

Chapter 6

Monitoring financial flows

***Section 1
Background***

***Section 2
Why measure resource flows?***

***Section 3
Methods***

***Section 4
Results***

***Section 5
Discussion and future strategies***

For a summary of this chapter, see the Executive Summary, page xviii.

Section 1

Background

The Commission on Health Research for Development drew attention to the importance of health research as the “essential link to equity in development”¹. It proposed that low- and middle-income countries should review and strengthen the management of health research so as to meet their national needs as well as contributing to the global fund of knowledge. The Commission also recommended that governments in low- and middle-income countries allocate at least 2% of national health expenditures and 5% of externally funded programmes to research and capacity strengthening. The Commission hoped that these financial arrangements would provide a secure foundation for funding the priority research needs in low- and middle-income countries, based on the new concept of Essential National Health Research.² The expectation was that low- and middle-income countries would review their current spending on health research and would strive to meet the stated goals.

Rather disappointingly, neither the low- and middle-income countries nor the donor community enthusiastically followed up the Commission’s recommendations, although

there were a few exceptions. Furthermore, since most low- and middle-income countries were not actively tracking the pattern of spending on health research, it was difficult to know how close they were to the target and what trends were occurring over time. One major obstacle was the lack of tested methodologies for monitoring spending on health research at the country level.

In an attempt to fill this gap, the Global Forum for Health Research has tackled the problem through its support of a network of investigators. This chapter synthesizes the main points of a recently published report on the first three years of the project.³ The aim of the publication is to stimulate interest in this important issue in the hope that other investigators will critically review the methodology that this team has developed and perhaps offer refinements. Furthermore, the tentative results from a few countries should stimulate others to follow the example and provide data from many more countries. Ideally, other studies will adopt the core definitions so as to facilitate comparisons among countries and also to examine trends over time.

¹ Commission on Health Research for Development, 1990. *Health Research: Essential Link to Equity in Development*. New York, Oxford University Press

² Task Force on Health Research for Development, 1991. *Essential National Health Research. A Strategy for Action in Health and Human Development*. c/o United Nations Development Programme, Geneva, Switzerland.

³ Global Forum for Health Research, *Monitoring financial flows for health research*. October 2001.

Section 2

Why measure resource flows?

1. Fragmented data

Knowledge of resource flows for health research is an important input into priority setting. Although funding agencies and companies in the public and private sectors may have internal mechanisms to track health research and development (R&D) expenditures, the available data is very fragmented. The Organisation for Economic Cooperation and Development (OECD) is the only institution with a mandate to regularly collect and disseminate standardized national statistics on aggregated health-related R&D for its member States. R&D funds are reported as part of Science and Technology (S&T) information. While no equivalent institutional mechanism exists in low- and middle-income countries, information on resource flows has recently begun to emerge.

The challenge now is to develop and apply health R&D indicators which can be collected in low- and middle-income countries, countries in transition and high-income countries. Wherever possible, such indicators should draw on existing international statistical standards. Consistency will facilitate comparisons between countries while also meeting national and regional needs.

A more detailed mapping of global resource flows will help decision-makers in all countries to target, and therefore better allocate, funds supporting health R&D. Mapping will also help monitor shifts in R&D funding allocations towards the most prevalent health conditions and determinants, identify the areas which do not attract enough

funding, and avoid unnecessary duplication of research efforts. These measures, in turn, are expected to have a significant impact on reduction of the burden of disease and injury in low- and middle-income countries, particularly among the poor.

2. Progress in resource flows measurement

Since the Commission report, the 1996 Report of the WHO Ad Hoc Committee on Health Research reiterated the importance of establishing an institutional mechanism for the systematic tracking of investments in health R&D. Although that report provided summary data on public and private investments in health research and estimated global health research investments at US\$56 billion, the authors acknowledged the complexity of developing a useful system to monitor resource flows.

Beginning in 1999, the Global Forum for Health Research supported efforts to develop and implement a system for tracking and reporting investments in health research. Monitoring focused on investments made by low- and middle-income countries, high-income country agencies providing funds to low- and middle-income countries, and for problems relevant to low- and middle-income countries.

