

Chapter 3

Progress in methodological issues

*Section 1
Monitoring resource flows and priorities for health R&D*

*Section 2
Burden of disease and analysis of health determinants*

*Section 3
Cost-effectiveness analysis and methods to assist resource allocation*

Summary

Chapter 3 focuses on three main tools supported by the Global Forum for Health Research which are important in any priority-setting approach.

Monitoring resource flows in health research

Information on global spending on health research is critical to evaluate the way funds are allocated and to monitor the 10/90 gap. Yet no estimates of resource flows in health research have been carried out since 1992, and there is no systematic monitoring system in place to measure funding of health research at the global level. The Global Forum has been working with a number of partners to establish an ongoing, standardized system to monitor global investments in health research. The group has advanced steadily towards the establishment of a computerized system for this.

Analysis of the burden of disease

Over the past decade, major progress has been made in the calculation of the burden of disease, particularly through the Global Burden of Disease Study (GBD 1990). This work will be continued with the implementation of the project GBD 2000, presented during Forum 3 (June 1999), which will project estimated disease burden to the year 2030. Forum 3 also included presentations on systems and projects which are expected to help increase the contribution of developing countries on burden of disease studies and help improve estimates of disease burden.

Cost-effectiveness analysis of investments in health research

Cost-effectiveness analysis is a valuable tool to help policy-makers and programme managers decide between different ways of spending their scarce resources to improve population health. The Global Forum for Health Research is supporting a number of cost-effectiveness studies in developing countries with a view to helping develop a standard methodology in this field for broad application to interventions in the developing world.

With the use of these analytical tools, the Global Forum can help monitor and quantify improvements in the 10/90 imbalance in health research investment. The aim is to review the magnitude of current and future disease burden and investments in R&D needed to reduce that specific burden. This information should provide a powerful summary indicator of current funding priorities for health R&D. For instance, this juxtaposition for the world's two biggest killer diseases, pneumonia and diarrhoeal disease, underscores the extreme mismatch between the disease burden and R&D investments. Although these two diseases represent about 11% of total burden, estimated R&D spending is only 0.2% of total R&D spending.¹

¹ Ad Hoc Committee on Health Research. WHO 1996.

Introduction

The *10/90 Report on Health Research 1999* provided detailed information on the analytical work that the Global Forum is promoting to help the process of priority setting for health research. The Global Forum is involved in efforts to develop analytical tools to help improve the evidence-based decision-making process. It is anticipated that improved methodologies and user-friendly tools will be attractive to agencies and governments in setting priorities for health research. While it is recognized that decisions on the allocation of funds for health research are often influenced by political considerations, the availability of an improved set of methodologies for priority setting at the local and national level would strongly reinforce the argument for a fundamental review of the way research funds are allocated.

This chapter provides a review of critical issues which have been identified over the past year. The Global Forum continues to focus its analytical work on priority setting on the following key analytical tools highlighted in the recommendations of the WHO Ad Hoc Committee Report:

- monitoring resource flows in health research
- burden of disease and analysis of health determinants
- cost-effectiveness analysis of investments in health research.

Through the use of these analytical tools the Global Forum can help monitor and quantify changes in the 10/90 imbalance in health research investments. The aim is to review the magnitude of current and future disease burden and investments in R&D needed to reduce that specific burden. This information should provide a powerful summary indicator of current funding priorities for health R&D.

The building blocks of the analytical work are not static. The tools require methodological improvements and adaptations to specific conditions. Many of these building blocks are still under development and have only recently been implemented in the field. As such, the methodologies require constant incorporation of results from field-testing. It is the progress in the modification of tools carried out by partners of the Global Forum that is described in this chapter. The Global Forum provides a catalyst for this work and helps ensure that these results are disseminated to a wider audience and generate interest and support from a wider range of constituencies.

Section 1

Monitoring resource flows and priorities for health R&D

1. Monitoring resource flows for global health research

The lack of a systematic monitoring of global spending on health research is one of the root causes of the 10/90 gap. There is no ongoing, reliable and retrievable data set of information on global health research funding. As a result, there are no accurate estimates of global spending, nor of the amounts allocated for research on the main diseases or risk factors. Yet this information is vital if the allocation of resources is to be improved at the global and national levels.

Although no regular monitoring system exists, independent estimates of resource flows have been conducted over the years. The Commission on Health Research for Development (1990) estimated that 95% of health R&D resources are spent on health problems affecting people in the industrialized world, while only 5% are spent on health problems in developing countries. Meanwhile, studies conducted by researchers at Harvard University in 1992 identified a similar range of imbalance in which only 5%-10% of global funding for health research was spent on health issues that affect the large majority of the world's population (see 10/90 Report 1999). This imbalance is referred to as the 10/90 gap in health research funding.

2. The Core Group on resource flows measurement of the Global Forum and its partners

The Global Forum and a number of partners have launched an effort to monitor global

spending on health research and development. The approach chosen by the Core Group differs from that used in regular national surveys to collect comparable statistics on R&D in OECD countries. While the former is based on data collection from major funding bodies in the public and private sectors, the latter is based on the response of recipient countries. The Core Group effort has a broader scope in that it extends beyond the OECD countries to include major funding bodies in developing countries.

