at the individual level, education and the behavioural sciences play an important role; second, at the socio-economic level, issues of accessibility (financial and other) to food, production and distribution, legislation (pricing policies), marketing and food control will all have to be addressed.

Behavioural research is needed in order to understand the origins of health-damaging behaviour and, more important, to identify the approaches and design the means by which health-promoting behaviour may be encouraged. The scope of interest includes the behaviour of individuals, families, communities and organizations, including that of individuals within such groups.
5. The changing scene of science and technology

Scientific advances

An up-to-date research strategy must take account of changes in the health scene which result not only from economic constraints but, above all, from scientific advances. In the last few years, major developments have occurred in molecular biology (biotechnology, genetics, genome mapping, gene therapy and so forth), in technology (related to imaging of body structures and functions, vaccines, diagnostics, information, applications of lasers, enhanced implants, new materials for prostheses, etc.), and in applied sciences (biophysical techniques for the design of biologically active macromolecules, drugs and proteins). These developments have created many powerful new opportunities for health care and its delivery.

5.1 Recent advances, and cost-effectiveness

Progress in research depends on the continuous generation of technological innovation but the costs associated with these new innovations are considerable. In the years ahead, there will be increasing need for government/indus-
try cooperation in the development and use of these promising new technologies. A cost-shared partnership between government and industry will be essential to ensure that contemporary needs of the research enterprise are met in such diverse fields as biotechnology, advanced materials, vaccine development, high-performance computing and genetic engineering. Research should also seek to reduce the cost and increase the availability of the new technologies.

Access to these advanced technologies will better enable the scientific community to solve complex problems in health research and to apply new technological capabilities to current and emerging health problems. Examples may include: development of genetically enhanced cardiovascular implants, blood substitutes and special programmes in orthopaedic biomaterials; vaccine development geared towards disease prevention, especially in children; development of information systems that will link physicians, hospitals and research institutions so as to improve the effectiveness of health research programmes as well as the quality of treatment and clinical care; additional initiatives in HIV/AIDS research; improved diagnostics such as the application of polymerase chain reaction technology, even in primary health care; application of new knowledge from the current human genome project, gene therapy and transplantation technology.

Although the costs associated with these new technological advances are very high, the impact of the new
advances will significantly reduce the costs – and the risks – associated with the long-time care of patients with debilitating conditions.

5.2 Health research and human development

Health has been viewed, by some commentators, in terms of survival rates. The appearance of a population explosion in the 19th century was characterized by low survival rates, so a logical goal would be that, when the population stabilizes by the 21st century, there should be high survival rates at all ages, with minimal disability.

Focusing on the situation in which there is no strong economic growth, it can be seen that the population explosion largely accounts for the poor state of health in developing countries. During the last quarter of the 20th century, many of these countries have seen a near doubling (or more, in Africa) of their population. Although Asia and Oceania will, by the end of the century, constitute nearly 60% of the world population, they have succeeded in slowing down their growth rate and the positive effects on health have already started to appear. The morbidity pattern in the Third World is characterized by the predominance of infectious diseases, and their severity is such that they largely determine the mortality profile.
A classical indicator of health is infant mortality rate, a good proxy measure of under-development. Infant mortality rate is also closely related to women’s literacy, and it has been demonstrated that, for specific income groups, countries with a higher proportion of literate women have an infant mortality rate considerably lower than countries with a low level of female literacy. For example, in countries within the same income group, say higher middle, those with a better than 90% proportion of literate women have an average infant mortality rate of 31 per 1000, more than three times better than those with a less than 35% proportion of literate women (107 per 1000). Comparable gradients apply for countries within other income groups (Figure 2).

**Figure 2**

![Figure 2: Infant Mortality and Women's Literacy, by Broad Income Groups](image)


Despite such discrete gaps, overall literacy – a critical determinant of health globally – continues to increase in the South, as can be measured by the «Gross Number of Literate Persons». Moreover, figures for primary, secondary
and tertiary enrolment in the South in 1985 are comparable to enrolment figures for the North in 1950. Thus, the educational lag between North and South is of the order of one generation (whereas the industrial lag has been about 100 years).

As regards the physical environment, water supply and sanitation are key factors influencing health development, and much remains to be done, particularly in the rural areas of Africa, South Asia and Latin America. The costs involved run into hundreds of billion dollars, the countries concerned are competing for very limited resources, and it is difficult to assess effective coverage because of maintenance problems. Thus geographic distribution of services within a country is bound to be uneven (Figure 3).

**Figure 3**

*Rural Water Supply Service Coverage*

It is appropriate to emphasize the importance of differences in the causation of nutritional disorders in communities. Whereas in the industrialized countries malnutrition is related to affluence, in the developing countries malnutrition is often the consequence of maldistribution and hunger (Figure 4). Although, on average, the world has a growth rate of agricultural production which can easily feed its entire population, famine is still widespread in large parts of the African continent.