The five-year Resource Flows Project's goal is to improve priority setting through developing a database of internationally comparable statistics on global resource flows for health research. To reach this goal, the Global Forum and its partners intend to:

- define the inputs for the database
- develop institutional mechanisms for providing the inputs
- report health R&D expenditures
- ensure that decision-makers have access to the database
- link these activities with priority-setting exercises in order to maximize the effectiveness of investments in health research.

This chapter describes the first three years of project work. An Advisory Group (Annex 6.1) met with Global Forum staff four times

between January 1999 and February 2000 to assist in the development and assessment of the methodology used for obtaining data for the project, including the conceptual framework.

Collecting and reporting data on funding for health research are challenging tasks and this report represents only the first step towards that end. The Global Forum is actively supporting the work carried out by others, facilitating standardization where feasible, helping to fill in gaps to disseminate the information.

Section 3

Methods

1. Definition of health research and development

The following definitions of research and health research, used by the OECD and UNESCO, were adopted for this study:⁴

“Research and experimental development comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this knowledge to devise new applications.”

Thus, health research is a process for generating systematic knowledge, and to test hypotheses, within the domain of medical and natural sciences as well as social sciences, including economics and behavioural science. The information resulting from this process can be used to improve the health of individuals or groups.

2. Conceptual model

One objective of the project was to measure total funding of health R&D worldwide, with

⁴ OECD. The Measurement of Scientific and Technological Activities, Proposed Standard Practice for Surveys of Research and Experimental Development, *Frascati Manual 1993*, Paris, 1994.

particular emphasis on R&D for or by low- and middle-income countries. Insert 6.1 illustrates the main components. “Area A” corresponds to the health R&D efforts of high-income countries. “Area B” represents the health R&D efforts of low- and middle-income countries. The overlapping “Area A/B” depicts where these efforts converge or overlap. These three areas could be further defined in several ways. For the purpose of financial flows in the present study, “Area A” describes all health R&D *funded* by high-income countries; “Area B,” all health R&D *financed by and carried out in* low- and middle-income countries. “Area A/B” corresponds to R&D funded by high-income countries and carried out in and for the primary benefit of low- and middle-income countries. The area should also incorporate R&D carried out in high-income countries which is for, or relevant to, the needs of low- and middle-income countries, and R&D carried out in low- and middle-income countries which is for, or relevant to, the needs of high-income countries. The three

areas constitute the framework for project data collection.

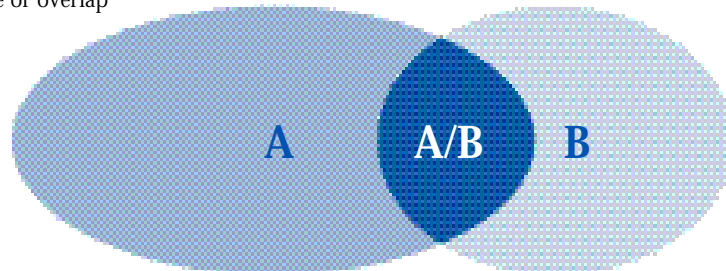
Data on health R&D expenditures can be collected from the unit providing the funds (“the funder”) or from the unit actually carrying out the research (“the performer”). The data compiled within areas “A” and “A/B” were generally collected from funders, whereas the data for area “B” were collected from both performers and funders. Because the three categories of data were compiled using different approaches and from different sources, it was challenging to aggregate them into the global total, and especially to avoid double counting of area A/B.

The countries undergoing transition from centralized to market economies do not fit easily into the model. They are examined in a separate section but are also treated in the discussion of area A/B, as they are eligible for some of the types of support for health R&D traditionally oriented towards low- and middle-income countries.

Insert 6.1

*Graphic representation of health research funding**

- A** = R&D by high-income countries
- B** = R&D by low- and middle-income countries
- A/B** = R&D efforts converge or overlap
(see text for details)



* Proportions for surfaces A, B and A/B are indicative only.

3. Classification framework

The major product developed under the guidance of the Advisory Group was a classification system to cover total health R&D. The aim was to produce a set of categories that would be useful for decision-makers especially in low- and middle-income countries. It would, in addition, serve as a framework for special surveys and for documenting data compiled from other sources.

There are other dimensions by which R&D resource flows are commonly classified. These may include activity, discipline, topic, location, beneficiary and development outcome. The Advisory Group and consultants endorsed the development of a comprehensive framework that included multiple levels of disaggregated data and thoroughly discussed the details.