The aim of the project is to develop a network and an information system to facilitate the systematic collection of internationally comparable statistics on global resource flows for health R&D. The system will serve as a tool for improving priority setting according to disease burden and for tracking the allocation of funds for R&D.

The Core Group was established in 1998 at a meeting entitled "Towards the Better Monitoring of Resource Flows to Health R&D", jointly convened by the Global Forum and the World Health Organization. Participants included representatives of funding agencies in the public and private sector, researchers from developed and developing countries who initiated national studies of health R&D and managers of databases of scientific projects.

Current institutions represented in the Core Group for the monitoring of resource flows for health research include the following:

- Council on Health Research for Development (COHRED)
- Government of the Philippines
- Global Forum for Health Research
- Harvard School of Public Health, USA
- Health Authority of New Zealand
- International Federation of Pharmaceutical Manufacturers' Associations (IFPMA)
- National Institutes of Health (NIH), USA
- Pan American Health Organization (PAHO)
- Scientists for Health and Research for Development (SHARED), The Netherlands
- United States Agency for International Development (USAID)
- Wellcome Trust, United Kingdom
- World Health Organization (WHO).

The Core Group met in January, June and October 1999 to examine the following issues: classification of the information, sources of information, level of aggregation required and use and dissemination of this information.

3. International database of health R&D funds

The first step in tracking funding is the creation of a system to organize the information to be collected. The Core Group has focused on efforts to establish an information system with well defined, mutually exclusive categories.

The international database will be based on information supplied by all major funding agencies on their allocation of funds for global health R&D. Recent major advances in communication technologies offer unprecedented opportunities to facilitate the exchange of information on research projects, on funding opportunities and on financial data on health R&D. The Core Group is taking advantage of these new opportunities by developing a web-based data collection

instrument, which will lead to the full interactivity of various existing websites. This compendium of information will then form the basis for monitoring resource flows over time. Sharing over the Internet and further analysis of this information will allow for an iterative process and gradual improvement of the database. One such initiative is the database on ongoing research projects, launched in 1996 by the Netherlands Organization for Scientific Research under the name of SHARED, to facilitate the exchange of information on research projects among scientists worldwide. It uses state-of-the-art web technology, which has been developed to take into account communication problems in less developed regions. The SHARED technology is to be used as the main system to collect information for the resource flows project.

4. Broad classification issues (see Insert 3.1)

The focus of the January 1999 Core Group meeting was to review options and agree on the choice of the conceptual framework². A major challenge was the need to balance desired inputs, feasibility and relevance for policy. Taking this into account, it was decided that investments for health R&D would be categorized in the database under five main categories:

- R&D on major disease groups, sub-groups and selected diseases – following the categorization developed for the global burden of disease study
- R&D on determinants of health (genetic, environmental, socio-economic, cultural and behavioural)
- R&D on health systems
- capacity building (human and institutional)
- fundamental research (not specific for any category described above).

² Catherine Michaud, Harvard Center for Population and Development Studies. Presentation at Forum 3, June 1999.

These categories are both comprehensive and mutually exclusive. They are also structured following a “tree structure” which moves from aggregate broad categories to more detailed sub-categories. Such a tree structure provides a flexible data collection instrument that can accommodate varying levels of aggregation for any topic of interest (Insert 3.1).

(i) Research on major disease groups and sub-groups

The first set of internationally comparable estimates of the global burden of disease in 1990 by age, sex and region were published in 1996 for over 100 diseases, health conditions and injuries.² This study was a major breakthrough in the development of evidence-based health policy. In recent years, a rapidly growing number of countries have undertaken and completed national burden of disease estimates. And in 1999, WHO established a new Department of Evidence for Health Policy to further this effort. A study is now under way to estimate the Global Burden of Disease 2000, as described in Section 2 below.

The juxtaposition of the magnitude of current and future disease burden and investments in R&D needed to reduce this burden provides a powerful summary indicator of current funding priorities for health R&D. One striking example of this is the extreme mismatch that exists between the disease burden and R&D investments for the world’s two biggest killer diseases: pneumonia and diarrhoeal disease. Although these two diseases represent about 11% of the total global disease burden, estimated R&D spending is only 0.2% of the total amount spent on research and development. In view of this, members of the Core Group agreed that the GBD classification of health

conditions, diseases and injuries should be adopted for the tracking of resource flows for R&D on major diseases and health conditions.

(ii) Research on determinants of health: exposures/risk factors that impact on health (within and beyond the health sector)

This section on risk factors is further subdivided into (i) proximate determinants of ill health and (ii) distal determinants of ill health.

Many diseases or injuries are caused by infection with a single pathogen, or by an isolated violent event without any known precursor. Research on those diseases is well captured by the GBD classification of disease topics. However, numerous cases of disease or injury arise from prior or current exposure to a risk factor of some sort. These cases of diseases and injuries would probably not have occurred without this exposure. Research on some risk factors clearly falls within the health sector: for example, hypertension, physical inactivity, unsafe sex and poor nutrition. However, others fall in other sectors such as environment, water and sanitation and education, or are due to the impact of undemocratic political systems on the health status of populations. It follows that investments to support R&D on risk factors and exposures should include the relevant R&D conducted in non-health sectors as well.