To feed people, jobs must be provided. Estimates of the labour force arriving on the market have been made (Figure 5), and the numbers are staggering, particularly in the former «centrally planned economies» and in the developing countries, which together contribute only a small fraction of the world’s GNP. Indeed, the ratio of total GNP between North and South is roughly 4 to 1. Expressed per capita, it would be of the order of 20 : 1. This imbalance is closely paralleled by the distribution of R & D resources and the number of scientists and engineers.

<table>
<thead>
<tr>
<th></th>
<th>GNP</th>
<th>R &amp; D</th>
<th>Scientists &amp; Engineers</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>North</strong></td>
<td>80%</td>
<td>95%</td>
<td>90%</td>
<td>20%</td>
</tr>
<tr>
<td><strong>South</strong></td>
<td>20%</td>
<td>5%</td>
<td>10%</td>
<td>80%</td>
</tr>
</tbody>
</table>

*Distribution of population and resources between North and South (approximations)*

What conclusions should be drawn from these observations? Firstly, that there are obviously close linkages between health, science and technology, and the overall proc-
Figure 4

Percentage of calories required

Source: Verhasselt and T. 1997

Figure 5


World
- Labor Force 1950
- Increment Labor Force 1950 - 1975
- Increment in Labor Force 1975 - 2000

Developing Countries

Source: Verhasselt and T. 1997
ess of development. Secondly, that it might not be very effective to subordinate the promotion of health to economic development, since the latter progresses slowly and unevenly. Thirdly, that the minimal resources available for research in the South should be used selectively to maximize their impact on health. It is of the essence to foster reliable partnerships with the North, in order to strengthen the overall infrastructure in science and technology, and to equip the decision-making apparatus with appropriate capabilities in policy planning and research.

5.3 Science and technology policies

Enlightened policies are required in order to ensure that an adequate response is made to demands, needs and opportunities in relation to the use of science and technology for the purposes of improving health, whether individually or nationally. This is achieved firstly by establishing mechanisms for recognizing and assessing needs and opportunities, and secondly by specifying guidelines for deciding the choice, or balance, between different options that arise. In additional, help may be needed by planners in making good use of decision-support procedures by which to decide priorities of concern and allocate resources within the national context.

It is obvious that health research policies will differ from country to country, but most developing countries have some priorities common to all. WHO needs to have in-house expertise on a variety of technologies, and access to technical advice on many others. It is also uniquely
placed to recognize early signs of emerging threats to health by using its unique capability to compile and evaluate data across national and continental boundaries. Assistance with the methodologies of trend detection and forecasting can properly be offered by WHO to member countries.

An appropriate technology policy is essential to ensure that technology needs are identified. At national level, this may require the assistance of experts who would, inter alia, take a critical look at existing problems in the light of available technology and resources. Continuous evaluation and monitoring of new developments in science and technology are essential to avoid wastage and repetition of mistakes already made elsewhere.

Implementation of solutions based on science and technology is an important component of professional work, and the initiative must lie with those who understand the technology concerned. Planners should be fully conversant with the potential and cost of any new technological applications, which means that an effective dialogue between planners and informed professionals must exist.

Training of personnel will certainly be necessary. It may also be vital to ensure that the practices and culture of the personnel are not inimical to the technology or, in practice, its use. Incentives may be needed to ensure that the technological equipment is properly installed and maintained, and that the operating personnel can guarantee the continued quality of performance.
5.4 The need for specific new methodologies

5.4.1 A policy for essential information

What we need to know

Research is vital to specify what information is needed, bearing in mind the need for quality testing and assurance, how it should be expressed and how it should be stored to form a sensible and potentially informative «knowledge base». The techniques of artificial intelligence have much to offer here, and the development of suitable expert systems would be timely.

Planning needs information; so does research. The services and the resource allocations to provide national health care can only be rationally planned on the basis of knowledge about the needs in the light of all relevant factors. But what knowledge is needed? An «essential information list» for planning purposes could be a valuable guide for member countries. It would specify the minimum set of data that will permit effective planning and support policy analysis.

Once national policy needs have been identified, it will be feasible to deduce the informational needs. Once the informational needs have been met, by adequate data col-
lection, it will be possible to demonstrate how policy should develop. Once policy has been developed, its performance in different circumstances can be analyzed. Policy analysis is crucial because of the need to understand how policies would operate under changing national circumstances resulting from development.

Some components of an essential information list could be readily specified and easily measured as explicit variables. Other information can only be obtained indirectly as indicators, so various new indicators may need to be developed and validated; they should be both inexpensive and robust. Not all information exists in the form of numerical data. Some can only be expressed qualitatively, or may exist in the form of expert observations; if this can be converted from anecdotal indications into systematic, logically-consistent knowledge, it will prove a valuable source of inexpensive information. Objective methods of validating new or existing indicators are a priority requirement.