The main categories of the classification are listed in Insert 6.2.

Insert 6.2

Classification of resource flows for health research

Levels of aggregation of R&D funds	
A.1	Non-oriented, fundamental research
	No further disaggregation
A.2	Health conditions, diseases or injuries
A.2.1	Group I (communicable, maternal, perinatal and nutritional conditions) *
A.2.2	Group II (noncommunicable diseases) *
A.2.3	Group III (injuries) *
A.3	Exposures, risk factors that impact on health (determinants)
A.3.1	Risk factors within the health system
A.3.2	Risk factors outside the health system
A.4	Health systems research
A.4.1	Policy and planning research
A.4.2	Health services delivery research
A.4.3	Surveillance
A.5	Research capacity building
A.5.1	Recurrent expenses
A.5.2	Capital expenditures

* Groups I, II and III follow the Global Burden of Disease classification (C.J. Murray & A. Lopez, *Global Burden of Diseases and Injuries*. Volume 1. WHO, 1996)

It was also necessary to identify some institutional categories for the main types of health R&D funders and performers. The

following groups of funders and users/performers were identified (Insert 6.3):

Insert 6.3

Classification of funders and performers

	Funders	Performers in low- and middle-income countries
Public sector	Government departments (national aid agencies)	Government departments Academic/research institutes Hospitals Others
Private sector	Pharmaceutical firms Private non-profit organizations	Pharmaceutical firms Academic/research institutes Hospitals/laboratories NGOs Others
International	Multilateral Bilateral	Foreign institutions Government departments Others

The funding classification tested in previous exercises had been used for health R&D financed by high-income countries (Areas A and A/B in Insert 6.1).

The user/performer classification was developed during the experimental health R&D surveys in selected low- and middle-income countries (Area B in Insert 6.1).

4. Sources of data⁵

Previous global resource flow studies have, by and large, focused on data from existing databases and estimated the data from low- and middle-income countries. The present project extends that work by developing

special surveys based on the new classification; by making more extensive use of recently published data sets; and by undertaking institution-specific case studies involving personal contacts with funding agencies and low- and middle-income country institutions. The following strategies were used:

- (a) Funder questionnaires
- (b) Special survey for low- and middle-income countries
- (c) Funder surveys/databases
- (d) Government S&T surveys
- (e) Evaluations, annual reports, websites
- (f) Interviews/personal contacts.

⁵ For further details, see Global Forum for Health Research, *Monitoring financial flows for health research*. October 2001

Section 4

Results

1. Global health R&D and main aggregates funded by high-income and transition countries

Based on partial estimates, public and private sources worldwide invested a minimum of US\$73.5 billion in health R&D in 1998 (or about 2.7 % of total health expenditures worldwide). Governments in high-income countries, countries in transition, and low- and middle-income countries invested at least US\$ 37 billion (50%), and the pharmaceutical industry US\$30.5 billion (42%). Private, non-profit and university funds provided the remaining US\$6 billion (8 %). See Insert 6.4.

Governments of countries having established market economies (high-income countries) spent US\$34.2 billion on health R&D, in addition to an estimated US\$350 million in development assistance for health R&D.

Governments of the Central and Eastern European countries in transition for which estimates are available (Czech Republic, Hungary, Poland, Romania, the Russian Federation, Slovak Republic and Slovenia) spent an estimated US\$200 million out of a total health R&D expenditure of about US\$360 million in these countries.

For low- and middle-income countries, it is estimated that Argentina, Brazil, Mexico and other Latin American countries, in addition to India, Malaysia, the Philippines, Thailand, Turkey and Chinese Taipei, spent a minimum of US\$2.5 billion in 1998 on health R&D. Data for other low- and middle-income countries which spent significant amounts on health research, such as the People's Republic of China, are not available at this stage.

Insert 6.4

Estimated global health R&D funding 1998 (in current US\$)

Total US\$73.5 billion

	Total (billion US\$)	Percent
Public funding: high-income and transition countries	34.5	47
Private funding: pharmaceutical industry	30.5	42
Private not-for-profit funding	6.0	8
Public funding: low- and middle-income countries	2.5	3
Total	73.5	100

Overall investments in health R&D from public, industrial and non-profit sources increased in real terms in high-income countries during the 1990s, in contrast to a general decrease in the countries in transition.