It is important to capture research information to identify and reliably quantify the impact of these risk factors so they receive the same attention as disease or injury in the health policy debates. For each disease or injury, a choice needs to be made between the prevention and treatment of the disease or injury itself, and the prevention or reduction

³ Global Burden of Disease, 1990. The Global Burden of Disease and Injury Series. Ed. C. Murray, A. Lopez, 1996.

of exposure to various risk factors that may be the underlying causes of disease or injury (proximate or distal determinant). There is growing awareness of the need to adopt a broader, multisectoral approach in defining priorities for the allocation of resources to tackle complex health problems. Research to provide reliable estimates of the contribution of various risk factors to the overall burden of disease and injury is thus required for a balanced and comprehensive assessment of the causes of ill-health.

(iii) Research on health systems

Even when tools (drugs and vaccines, for example) are available to reduce it, a large burden of disease may persist because of failures in health systems. For instance, research may be needed to develop and evaluate ways to increase the efficiency of the Expanded Programme on Immunization by simplifying delivery and maximizing use of opportunities for immunization. Another example would be research to evaluate the promotion of insecticide-impregnated bednets, possibly for inclusion in a future Healthy Household package. Research on how health systems respond to unmet needs is therefore a key component of health R&D. Research on health systems has three sub-components: policy, health services and intelligence.

(iv) Capacity building

Capacity building was described as one of the purposes of health R&D investments. It was further subdivided into “human capacity building” and “institutional capacity building”. Human capacity building includes the training of researchers and research staff in both short-term courses and academic qualifications. “Institutional capacity building” deals with equipment, building, development of management systems and infrastructure networks.

(v) Basic research

Strategies to define priorities for basic research are based on the selection of promising, high quality projects. Thus there is no need to further categorize generic areas of research. One example would be research on molecules which could lead to parasitic vaccines but with no clear direction as to which parasite it would target. Thus, this research area could not be categorized in any of above health conditions.

In addition, the Core Group recommended the inclusion of the geographic destination of R&D funds spent either within the donor country or “abroad” by country or region. This information is readily available from most funding sources and has important policy implications. Finally, the Core Group decided to leave out attempts to define who the ultimate beneficiaries of research results might be, and to leave out attempts to quantify the expected outputs of R&D (i.e. drugs, vaccines, diagnostics, new clinical algorithms and other interventions). R&D outputs should be the topic of semi-quantitative studies limited to topics of special interest.

Since most developing countries do not have national statistics on health R&D investments, the collection of health R&D statistics still requires a substantial investment of human and financial resources. An important objective is to collect comparable statistics in as many developing countries as possible. To facilitate this effort, the Core Group will define a minimum set of comparable data to be collected in developing countries.

5. Audience and users of information on resource flows for health research

The primary goal of this effort is to assist health R&D decision-makers by providing an objective information base to those who decide on the allocation of funds for health

R&D. The main users of resource flows information include decision-makers in the following key institutions:

- ministries of health and public research institutions
- WHO and other UN agencies
- development banks
- bilateral organizations
- foundations and other non-profit organizations
- private-sector companies.

Most of these categories of users of information on resource flows for health research are represented in the Core Group.

6. Future areas of work

The Core Group will collect information from the main agencies funding health research worldwide. In addition, the group will stimulate the implementation of projects both at the local and regional level to obtain more accurate information on resource flows. The use of national as opposed to international funds is of interest for developing countries in

particular. This information will be collected by incorporating more researchers from developing countries in the Core Group.

It is anticipated that the first estimates of the flow of resources towards health research at the global level will be available by October 2000. A report will be presented at the International Conference on Health Research and Development in Bangkok.

7. Contribution to correcting the 10/90 gap

The study of resource flows is central to monitoring the 10/90 imbalance. Yet ten years after the 10/90 gap was first identified, there is still no systematic tool in place to monitor health research financing. As a result, it is difficult to gauge how funding allocations are made. It is more likely that an ongoing system will show potential trends in expenditures than a series of cross-sectional surveys. This system is expected to play a central role in advocacy for change.

Insert 3.1

Summary data fields for the database on health R&D expenditures

Main topic	Sub-group	Level
Health R&D projects and programmes	Health conditions (preventive and curative / palliative / rehabilitative interventions)	Group I: Communicable / maternal / perinatal and nutritional conditions
		Group II: Noncommunicable diseases
		Group III: Injuries
	Risk factors	Proximate determinants Distal determinants
	Health systems	Policy Health services Intelligence
Capacity building	Fundamental research	No further breakdown
	Human Institutional	

Section 2

Burden of disease and analysis of health determinants

1. Introduction

Disease burden is an important measure of the degree of morbidity and mortality in a given population. Over the past decade, information on the global burden of disease has had a powerful influence on policy-makers and proved to be an effective tool for advocacy. The work has informed a large number of national and global initiatives and the accounting of healthy life lost as a consequence of morbidity has led to a renewed interest in a wide range of conditions.