Furthermore, the insights and expertise acquired by, for instance, planners, epidemiologists, and external consultants should be seen as an important part of a country's «knowledge base»; it should be captured in a form that makes it readily accessible to later successors, and not merely dissipated with the departure of the experts concerned.
5.4.2 Indicators

The search for better indicators

Whether studying health-related phenomena, or trying to unravel the complex pathways of causes and effects that link health with events and variables in other sectors, better indicators are needed. Notions like «ill-health» or «a lack of health» need to be replaced by indicators expressing such positive concepts as «perceived quality of life», «health reserve» or «well-being.» A wider critical review of indicators raises other issues – acceptability, availability, utility (explanatory and predictive capability) and validity – and the need to discard those that are redundant, unverifiable, unstable or ineffective.

The difficulty that arises with indicators is that it is usually regarded as essential to identify something «measurable», whereas most of the entities being examined are not quantifiable, at least not in any simple way. A further problem exists with validation, which is not often attempted. New indicators with suitable properties are needed now, and so is the methodology for designing them. In the natural course of development, a new indicator giving positive results usually has to be transformed into a robust, cheap technique. Success at this stage will determine the utility of the indicator.

Health as a concept will always be subjective; it cannot generally be measured in any direct way. Health and health
status of an individual or of a community can only be evaluated by using measures that «indicate» the variable, attribute or concept that cannot itself be accessed. But by disaggregating the concept into its contributory components (some being lower level concepts themselves) using cognitive analysis, it is feasible to iterate the process down until a set of observable or measurable elements can be recognized. The process would have to be guided by a «knowledge map,» and this takes account of the fact that much of the contributory information would have to be in the form of «knowledge» rather than data. Such indicators are called «knowledge-based» indicators, and seem to offer potential for wide-ranging applications, in particular, for contributing to research on multisectoral interactions with health, as well as on behavioural issues mentioned below.

5.4.3 Behavioural factors

Behavioural issues are crucial in the context of health, not least in order to understand the origins of health-damaging behaviour, and to identify approaches and design the means by which health-promoting behaviour may be encouraged. In this context, the term behaviour includes that of individuals, families, communities and organizations.

Understanding behaviour generally starts from direct observation rather than quantitative measurement, and much potentially useful knowledge comes from subjective impressions. There seems to be no common perception that a fully «scientific» approach is feasible.
The need to understand individual behavioural choices in the context of health raises many questions which have not yet been answered. For instance, what part do social-environmental factors, economic circumstances and cultural values play in behavioural choices; what interactions exist between individuals and communities, and how do these exert an influence; what is the role of an individual's internally perceived «quality of life» in relation to particular behavioural choices; what features contribute to an individual's perception of this «quality of life»; what is the relation between «stress» and behaviour; how does perceived risk enter behavioural choice? More generally, we need to understand the influence on individual behaviour of various institutions: administrations, communities, social pressures, the media.

In the study of behaviour-affecting measures, it is necessary to identify educational actions that act at the cultural level, especially in synergism with other measures. One might also ask what leads some societies to initiate community-wide action to improve health, e.g., by environmental action? Identifying the motivating factors underlying successful manipulation of group behaviour (such as fashion or modes of lifestyle) may be instructive. Indeed, case studies will clearly be a fruitful source of information.

The behavioural patterns of and within organizations for health care delivery also warrant investigation, for instance, the process of decision-making and resource allocation, both within an organization – in supporting its
infrastructure – and in carrying out its function. The structure of the organization, internally and externally, may be relevant to its behaviour patterns, those of its personnel, and its efficacy; a taxonomy of organizations according to their structure and how they conceive their role might be a useful starting point. How organizations affect and are affected by the motivations of their personnel is another possible area for investigation.

Research should seek to increase knowledge about the motivations and constraints that affect behaviour, and should also acquire a better understanding of the available mechanisms and potential for influencing it – together with the possible risks – so as to reduce health-damaging behaviour and encourage health-promoting behaviour in the individual or group.

5.4.4 Systems and modelling approaches

The weaknesses of previous global models suggest that new approaches are needed, particularly in terms of defining the right questions, acquiring the right data and developing the right methods.

There are two major problems to be faced with models: first, complexity, and second, character. Complexity brings its own problems of practicality – identifying all the pathways comprehensively, determining the nature of the causal effects along each pathway, and expressing all the factors in a computer model that can be shown to be correct and
that requires, of course, sufficient computer power and speed. A full description of any system relevant to health will indeed be highly complex and elaborate. Is a full system feasible? Probably not. So, is a partial system model feasible and – more important – valid? So the significant question is whether simplified system models can be developed and, if so, whether they are likely to be valid?