The figure of US\$73.5 billion contrasts with that of US\$56 billion in 1992 (in current terms). It is estimated that up to one-third of the increase between 1992 and the present study is in real terms. Data from low- and middle-income countries, when available, indicate considerably larger R&D investments in health from national sources than earlier studies had estimated.⁶ While this increase reflects real growth in overall investments in health R&D, it probably also reflects better reporting for these countries.

2. Funding health R&D in high-income countries

(a) Public funding of health R&D

Governments in high-income countries invested US\$34.2 billion in health R&D in 1998. The United States provided over half of this amount, investing US\$19.5 billion. Japan contributed US\$2.9 billion, Germany US\$2.4 billion, France US\$2.2 billion, the United Kingdom US\$1.8 billion and Canada US\$0.75 billion. Together, the G7 countries (including a rough estimate for Italy) accounted for 90% of total publicly funded health R&D in the high-income countries. All other high-income country governments together contributed US\$3.5 billion.

For the United States, public funds spent for health R&D are estimated as corresponding to 0.22% of GDP, the highest figure among high-income countries. This is followed by Sweden, Austria and Finland, whose R&D

funds correspond to more than 2% of national health expenditure.

Public funding of health R&D grew in the high-income countries both as a group, and in virtually all of the countries studied, individually. This was partly due to improved coverage and reporting of the data series. For example, the category “funding of hospital R&D” was added during the project period in France, the United Kingdom and Finland.

(b) Industry funding of health-related R&D

The pharmaceutical industry is the dominant industrial funder of health-related R&D. The majority of pharmaceutical research is funded by multinational companies, which are officially headquartered in high-income countries. There is of course some pharmaceutical R&D carried out in transitional and low- and middle-income countries.

The pharmaceutical industry, including biotechnology companies, spent an estimated US\$30.5 billion in 1998, corresponding to 42% of all health R&D funding (Inserts 6.4 and 6.5). Reported investment in R&D as a share of sales in the pharmaceutical industry is very high. It ranged between 12% and 21% of turnover in the 15 companies having the largest R&D investment. The share was higher still in the 10 biotechnology companies making the largest R&D investments, corresponding to allocations of 26% to 67% of revenues to R&D (Insert 6.5)⁷.

It has not been possible to provide a breakdown of the global total by country. From national sources it is estimated that research-based pharmaceutical companies in the United States invested US\$20.3 billion in

⁶ C. Michaud, C.J.L. Murray, 1996. Resources for health research and development, 1992: a global overview. Annex 5 of *Investing in Health Research and Development*. Report of the Ad Hoc Committee on Health Research relating to future intervention options. Geneva, World Health Organization, 1996.

⁷ For further details, see Global Forum for Health Research, *Monitoring financial flows for health research*. October 2001

R&D in human-use pharmaceuticals, of which US\$16.9 billion were spent at home and US\$3.4 billion abroad.⁸

(c) Private foundations and other not-for-profit organizations

Private foundations and other not-for-profit

Insert 6.5

R&D expenditures by major pharmaceutical and biotechnology companies, 1998 (US\$ million)

Pharmaceutical companies 15 leading companies with largest R&D	R&D expenditures	Per US\$ of total pharmaceutical sales
AstraZeneca	2,183.0	0.17
Glaxo Wellcome	1,927.5	0.15
Roche	1,893.1	0.19
Merck & Co	1,821.1	0.12
Novartis	1,801.3	0.16
Bristol-Myers Squibb	1,559.0	0.12
Hoechst Marion Roussel	1,426.2	0.18
Johnson & Johnson	1,400.0	0.16
SmithKline Beecham	1,394.0	0.18
American Home Products	1,389.9	0.16
Rhône-Poulenc Rorer	1,010.5	0.17
Boehringer Ingelheim	866.0	0.19
Bayer	852.3	0.18
Novo Nordisk	420.1	0.21
Yamanouchi	415.1	0.17
Biotechnology companies 10 companies with largest R&D		
Amgen	663.3	0.26
Chiron	108.0	NA
Genentech	396.2	0.55
Biogen	177.2	0.45
ALZA	156.8	0.67
Immunex	92.0	NA
Genzyme	63.0	NA
British Biotech	20.8	NA
Chiroscience	51.3	NA
Genset	10.1	NA