Disease burden is increasingly recognized in both developing and developed countries as an impartial measure of the health status of a given population. This measure uses evidence-based information to provide a quantitative measurement of health status. This methodology relies on public health branches of quantitative disciplines, including epidemiology and demography.

The challenge now is to continue promoting this method as a quantitative tool, and to use the information to guide research priorities and funding allocation.

2. The 1990 and 2000 Global Burden of Disease Studies

Probably the largest piece of work undertaken to date has been that of the Harvard University/WHO/World Bank *Burden of Disease 1990 study* (GBD 1990)⁴ The GBD 1990 was first presented in the World Bank's *World Development Report 1993*.⁵ The data has since been re-analysed and produced a wealth of information on a wide range of health conditions for different regions of the world.

An important focus of this work is the emphasis on standardization of methods for data collection and analysis. One of the objectives of the GBD 1990 was to achieve consistency in global estimates from a wide range of sources and ensure avoidance of double counting of data, especially for mortality estimates. Another key aspect of the study was the investigation of the determinants of health. Estimates were made of the contribution of smoking, alcohol, substance abuse and other lifestyle factors to global ill-health.

⁴ Global Burden of Disease, 1990. The Global Burden of Disease and Injury Series. Ed. C. Murray, A. Lopez, 1996.

⁵ World Bank Development Report, 1993.

Insert 3.2

The Latin American experience: a regional example of resource flows monitoring⁶

This exploratory study was conducted in 1998 to examine major trends in health research financing in Latin America. The study was conducted in three countries which account for about 75% of health research in Latin America: Chile, Brazil and Mexico. An earlier study (1996) in the area indicated two trends in funding: (i) an increase in the share of private enterprise in science and technology expenditure and (ii) an increase in external financing by the Inter-American Development Bank (IDB) and the World Bank, mainly for technological innovation. In view of the limited sources of data for health research, the latest study was designed to clarify whether the existing private-sector investments in science and technology represented an absolute – or a relative – change in spending.

Information on international funding sources was explored since research resources are included in loans under non-specific allocation items. A systematic study was conducted on the flow of resources allocated to research components as part of loans from the World Bank and IDB. The study analysed 26 IDB projects disbursed between 1992 and 1998, using a specially designed matrix. The studies were quite different and included a variety of themes.

Of the 26 projects, 22 were focused exclusively on health and four on science and technology with a health component. Of the 22 health projects, two were regional efforts while the remaining projects were nationally directed, benefitting 18 countries in the region. Of all IDB health sector loans, 6.7% were dedicated to research and totalled US\$264 million. The proportion of the loans dedicated to research in these countries ranged from 0.05% to 100%. Brazil, with larger loans, received 23% of loan resources for research and Argentina, the second largest recipient, got 5%. Of the 18 countries analysed, 50% of the resources for research was concentrated in eight countries (Brazil, Argentina, Venezuela, Peru, Colombia, Dominican Republic, Uruguay and Jamaica).

A breakdown of the type of expenditure showed that 85% of all resources for staff was accounted for by national consultants/researchers and 15% by international consultants. Again, variation between countries was high. For instance, in Paraguay, none of the resources went to national consultants; in Belize, Honduras and Guyana, national researchers accounted for 20% of the resources; and in the Dominican Republic, Guatemala, Jamaica, Colombia, Panama, Brazil and Uruguay, 93% of the resources went to national consultants.

The Project OFIS (Oportunidades de Financiamiento para la Investigación en Salud, or Opportunities for Health Research Financing) is a response by the Pan American Health Organization to the need to monitor resource flows in the region. It is a group of databases that contain information on public and private, national and international agencies supporting research and human resources development in the area of health research and is accessible to researchers and policy-makers. Training courses are available for researchers in grant writing and negotiating skills. Contacts with funding sources are regularly maintained in an effort to encourage an increase in grants for health research.

⁶ Based on Ulysses B. Panisset, Pan American Health Organization/World Health Organization. Paper presented at Forum 3, June 1999.

Insert 3.2 *(continued)*

Common trends in three countries that accounted for about 75% of health research in Latin America in 1998: Chile, Brazil and Mexico

- economic crisis (1998 and worsening in 1999) reverses a tendency for increases in funding from 1990-1997
 - conflicting data on the same resources, depending on the source
 - lack of reliable data for private sector
 - health-specific data rarely available
 - dispersed data in states (provinces)
 - government agencies have limited resources to support the analysis of resource flows
 - lack of funds for major study: low priority and lack of political will
 - need for advocacy to study resource flows for health research
 - risk of double counting (recurrent versus capital spending; commitments versus disbursements)
 - need to monitor resource flows for institutional development
 - poor communication with decision-makers
 - need to develop methods and specific indicators
 - shortcomings in tax incentive legislation
 - specific studies needed in key areas (at the ministry of health level, for example).
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WHO, the Burden of Disease Unit at Harvard University and other groups with experience in national burden of disease studies, are currently coordinating the task to estimate and update the GBD for the year 2000.⁷ The objectives of the GBD 2000 are:

- to develop internally consistent estimates of mortality by age, sex and region
- to develop internally consistent estimates on the epidemiology of 500 sequelae
- to describe and put a value on health states associated with those sequelae
- to calculate summary measures of population health, diseases and injuries
- to estimate the contribution of major risk factors
- to develop alternative projections of mortality and non-fatal health outcomes.