On the matter of system character, an interesting issue emerges. When contemplating dynamic system models, economists naturally think in terms of a quantitative mathematical description of each pathway involved. But in the socio-economic context, at least some important relationships, causal or not, cannot be expressed in this way or, if they can, only at the cost of great complexity. However, such relationships can always be expressed semantically, i.e., in terms of verbal statements. These statements constitute knowledge about the system that is just as valid as quantitative mathematical statements and equations. It helps to recognize this because information in the form of semantic «knowledge» can be handled formally (stored in a computer, tested for logical consistency, linked inductively with other knowledge) using the methodology of computational logic. In principle, one could envisage integrating such a «knowledge-based» model representing appropriate parts of a system with a more conventional quantitative model representing other parts, thus achieving a more comprehensive representation of the overall system. The methodology needs and warrants further research.
5.4.5 Trend assessment and forecasting

The need to strengthen capacity for epidemiological analysis from field level up to policy level cannot be over-emphasized. Indeed, periodic observation and measurement of health-related variables are indispensable in order to monitor changes in health status.

Forecasting, prediction and trend analysis are terms that are often lumped together without regard to the multiplicity of ideas, purposes and methods involved, or to the different kinds of raw material to which they are directed. The common factor is change, particularly systematic change, whether with reference to a variable or an indicator, to social change, to technological developments or to emerging health problems.

Forecasting depends on trend detection, modelling and extrapolation. In its simplest form it involves the estimation of future magnitudes of a variable or a quantitative indicator on the basis of its recent past history. Prediction, on the other hand, is the attempt to guess new developments that will flow from what already exists, taking into account the momentum of existing patterns of change, or of new events that could occur. A trend is a systematic change in the size of a variable, or in its spatial distribution or in some other pattern feature; but the concept is also used in relation to more elaborate phenomena such as social change or technological development. It is sometimes useful to distinguish different types of trend; they may be temporal: a progressive change with the passage of time; spatial, show-
ing an altered geographical distribution with time; or spatio-
temporal, involving trends in both.

One must specify the kind of change to be monitored, 
select the indicator to be used, establish if the change is 
systematic, identify the pattern of longitudinal change in 
the past, isolate any underlying trend, extrapolate and – 
where appropriate – set the confidence band. Each of these 
steps requires a careful methodological choice. Prediction 
calls for insight, for sensitivity to what is possible and, 
perhaps, for a degree of lateral thinking. For instance, it is 
not difficult to sense the existence of new viruses «waiting 
in the wings»; some may be analogous to the 
immunodeficiency type but it is only possible to make even 
such an uninformative statement as this because we already 
have models to guide thought. Insight into viral structure 
is needed to expand on the prediction.

Health sector issues that are likely to achieve the status 
of emerging problems can often be recognized as the result 
of an underlying process or variable operating systemati-
cally, thus generating a consistent trend in some monitoring 
variable. Of course, not all variables behave this way; 
unpredictable events do occur – although if the possibility 
that they might occur is recognized, the chance of their 
ocurrence can sometimes be calculated empirically.

The fact that many health and health-related variables 
exhibit special features cannot be overlooked, because this 
must influence the procedures for trend detection and other
processes for recognizing changes. Numerous socio-economic variables that are linked to health – for instance, prices on world markets for agricultural commodities – exhibit long-term trends which may be obscured by irregular short-term fluctuations. Great care is needed in choosing the technical methods employed for forecasting.

There is scope for wider understanding and use of forecasting methodology in the health field. Research is needed into the choice of approach, together with indications of the risks likely to be encountered.

5.5 The emergence of new ethical issues

A Magna Carta of Ethics?

The history of mankind until this day shows that so far the «global village» does not accept only one human value system, but is using several conflicting systems which – in addition – seem to be modifiable by political will at any time. However, for the survival of man it will be crucial to adopt a «Magna Carta of ethics for global development» that is adhered to and that can be enforced.  

Biotechnology is becoming the source of significant new ethical problems; this is illustrated by research on the human genome. The mapping of the human genome,
which may be completed within the next ten to fifteen years, is a scientific development of potentially revolutionary impact on biomedical technology and health care. It will speed up significantly the identification of the genetic basis of widespread diseases, enable early, pre-clinical diagnosis, and facilitate the development of prevention or risk assessment, of new techniques and of effective therapies. Related advances in genetic engineering and biotechnology are already producing novel drugs and vaccines.

However, these developments can have controversial implications and may result in difficult ethical and social dilemmas. Much of the current research and development in genetic engineering and biotechnology is carried out by private companies, and there is an increasing tendency to commercialize and «cash in on» scientific advances. Recent attempts to obtain patent protection for specified human DNA sequences and for genetically engineered organisms, such as transgenic animals, should be seen as early warnings of likely future scenarios of conflict between private and public interest in this area. In the absence of an internationally adopted code of ethics in genomic research, and of appropriate legislation, the commercial cost of new biotechnologies with great potential impact on health care may be too high to be affordable by those in greatest need, especially Third World populations.