Source: SCRIIP 1999, Pharmaceutical Company League Tables; Ernst & Young: European Life Sciences 99, Sixth Annual Report

⁸ Pharmaceutical Research and Manufacturers of America, Annual Survey 2000.

organizations spent an estimated US\$3.4 billion on health research in 1998 of which US\$1.9 billion came from the United States, US\$700 million from the United Kingdom, US\$240 million from Japan, US\$200 million from Canada and US\$120 million came from France. An estimated US\$200 million came from all other high-income countries combined.

The two largest private sponsors of research in 1998 were the Wellcome Trust in the United Kingdom, which spent US\$650 million on biomedical research, and the Howard Hughes Medical Institute (HHMI) in the United States, which spent US\$389 million.⁹

In addition to these sources, at least US\$2.5 billion was contributed to health research through the private funds of universities and colleges in Canada, Japan and the United States.

3. Funding medical research in Central and Eastern European countries in transition

Countries in transition do not fit neatly into the model of country groups used for this study. Like the high-income countries, most had fully developed science and technology as well as health care systems. However, these systems suffered greatly during their difficult initial period of adjustment to market economies. And like the low- and middle-income countries, they have been recipients of aid from high-income countries, mostly to improve economic performance rather than for social objectives.

In 1998, the Czech Republic, Hungary, Poland, Romania, the Russian Federation, the Slovak Republic and Slovenia spent the equivalent of approximately US\$360 million on health R&D. Government financing

accounted for just over US\$200 million. The magnitude of R&D efforts are not adequately reflected in these dollar figures, however, as a result of these countries' weak currencies. Comparison of purchasing power parities, reflecting the average cost of goods and services in each country, raises total health R&D funding to US\$800 million, of which an estimated US\$450 million was financed by public sources.

4. Funding for health R&D by low- and middle-income countries

The study did not attempt to be a comprehensive review of all low- and middle-income countries investing in health research. Research focused on a few, selected countries in which teams conducted special surveys on health R&D, in addition to countries for which published information already existed. As such, this section is not meant to provide a comprehensive analysis of investments.

It is estimated that Argentina, Brazil, India, Malaysia, Mexico, Panama, Peru, the Philippines, Thailand and Turkey spent a minimum of US\$2.3 billion in 1998 on health R&D. Data for other low- and middle-income countries, among them countries which spend important amounts on health research such as the People's Republic of China, are not available at this stage. These gaps in knowledge will be addressed during Phase 2 of the project.

(a) Special surveys of health R&D

A three-country study conducted for the Council on Health Research for Development (COHRED) in Malaysia, the Philippines and Thailand traced flows of funds for health R&D from the funding sources to the performers of the research projects concerned. As a full report has been published, only the main aspects will be described here.¹⁰

⁹ Global Forum for Health Research, *Monitoring financial flows for health research*. October 2001.

¹⁰ B.A. Alano Jr and E.S. Almeria, *Tracking country resource flows for health research development (R&D)*. The Philippines, Centre for Economic Policy Research, 2000.

The survey concluded that these three countries spent over US\$33 million in 1997 and US\$30 million in 1998 (total expenditures by public and private sectors), with Thailand spending about 50% of the total.

Government is the main source of funds for health R&D. In Malaysia these funds come

largely from the Department of Science and Technology whereas the Department of Health is the main source in Thailand. In the Philippines, both ministries contribute. Multilateral and bilateral funding are relatively much higher (28%) in the Philippines than in the other two countries (see Insert 6.6).