3. Contribution towards the Global Burden of Disease 2000 study

For the GBD 1990 study, numerous groups of experts, using published and unpublished studies, have made estimates of the incidence, prevalence, remission and duration of diseases as well as case fatality and death rates. When no data were available, they made informed estimates. These estimates were critically reviewed for their internal consistency. The process of re-estimation, checking for internal consistency and revision was conducted through three iterations between 1993 and 1996.

However, despite the identification and correction of major inconsistencies, many of the assumptions need to be carefully revised and updated for the GBD 2000. To achieve this, a new process has been initiated to gather local information to describe more accurately the patterns and occurrence of

each condition from each region in selected countries. It is hoped that this effort will lead to the involvement of an increased number of experts in the review of the estimates for selected conditions.

The Global Forum is actively supporting the GBD 2000 study. In addition, the Global Forum provides support to three projects: the Virtual Network of Epidemiology, International Burden of Disease Network and specific country studies described below.

4. Virtual Network of Epidemiology (VINEDE)

As part of the global initiative on GBD 2000, the Global Forum initiated funding for a WHO project designed to improve the epidemiological description, by region, of each condition and sequelae to be included in the study. The project seeks to involve disease experts in each geographic region to review information that may improve disease estimates. This project will, in turn, strengthen the capacity of developing countries to use existing epidemiological data for disease burden assessment.

One of the primary objectives of the GBD has been to focus attention on non-fatal health outcomes and, more specifically, on disability. For some regions, data on the epidemiology of important non-fatal health conditions is extremely limited. Knowledge of the disabling sequelae for even well studied diseases is lacking both in developing and developed countries. And the absence of an estimate is often taken to imply that no problem exists. Therefore, when estimates are made, it is imperative that the assumptions and empirical observations used are made explicit to validate and modify those estimates in the future.

⁷ Rafael Lozano, WHO. Paper presented at Forum 3, June 1999.

The Virtual Network of Descriptive Epidemiology operates on the basis of the following strategies:

- identification of key people in each region to form a core group to orchestrate the work of VINEDE
- core group planning meetings to discuss Guidelines for Epidemiological Assessment (GEA) for the measurement of the global burden of disease and to identify potential participants.

A core group of experts has been established to develop the GEA, select disease experts or groups of experts willing to participate, and organize the launch of the network, follow-up procedures and a time-frame for estimates. In addition, following the launch of the GEA, papers will be commissioned to produce estimates for some diseases. Studies on groups of sequelae will be undertaken in two or three regions, including for malaria in Africa and Asia and for Chagas disease in Latin America.

VINEDE will update the current estimates of incidence, prevalence, case fatality, severity, duration and remission of the disease. Disease experts will use this information to construct the natural history of the disease. The GBD 2000 website will be the appropriate place to have an open and continuous discussion about estimates and standardization.

5. International Burden of Disease Network (IBDN)

In order to plan effective health services that are responsive to the health needs of populations, planners need to be confident that they can reliably assess those health needs. Over the past five years, the use of the global burden of disease methodology for assessing health needs has been adopted

throughout the world. The Global Forum recognizes the need to develop systems for sharing and disseminating information about ongoing research. Without this, efforts can become fragmented. One of the aims of the International Burden of Disease Network is to create a framework for systematic discussion across the whole burden of disease community, including the research community.⁸

The main purpose of IBDN is to provide open access to the methodology used to assess the burden of disease in different populations, as well as exploring other ways of measuring the burden. The network has a large number of users, including researchers and policy-makers, ensuring a broad exchange of information on burden of disease and cost-effectiveness assessments, which are a valuable tool for policy development.

IBDN uses a website for the network to identify current users of technologies on burden of disease assessment. The network then lists network members for contact, incorporates interactive discussion pages and publishes the “grey” literature not available elsewhere. In addition, the network holds meetings at least once a year to discuss, amongst other things, key research topics that have been identified by network members. The focus of network meetings is decided by network members but always has a component of training on the correct use of the methodologies.

6. Country studies on burden of disease assessment

The Global Forum recognizes the limited information available on burden of disease in developing countries. Information from countries and regions is still incomplete and

⁸ H. Seymour, Centre for Health Care Development, Liverpool. Paper presented at Forum 3, June 1999.

there are large gaps in specific geographic areas. In some cases, small but important groups of researchers from developing countries may not be identified to take part in the global initiatives.

With this in mind, the Global Forum Secretariat embarked on a project to identify groups from developing countries working in this area. The aim of the project was to identify and subsequently fund groups of researchers able to carry out burden of disease studies at the national or local level.