Another potential risk which may be extremely difficult to control is the possible misuse of genetic diagnosis
for employment-related or insurance-related screening. Such practices could infringe upon individual human rights, and enhance prejudice and discrimination against minorities.

Although most scientists, public health decision-makers and the general public tend at present to view such hazards as being rather improbable, the lessons of history should teach us that the risks should not be ignored. It is therefore important for WHO to study these problems and present the governing bodies with options for appropriate action.
6. Assessing needs and setting research priorities

The research needs and priorities of WHO will inevitably differ between regions, and between countries within the same region, according to a number of variables: the nature of the predominant health problems; the present level and changing pattern of health; the available economic resources and the appropriate human development policies; and the cultural, political and religious traditions. One objective, however, should be common to all - to undertake the kinds of research that will make it possible to advance rapidly to the goal of Health for All and the achievement of acceptable human development. It is probable that regional needs and priorities will be based on the synthesis of country ones, so the global emphasis will in turn reflect a distillate of regional and country requirements.

6.1 Country needs and priorities

A health research strategy must, first of all, be dynamic, and it must be based on the well-established concept that the determinants of health are of a multisectoral nature, and that there should be an appropriate balance between preventive and therapeutic measures and between basic and applied research. Furthermore, health research should cover a broad spectrum of activities ranging from elementary fact-finding and situation analysis to the fostering of innovation and experimentation.
Research on country-specific problems must extend beyond the narrow confines of the health sector. It should address health needs, disease profiles, resource allocation, programme evaluation, health financing and other issues concerning the objectives and operation of a country’s health system. Immediate future research strategies must also relate, inter alia, to applying emerging findings of science and technology, tackling problems of critical significance to health, and determining new and better indicators of health development.

Determination of national research priorities and implementation of national health research policies constitute a sine qua non for meaningful health care development. In order to be relevant, national health policy must be based on valid data derived from scientific research.

WHO as of now is laying emphasis in its programmes on five main areas: (i) health of man in a changing environment; (ii) food and nutrition for a healthy life; (iii) integrated disease control; (iv) information needs for advocacy, educational, managerial and scientific purposes; and (v) intensified health development action especially in developing countries, and those most in need. At the same time the basic and fundamental thrust of WHO’s programmes is on protecting and promoting health, ensuring access to health care, mobilizing resources for health, monitoring and evaluating public health action, and evolving new mechanisms and new avenues of effective action to meet the increasing health demands under circumstances of economic uncertainty.
6.2 Criteria for WHO’s involvement

Selecting priority areas

Certain criteria for selecting priority areas for WHO research efforts were suggested by the Global ACHR as long ago as 1976, and those criteria are still valid today. They include: (i) the magnitude of the problem, especially in the developing countries; (ii) the suitability of the problem for international collaborative research efforts coordinated by WHO; (iii) the priority of the problem as perceived by individual countries themselves and its relevance to the socioeconomic development of Member States; (iv) the probability of finding solutions and the feasibility of applying them nationally; (v) the availability of manpower, facilities and funds to carry out the research; (vi) the involvement of the countries themselves in the research efforts; (vii) the level of ongoing research efforts, both nationally and internationally, to solve the problem; (viii) the benefits that would accrue from applying the results; and (ix) the potential usefulness of those results in solving other problems.
7. Research capability strengthening

The basic requirements for the conduct of nearly all research are manpower, resources and infrastructures: the most important of the three is manpower, that is, the people who constitute the knowledge and skill base and the power of the society. Health research capacities will continue to vary from country to country, but national health systems will not develop without a national capacity to carry out health research. Research capability strengthening (RCS), particularly in developing countries, is critical for the training of researchers and the building up of research institutions. Determining the scope and size of a research establishment is a national responsibility and an important and integral part of health development. As such, it is of paramount importance to obtain national commitment, at the highest level, to promoting and providing the support required to build and sustain RCS.

7.1 Developing national capacity

Ministries of health play a pivotal role in obtaining this national commitment. However, in view of the multisectoral scope of health research, several ministries should collaborate to mobilize support from other sectors such as education, science and technology, and planning. External support for health research and/or RCS should be seen as complementary to that provided for this purpose from national resources.
The ideal research institution

Based on studies carried out by the ACHR, the main features which determine the success and sustainability of a research institution include: (i) a history of consistently strong leadership, dedication to quality work and constant improvement; (ii) a tradition of scientific inquiry coupled with a sense of discipline and rigour in research management; (iii) systematic documentation of professional and research activities, including publications; (iv) a critical mass, in professional, technical and financial terms, to guarantee momentum; (v) an environment conducive to research and likely to motivate young scientists; (vi) a close relationship with policy planners and decision-makers; and (vii) external cooperation and networking to attract further technical support and funding from international sources.