Insert 6.6

Funding of health R&D in three Asian countries, 1998

	Thailand	Philippines	Malaysia
US\$ million	15.7	7.4	6.9
% total government budget	0.06	0.11	0.04
% health budget	0.90	0.61	0.60
% GDP	0.012	0.049	0.010

(b) Health R&D data from ongoing R&D surveys

Total annual investment in Scientific and Technological Activities (S&T) in Latin America amounted to US\$15.3 billion in 1998, of which R&D accounted for nearly US\$11 billion.¹¹ Three countries (Argentina, Brazil and Mexico) accounted for 86% of the R&D spending. The percentage of GDP devoted to R&D ranged from about 1% in Brazil and Costa Rica to about 0.1% in Ecuador, El Salvador and Trinidad with a regional average of 0.58%. The public sector (government and higher education) tends to play the major role in both funding

and carrying out national R&D efforts in the region, though this share is declining. Total health research (R&D) spending in Latin America in 1998 is estimated as US\$1.4 billion (about 12.7% of total investments in R&D). Of this figure, Argentina (about US\$240 million), Brazil (about US\$850 million) and Mexico (about US\$200 million) accounted for all but US\$100 million (estimated for all other Latin American countries). The proportion of health research to total R&D investments in Latin America varies between more than 20% in Panama to less than 5% in Chile and Uruguay. It is not possible to identify the share funded from public sources.

¹¹ RICYT (Red Iberoamericana de Ciencia y Tecnología). *El estado de la ciencia: principales indicadores de ciencia y tecnología Iberoamericanos/Interamericanos*. Quilmes, 2000.

According to these estimates on health R&D, funding increased between 1992 and 1998 for all three major countries. The increases were about 40% (in current US dollars) in Argentina and Mexico, and may have doubled in Brazil.

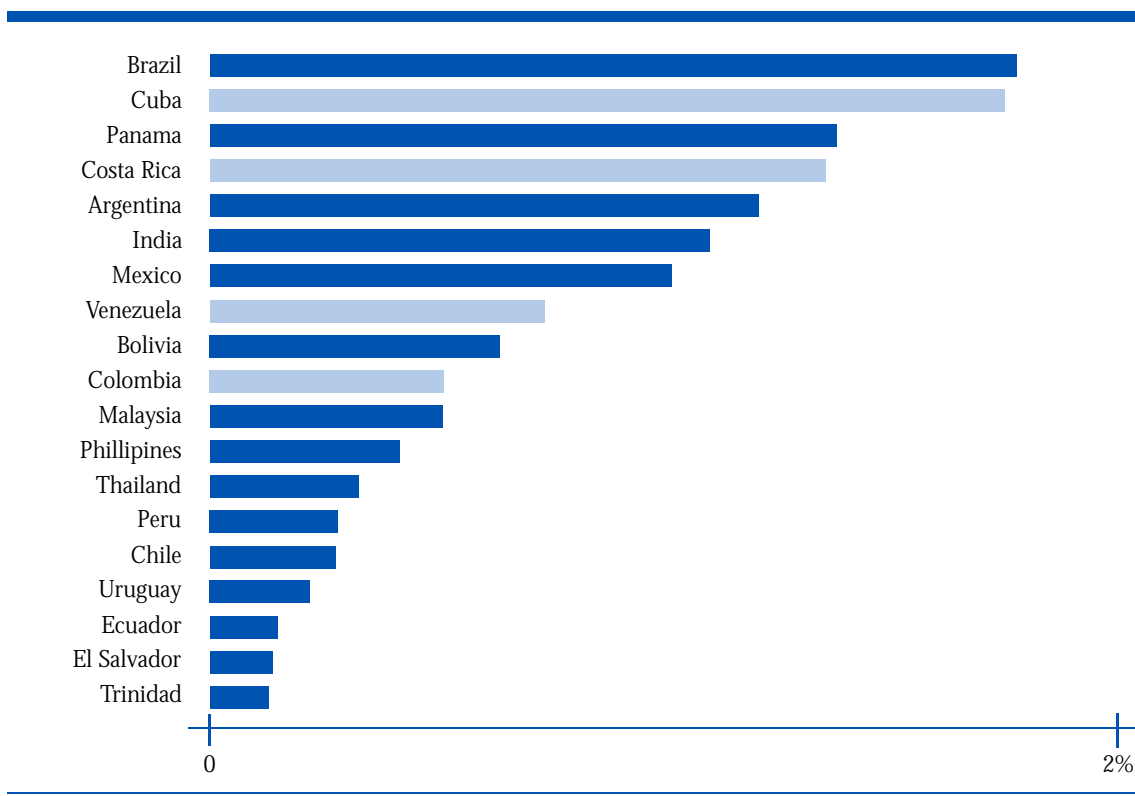
(c) Investments in health research as recommended by the Commission for Health Research and Development

The Commission on Health Research

for Development, convened in 1990, recommended that at least 2% of national health expenditures in low- and middle-income countries be allocated to health research and capacity building. Of the countries included in this study, Brazil and Cuba approached the 2% mark (Insert 6.7). Turkey was not included in Insert 6.7 as higher education subsidies in that country, particularly in state universities for medical education, influenced the high percentage reported.