The Secretariat invited letters of intent through the Global Forum and WHO websites with a request to a wide range of institutions and universities. The objectives of the project were to:

- strengthen national burden of disease studies by identifying and stimulating groups from developing countries to carry out studies on burden of disease
- identify and encourage the participation of local scientists from developing countries
- build local capacity for GBD methods, data analysis and interpretation.

The 73 letters of intent received were reviewed by a selection committee comprising representatives from the Global Forum's Strategic and Technical Committee, the Secretariat and WHO's Department of Evidence for Health Policy. Eight proposals were selected on the basis of standardized guidelines agreed in advance. The project titles and countries where the field work will take place can be seen in Insert 3.3. Proposals will be funded either partially or totally by the Global Forum.

7. Issues on measurement of burden of disease and alternative methods

It is critical to understand that the summary measures of population health, such as the

DALY, differ from the Global Burden of Disease Project. The GBD attempts to assemble a vast body of epidemiological estimates of diseases, injuries and risk factors, and uses DALYs as a summary measure.

The GBD 1990 was first presented in the World Bank's World Development Report 1993. In addition to generating the most comprehensive and consistent set of estimates of mortality and morbidity by age, sex and region ever produced, the GBD also introduced a new population health metric, the disability adjusted life year (DALY), to quantify the burden of disease. The use of DALYs meant that both years of life lost from premature mortality and years of life lived with disability could be simultaneously described via a single indicator. Detailed assumptions were used to construct this indicator. Some of these assumptions are currently under review in an effort to improve the methodology and the derived estimates.

Over the past two decades, considerable international effort has been put into the development of:

- (i) Measures to define the level of population health or summary measures of population health which integrate information on mortality and non-fatal health outcomes. Two major classes of summary measures have been developed: health expectancies and health gaps, of which the DALY is the best known. A key goal in constructing summary measures is to identify the relative magnitude or burden of different health problems.
- (ii) Ways of measuring the benefits of implementing specific interventions. Measures which are particularly suited to estimating the benefits of health interventions include QALYs (quality adjusted life year), changes over time in HEALYs (healthy life year) and changes in DALYs, DALE (disability-adjusted life

expectancy) and HALE (health-adjusted life expectancy). QALYs differ from DALYs in that they take into account quality of life, and HEALYs are designed to incorporate the consequences of premature mortality and morbidity dating from the year of causation as opposed to the year they first occurred.

A recently published paper⁹ raises a number of issues about the current calculations. While agreeing with the approach of measuring burden of disease, the paper argues that the impact of different interventions should be measured more directly. It maintains that the cost of each activity and its effect on people's health should be estimated, and that priority setting should be driven by a comparison of incremental gains with incremental costs. The author concludes that, instead of measuring the global burden of disease, efforts should be redirected to estimating the cost-effectiveness of particular activities. This leads to the recommendation that incremental benefits should be estimated, rather than total burdens, and that "intervention" should replace "disease" as the cornerstone of the system.

In response to this, a discussion paper by Murray and Lopez¹⁰ stresses the difference between GBD and population summary measures and urges researchers to differentiate between the Global Burden of Disease Study and the methodological, ethical and conceptual issues relating to the development of summary measures of population health. The discussion paper underlines the critical relevance of summary measures of population for policy formulation. In addition, the authors highlight the importance of using cost-effectiveness studies in priority setting for

health funding. (The five-step priority-setting method for health research endorsed by the Global Forum includes both disease burden and cost-effectiveness of the interventions.)

A further problem of measurement is the issue of co-morbidity, which deals with the quantification of the effect of more than one disease or condition affecting one individual. The GBD 1990 used a simplistic additive model in which, for the same individual, the average time spent in two different health states were combined. Further, a condition of one individual may affect others. An example of this would be the effect of an alcoholic relative on other family members. The measurement of disease burden would carefully estimate the effect of alcohol on morbidity, disability and mortality. However, it would not estimate the effect of this factor on its immediate surrounding, such as violence at home or accidents induced by the individual under the effects of alcohol. It is now identified that substantive work will be required to improve on the estimation of the prevalence of non-dependent co-morbidity.

A further area of discussion is the incorporation of distributional concerns into summary measures of population health and the estimation of the benefits of health interventions. It is debatable whether distributional values should be incorporated into the design of summary measures or whether separate measures of the distribution of health across individuals should be routinely assessed. It is also debatable whether distributional values should be directly incorporated into assessing the benefits of health interventions or kept as a separate component of the evaluation of health interventions. Both these areas require further research.

⁹ A. Williams, *Calculating the global burden of disease: time for a strategic reappraisal?* Health Econ, 8:1-8, 1999.

¹⁰ Progress and directions in refining the Global Burden of Disease Approach: EIP discussion Paper No.1. WHO, May 1999.

8. Future action plan

A key priority for the future of burden of disease studies is to generate high quality information from countries that have not yet done so and to promote the use of this for policy-making. Developing countries often lack information on basic indicators such as mortality, let alone the burden of disease. An important step towards promoting studies on disease burden at the country level is to strengthen national capacity and support local initiatives to measure the disease burden.