The priorities for RCS should flow directly from national health and research priorities. Here too the ministries of health, being the health providers, should have a key role. They are in the best position to enunciate balanced priorities for RCS. The focus of RCS should initially be on investigating health problems, using scientific methods, to provide the rationale for informed decision-making that will lead to improved management of health services.

Foremost amongst the various disciplines in which skills are needed for national health research programmes
are epidemiology, supported by essential laboratory re-
search, policy analysis research, information and social
sciences. The level and duration of training in these dis-
ciplines should be carefully worked out, keeping each coun-
try's unique situation in mind.

The RCS process should ensure utilization of research
results (in order to demonstrate its usefulness – the key to
obtaining resources), and should lead to linkages between
scientists in universities, health services and research insti-
tutions.

To start with, every effort should be made to use exist-
ing facilities and personnel. Very few developing countries
can afford to build and maintain institutions solely for
health research. In this connection the universities and
academic institutions have a special role. They should
become more involved in national health research pro-
grames and encourage their staff to engage in such re-
search, even for purposes of promotion and career advance-
ment.

Considerable experience has been gained internation-
ally in RCS. Approaches commonly used include support
for the training of researchers, for institutional facilities,
equipment and supplies, and for the creation of new staff
positions. Often neglected aspects of RCS are the provi-
sion of scientific information and the establishment of
linkages amongst scientists within the country and with
those from other countries.
Experience in several developing countries has also shown that, while qualified physicians or science graduates can be trained to carry out national health research, every type of health worker – even at the most peripheral level – can learn scientific approaches that will enable them to analyse health problems in a systematic manner and take steps to deal with them. The RCS process is long-drawn-out, and the approaches adopted should be flexible so that they can be modified with time and experience. In order to develop future generations of researchers, problem-solving attitudes and a spirit of inquiry should be encouraged as essential components of formative education. Similarly medical and science students, during their training, should be encouraged to take part in on-going research projects in their institutions or even carry out a time-limited project. A broad approach should be adopted for training researchers, ranging from teaching health workers scientific methods of collecting and analysing data to training science, medical, nursing and social science graduates in more advanced and sophisticated techniques and skills.

In most developing countries, it may not be possible to employ researchers on a full-time basis. A system of incentives including appropriate career structures should be available, if required, to attract and retain potential research workers. Similarly, appropriate incentives should be made available to coax well-trained scientists from developing countries who are working in developed countries to return home.
7.2 Role of international cooperation

A responsible scientific community

It is the role of the scientific community to increase the knowledge that is of critical significance to global development, to examine barriers for not using available knowledge and to test means and ways to overcome them, to develop new methods and technologies for coping with problems on hand, to establish new approaches to communicate the results of such global science to responsible politicians or community leaders in spite of their «short-term perspectives» and most importantly — to train scientific people who are capable of quality work and transdisciplinary thinking in all parts of the world as community teachers.³

Health research has become more complex, interdisciplinary and global. It is a pluralistic enterprise, with expanding global, legal and ethical implications. It has become increasingly multisectoral, requiring new partnerships, whether North-South, South-South, public sector-private sector or academic-industrial. Thus it now becomes more critical than ever before to develop stronger linkages between institutions in the North and their counterparts in the South where a specific disease may be epidemic. Emerging health issues must be anticipated as a part of forward planning. For instance, regional initiatives in the South must be developed in partnership with institutions in the North and vice-versa, based on windows of opportunity.
Certainly, solutions to many public health problems will require a marshalling of scientists and resources on a global scale. For instance, due to geographic difference, diagnostic and therapeutic measures will require testing in both North/South regions of the world. Such measures include, among others, vaccines for AIDS, malaria and other parasitic diseases, as well as a number of childhood diarrhoeal and respiratory infections.

Future collaborations will depend on the participation of scientific teams and communities from both North and South regions of the world. These partnerships present both opportunities and challenges for investigators from the North working collegially with their counterparts in the South, and vice-versa.

The development of several medical technologies, including an AIDS vaccine, will call for policy initiatives that address ethical and legal obligations to all populations participating in clinical trials, but especially the underserved in the developing world.

Scientific solutions to such problems as global epidemics and lethal diseases, environmental degradation and famine will require such a coordinated global response. Public policy decisions of international dimensions will need assessment of data collected from international efforts.

Many bilateral and multilateral agencies have provided resources to developing countries for health research projects
and, to a lesser extent, for RCS. In some instances external assistance has played a catalytic role in mobilizing national support, while, in others, external support was short-lived and not associated with any meaningful, endogenous RCS. Such collaboration should be a sustained partnership on an equal basis, providing an opportunity for both technology generation and adaptation for use in the field. Research projects undertaken within these collaborative ventures are a fruitful ground for training young researchers. Cooperation between developed and developing countries, as well as among developing countries, is desirable. Regional agreements could enhance national motivation to join in a common enterprise.

WHO should coordinate the RCS activities of its special programmes for research and training, and other programmes with a research component, to effectively meet the RCS needs of developing countries.