The methodology for measuring disease burden is still evolving. A number of groups are involved in efforts to revise the DALY weighting measurements and improvements are expected in this area. In addition, improvement of the methodology will include new research involving the exploration of risk factors, co-morbidity and causality. This developing area is likely to expand over the next few years.

Promoting the use of measures of disease burden for priority setting for health research funding is also crucial. Global studies on disease burden, such as that of the GBD 2000 will have to be supplemented by information from the regions and countries. The design and implementation of projects aimed at

improving the quality of information emerging from regional studies is of paramount importance.

9. Contribution to correcting the 10/90 gap

One of the major problems in attracting funds for health research is that health – unlike agricultural research, for example – is seen as a social rather than economic investment, and therefore given lower priority. The economic return from investing in this global public good has not yet been calculated, although it is likely to be much higher than many other projects of national interest. The World Bank set this process under way with the publication of the World Development Report 1993 which emphasized the critical importance of investing in health. The Ad Hoc Committee Report went a step further in arguing that investments in health research are crucial for the overall development effort.

By using evidence-based information on disease burden, the decision-making will be more transparent and selective. Not only will the research priorities be more in line with the range of diseases and conditions that prevail in a particular area, the process will also lead to better informed and more rational decisions.

Insert 3.3

Country studies on burden of disease (selected from 73 proposals submitted) partially or wholly supported by the Global Forum for Health Research

Project title	Country of study
South African burden of disease project	South Africa
Community-based valuations of health-related quality life (HRQL) to put a value on the burden of disease	Kenya
Measuring the burden of disease: comparative assessments in developing countries	Ghana, Pakistan, Uganda
Burden of disease among the poor in Tanzania	Tanzania
Projecting burden of disease in Nigeria	Nigeria
Improving methods of measuring burden of disease to take into account social, cultural and environmental factors	Cameroon
Study on burden of disease measurement in India	India
Measuring the burden of major cancers in Korea	Korea

Insert 3.4

Cost-effectiveness study on health interventions to prevent work injuries in the metal-working industry, conducted by the Mexican Institute of Social Security¹¹

Intervention	Total cost of the intervention in US\$	HEALYs gained	Cost-effectiveness ratio	Ranking
Education	239,742	376.11	637	1
Training	1,567,701	752.22	2,084	2
Inpatient care	856,104	386.56	2,215	3
Helmet	353,690	112.40	3,147	4
Security apron	383,051	107.90	3,550	5
Security gloves	168,468	3.55	47,432	6
Security glasses	147,653	3.09	47,736	7
Lumbar support	737,164	18.62	92,766	8
Security shoes	1,727,072	0.33	1,147,770	9

¹¹ A.M. Salinas, Epidemiological and Health Services Research Unit. Mexican Institute of Social Security. Paper presented at Forum 3, June 1999.

Section 3

Cost-effectiveness analysis and methods to assist resource allocation

1. Introduction

Cost-effectiveness analysis is a useful tool to help policy-makers and programme managers decide between different ways of spending their scarce resources to improve population health. Cost-effectiveness analysis provides information on which interventions are likely to provide the greatest improvements in health for the available resources, one critical input to decision-making, along with information on factors such as health inequities. Cost effectiveness analysis can help guide the R&D process by showing the possible value of new tools. It can identify whether a new tool or product is likely to be better value for money. As such, it is one important component of the analytical work for priority setting.

There is a growing body of literature which evaluates the cost-effectiveness of health interventions, although many studies do not compare the cost-effectiveness of different interventions. However, there is a lack of the evidence required for these studies, particularly on costs. Very few studies report confidence intervals for cost estimates or for cost-effectiveness ratios, and for many interventions the only data that exist pertain to developed countries. In addition, there is little information on the way costs and effectiveness vary according to the scale of the intervention. For example, it is well known that the costs of immunization against a specific disease are likely to increase dramatically at very high coverage levels when the system has to search for hard-to-reach cases. However, at this stage, the high costs have to be weighed against the

window of opportunity for eradicating the disease. Today, the polio eradication initiative is now at this stage, as it strives to reach the remaining non-immunized children and eradicate the disease.

An additional problem in cost-effectiveness studies is the difficulty of comparing the few published studies due to the lack of methodological consistency. Ideally, policy-makers at the country level would have information on the cost-effectiveness of all competing interventions in their local settings. However, since it will not be possible for studies to be undertaken on every possible intervention in every country, it will be necessary to adapt the results of studies undertaken in different settings.

WHO, the Global Forum, the Center for Pacific Rim Studies (UCLA) and the Harvard Center for Population and Development Studies initiated a series of comparative studies to help develop and apply cost-effectiveness analysis methods in health R&D. The objective of the project was to develop a comparative database showing the cost-effectiveness of interventions that could contribute most to improving health status. In addition, the studies seek to: (i) develop a standard methodology for use in all studies, thus enabling comparison between results; (ii) stimulate a series of studies on priority topics using this methodology (or, where possible, recalculate the results of different studies to make them consistent with the agreed methodology); and (iii) develop a

method for adapting the results. These studies are ongoing and no results of the comparisons are available at present. One completed study conducted in Mexico is presented below.

2. Searching for common methodologies to study cost-effectiveness in developing countries: an example from Mexico

In a paper presented at Forum 3,¹² the Mexican Institute of Social Security reviewed the relevance of conducting a cost-effectiveness study to improve safety in the workplace. In the current financial climate, it is easier to convince employers and regulatory agencies of the need to prevent work-related injuries if there is good evidence of their cost-effectiveness.

All work entails an element of risk and it is the employer's responsibility to ensure safety. Work injuries impact not only on the individual's health (injuries can produce partial or total disablement, permanent or temporary disablement and death) but also on their productivity and that of the industry. In addition, they have a financial impact on the family and on the health-care provider. However, employers are often reluctant to install a safety device or introduce an injury prevention programme unless the installation cost can be offset either by a reduction in the direct costs of injuries or by higher productivity.

The study, based in Northern Mexico in the metal-working industry, covered 82,034 workers registered in this type of industry in 1998. The cost-effectiveness of specific health interventions for work injuries was estimated and these health interventions were ranked in

order of cost-effectiveness (see Insert 3.4). For the purposes of this study, effectiveness was measured through the number of healthy life years (HEALY) gained from each intervention. Information was categorized by anatomical region and type of injury. Case disability ratios, duration of disability and disability cases were established by consensus. Costs were estimated per worker, and by type and quantity of inputs of specific health interventions at 1999 prices. These costs were assessed for the total number of workers in order to determine the cost per health intervention. The cost of medical care was estimated for each type of injury based on the model of budget per capita. This model estimated fixed and variable costs for determining the unit cost, which was related to the level of health care required.

Education was revealed to be the most cost-effective intervention and security shoes the least cost-effective in preventing injuries in the metal-working industry. In this case, cost-effectiveness analysis revealed that the most expensive intervention did not necessarily produce the maximum benefit. This kind of analysis can help decision-makers select the most cost-effective intervention to meet the legal requirements for safety.

3. Methodological issues and current thinking on cost-effectiveness analysis studies

A document prepared by WHO's Department of Evidence for Health Policy¹³ reviews the argument on the sectoral perspective. Cost-effectiveness analysis studies generally compare new interventions to current practice. These studies do not compare the cost and effectiveness of all possible

¹² A.M. Salinas and E. Villarreal, Epidemiological and Health Services Research Unit, Mexican Institute of Social Security. Paper presented at Forum 3, June 1999.

¹³ C.J.Murray, D.B.Evans, A. Acharya, R.M.Baltussen. GPR Discussion Paper No. 4. July 1999, WHO.

interventions in order to select the mix that maximizes health for a given investment. The implicit assumption that the required additional resources would need to be transferred from another health intervention or from another sector is rarely discussed. A broader view of cost-effectiveness would explore its use in allocating a fixed health budget between interventions in such a way as to maximize health in a society. If the calculations show that some current interventions are relatively non-cost-effective, and that some which are not fully undertaken are relatively cost-effective, resources could be reallocated across interventions to improve population health.

The paper argues that a choice has to be made between two pathways. The field can develop towards increasingly contextualized analyses or towards more generalized assessments. Cost-effectiveness analyses can become increasingly context specific. This is particularly the case if they directly incorporate context-specific social concerns such as distributional weights or a priority to treating the sick, and ethical and political constraints facing decision-makers. A second pathway of more generalized assessments is preferred by the authors. Studies would focus on the general assessment of the cost and health benefits of different interventions in the absence of various highly variable local constraints on decision-making. A general league table of the cost-effectiveness of interventions for a group of populations with comparable health systems and epidemiological profiles would be a valuable tool for cost-effectiveness analysis to inform health-policy debates. Information on general cost-effectiveness can be used alongside assessment of the effect of different resource allocations on other important social goals such as equity. In view of these benefits, WHO is proposing to modify standard cost-effectiveness methods. By removing the current intervention mix, current allocative

inefficiencies to analysis will be exposed. This will make it easier to transfer results from one population to another.

It is anticipated that the Global Forum, in collaboration with WHO, will explore the strengths and weaknesses of both methodologies in future work.

4. Future action plan

Cost-effectiveness analysis is an integral part of the analytical work of the Global Forum and its partners. The issues relating to the contextualized or generalized methodologies are critical to the priority-setting activities and comparative studies are anticipated on both approaches.

5. Contribution to correcting the 10/90 gap

While estimates of the burden of disease and estimates of the resource flows for health R&D are important components of evidence-based priority setting, information about the likely value for money of different investments is also critical. Cost-effectiveness analysis helps identify which research projects are likely to produce the greatest improvements in health status for the available resources, and whether some interventions are likely to be more cost-effective than others. The paper on the Mexican experience referred to above is a good example of the potential of cost-effectiveness studies to help guide policy-makers.

Meanwhile, the issue of contextualized as opposed to generalized studies is crucial to the use of cost-effectiveness studies to help correct the 10/90 gap. In response, the Global Forum will continue to help develop and improve methodologies which are consistent and applicable to a variety of contexts.