7.3 Resources for health research

A great deal of thinking and writing has been done by WHO and other organizations on how to obtain adequate resources for health research, especially in developing countries, but what is available or likely to be available is grossly inadequate to meet all the ideas generated. Resources for health research include manpower, equipment facilities, scientific tradition and funding, but this section will mainly address funding facilities and equipment, since
the issues of manpower and scientific tradition have already been dealt with under Research Capability Strengthening (RCS). It must be emphasized, however, that research funding and RCS must be taken together; all too often in the past, expensive research facilities have been set up which have withered away because inadequate provisions had been made for funding research and the technical support essential to that research.

A partner in research

An example of the NGOs which are working most closely with WHO in the field of international health research is CIOMS – the Council for International Organizations of Medical Science. This is an umbrella organization for some 70 international organizations and 33 national bodies, whose objectives can be summed up as:

- to promote international activities in the field of medical sciences whenever the participation of several international associations and national institutions adhering to the Council is deemed necessary; and

- to serve the scientific interests of the international biomedical community in general.

CIOMS has been particularly instrumental in organizing international conferences and studies on the subject of bioethics; in 1982 it published its International Guidelines for Biomedical Research involving Human Subjects, subsequently revised and updated in 1992.
WHO has a good track record over the past 20 years for fund-raising for research and RCS oriented to the needs of the developing countries. The rise in funding raised by WHO for these activities from US$ 5 million a year two decades ago to over US$ 100 million a year in 1992 can largely be attributed to the recognition that the research problems identified were of high priority, and that WHO has the expertise and structure to ensure high quality and well-managed research information systems.

Furthermore, WHO has the structure at national, regional and inter-regional levels to ensure that the research and RCS conducted conform to high technical and ethical standards, with close interaction between research and operational activities. The continued and increasing support by those providing funds to support WHO’s research priorities and programmes over the past years reflects satisfaction with the quality of the collaborative research conducted, the progress made in institution-strengthening for research in developing countries and the cost-effective management of the activities themselves. It is desirable at a time of worldwide recession and economic restructuring to capitalize on this experience and these achievements.

7.3.1 Mechanisms for raising funds for research facilities

Health systems research (HSR) is most frequently given the highest priority in recommendations on research requiring expansion in developing countries. HSR is considered
to be one of the keys to getting greater value from the scarce resources that are available for health. It is also an important mechanism to identify unmet health needs, and to guide policies towards overcoming the inequities in health status. HSR which monitors the effectiveness of health systems and health services programmes, and informs judgements on policies and management decisions, is crucial for the development of appropriate health care services for achieving Health for all and ensuring the sustainability of health research in developing countries. Those countries are also increasingly involved in biomedical and basic research to identify new methods of improving health and the control and management of diseases.

**Biomedical and health systems research**

The more multidisciplinary the research institution is, the more likely it is to be sustained. Biomedical research goes hand-in-hand with health systems research (HSR). The capacity for biomedical, socio-behavioural and economic health research contributes to the strengthening of HSR [which], much as it is needed in developing countries, is more difficult to sustain than biomedical research. Biomedical research is more vertical, with clear-cut objectives and methodology, while HSR is horizontal, cutting across many disciplines. Support for HSR is not only necessary, it is also cost-effective.
In the overall experience of WHO, there are different ways in which further funds have been or might be raised for support of health-related research. These mechanisms include:

(a) Increasing funds for research from WHO's regular budget (RB). Of all mechanisms, this is the one that represents the hardest money. Once enshrined in the budget, an item is likely to be carried through for a number of years and will represent a very genuine commitment of a country to a particular topic. On the other hand, it usually takes a number of years to get a project into the RB and there is intense competition among different proposed activities.

(b) Intensified efforts to have WHO act as an Executing Agency for programmes and projects funded by other agencies. In this context, WHO is asked on the basis of its technical competence to develop — in conjunction with a Member State and an international agency such as the World Bank — a detailed plan of action for a given «health research plus research capability strengthening» activity (HR/RCS) over a number of years. Once the plan is approved, the main responsibility will lie with the Member State and WHO. Here again, one is in relatively «hard money» territory.
(c) Generation of projects in which WHO acts as a facilitator and technical partner in bilateral aid programmes. This is a similar mechanism to that of Executing Agency except that the source of funds is governmental rather than international.

(d) Collaboration with philanthropic organizations. Some philanthropic organizations might simply be sources of funds; others, like the Regional Fund, can be expected to make valuable technical as well as financial inputs into a project.

(e) Extension of WHO special programmes mechanism to other research areas and RCS. The special programme mechanism for HR/RCS can actually bring together all the previously mentioned sources of funds into a single mechanism. Regular budget, international organizations, government aid programmes and private foundations all contribute to a large and complex research and institution-strengthening programme.

(f) Modification of the special programme mechanism to a regionally oriented base - «the intensified programme mechanism.» It is possible that, for a new HSR programme, a modification of the special programme mechanism could be anchored in the regional offices rather than at WHO headquarters.
(g) Enhanced tapping of the pharmaceutical and other industries for increased contributions. This could represent a so far largely untapped yet considerable potential source of funds for HR/RCS unconnected to drugs, equipments or other products.

(h) Encouraging research initiatives in developed countries to focus on health problems of the South, as in a recent joint USA-Japan research effort with such an orientation.

(i) Exploring the possibility of public contributions – «voluntarism» (in forms prevalent in many countries for research in such areas as cancer or CVD) for HR/RCS for developing countries.

(j) Co-financing of HR/RCS in developing countries between WHO programmes, or national projects with WHO acting as intermediate, and the large research institutes of developed countries. This would not only bring in funds to such projects but would also stimulate or reorient research in the large institutes of developed countries into problems of concern to the Third World. Such co-financing and collaborative projects would also serve to promote RCS in developing countries.

(k) Increasing contact between WHO and the Economic Commission for Europe which has funds that could be channelled into HR/RCS for developing countries.
(l) Changing national regulations in certain developed countries to allow investigators to use a percentage of their research funds for collaborative research with scientists and institutions in developing countries.

(m) The establishment in WHO of highly modified special programmes, such as that on vaccine development, which bring together staff of different existing programmes but without the infrastructure, staffing or managerial mechanisms of WHO’s large special programmes.

7.3.2 Need for greater visibility and commitment

In order to facilitate fund-raising for research, it is important to give a higher profile than hitherto to health research in science policy units. A small investment in building up nuclei of health research-oriented individuals within existing science policy units would help to encourage this. There is also a need for better data and better analysis of funding and activities in health research and RCS. For instance, estimates of expenditures on all health R & D conducted in developing countries in the mid-eighties vary by a factor of 2; from $685 million to $1430 million: what is needed is accurate documentation kept on an ongoing basis.
It is incorrect, although repeatedly done, to equate activity with funding. For one thing, different types of research involve different costs. Some research such as HSR can be conducted much more cheaply than, say, drug development. Moreover costs vary among countries: $1 million spent in a developing country may be the equivalent of $20 million spent in an industrialized country. Costs also vary over time owing to inflation and changing currency values. It is essential to compare like with like by using constant units of currency, with a given year taken as a basis. One must also avoid naive analyses, such as those which imply that virtually none of the research carried out in developed countries is of benefit to the less developed countries. Not only is fundamental research likely to benefit equally both developed and developing countries but—given the rapidly increasing incidence of post-transitional diseases in LDCs such as cancer and CVD—research in industrialized countries on these diseases is likely to be of substantial benefit to developing countries as well.

Finally, it is obvious that the best way of attracting increasing funds to health research and research capability strengthening is for both WHO and governments to give these activities greater visibility and greater commitment. For example: by WHO allocating larger amounts of the regular budget to HR/RCS; or by governments giving greater prominence in their national health plans to HR/RCS, or earmarking 5% of funds in the often very large bilateral aid health programmes.
Concluding remarks

As mentioned in the foreword, the policies and strategies discussed in this text complement and expand the 1986 document on «health research strategy.» Changes in the socio-economic, technological and behavioural spheres increasingly determine the process of health development.

Severe constraints in financial, material and human resources must be addressed by promoting better methods of policy analysis, planning and research. The synergistic efforts of all relevant sectors which determine health status and health services are essential.

The need for more effective, multisectoral approaches to health research is consistent with an earlier ACHR statement: «In developed countries, the infections declined because of (a) increased resistance brought about by improvement in nutrition and, later to a lesser extent, immunization, and (b) reduced exposure, which resulted from hygienic measures (in respect of water, sanitation, food and housing) introduced progressively from the late nineteenth century. In the developing countries, the decline of mortality appears to have been due predominantly to better nutrition, for in some countries which in a few decades have attained Western standards of health there were no substantial advances in the other major influences. However, there were some other developments which contributed powerfully if indirectly to health: education, particu-
larly of women; equity of access to health resources; political and social will to improve health; above all, control of fertility, which safeguarded the advances from the effects of rising numbers.

In the light of this assessment of the contribution of different influences, developing countries which do not have the resources needed to provide all the services specified under primary health care – and that is the position in which nearly all are placed – would be well-advised to give high priority in research and services to nutrition, immunization and sanitation.»
(excerpt from «Priorities in health research and service policies in developing countries»)7

A more detailed discussion of research priorities, however, should be the subject of a separate document.
References


2 Adapted from Health Research Strategy, WHO/RPD/ACHR (HRS)/86, pp 24-30

3 Professor Theodor M. Fliedner, Task Force Report on Evolving Problems of Critical Significance to Health, ACHR31/92.8, p. 2

4 ACMR document, 1976, ACMR18/76.13

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