Insert 6.7

Selected low- and middle-income countries: estimated health R&D as % of total health expenditure



Pale countries are particularly rough estimates.

Sources: Health R&D data: as above

GDP: *World Development Report 2000-2001: Attacking Poverty*. World Bank, Washington DC, 2000; RICYT, *El estado de la ciencia: principales indicadores de ciencia y tecnología Iberoamericanos/Interamericanos*. Quilmes, 2000.

Health expenditure: *World Health Report 2000. Health Systems: Improving Performance*. WHO, 2000; *OECD Health DATA 2000; A Comparative Analysis of 29 Countries*. OECD, Paris, 2000.

Section 5

Discussion and future strategies

Health research is essential to improve the design and implementation of health interventions, policies and health service delivery. It is evident that the 1990s have seen a worldwide increase in funds for health research and a transition of donors. Yet, in order to improve the health of the majority of the world's population, research must be targeted to solving the problems of greatest importance worldwide now and in the future. Thus, research funds must be rationally allocated in order to:

- Develop new and improved technologies to address the diseases and conditions of greatest magnitude;
- Improve the delivery of and accessibility to health care, including preventive interventions;
- Address the cross-sectoral issues relevant to improved health.

Access to research findings – not only by the research and biomedical community, but by the global population – is critical. Hence the importance of their application at the policy and programme levels. It is therefore essential that information on health research funding on a disaggregated basis be collected and disseminated.

1. Demand for data

The demand for data on resource flows is highly segmented. Various constituencies require different types of information. Some constituencies want resource flows data to inform policy and, ultimately, to provide guidance for action. Other constituencies

want resource flows data for advocacy purposes; for example, to point out that inadequate resources are being allocated for health research by a government or organization. At disease or research topic level, constituencies need data to show that important areas are being neglected. The diversity of the demand for resource flows data is reflected in the diversity of the data tracked by funders and performers.

2. Supply of data

(a) Total health R&D data

Data is readily available for advanced countries from existing data collection systems. Improvements in quality and standardizations are already underway. As part of this process, potential as well as real double counting are being reviewed. Areas constituting gaps, such as research in hospitals, are included. While it is still difficult to obtain reliable health R&D totals for some low- and middle-income countries and countries in transition, data collection systems are evolving: for example, the Latin American region. The best information obtained to date has been through special studies and surveys. While the initial study may take as long as two years to complete, such a study can form the countries' basis for a more systematic approach to monitoring resource flows in the future. In addition, by building such systems in a manner that is compatible with existing global data collection systems, it will be easier in the future to obtain a more accurate overview of total health R&D funding worldwide.

(b) Disaggregated health R&D flows data

Funding flows from high-income countries to low- and middle-income countries, or countries in transition, are usually very difficult to trace. For example, funding may be passed laterally from one advanced country agency to another before it is provided to a low- and middle-income country agency. Furthermore, these funds may be provided through multilateral channels, bilateral channels or via secondary funders, such as advanced country universities or non-governmental organizations who administer the funds on behalf of a government agency. In addition, many funding agencies are highly decentralized with decisions on allocations made in low- and middle-income countries and reporting requirements based on the overall goals and objectives developed within the bilateral relationship. Many advanced countries' funding agencies, especially those disbursing ODA, do not collect disease-specific data; therefore, this is unavailable or not easily accessible.

Funding flows within low- and middle-income countries are also complex. Research institutions receive public funds bilaterally, multilaterally and from their own governments and may concurrently receive funds from external and internal non-governmental entities. As tracking these funds is usually very difficult and time-consuming, a mapping of institutions and funding structures must be done first.

Private investments by pharmaceutical companies account for almost half of the total investments into research worldwide. Only aggregated information is released in this group. Information on the cost of research and clinical trials for discovery and development of medicines was not considered in this study. The widely quoted figure of US\$500 million required to develop a new drug was not addressed in this study and should be studied and discussed in future.

(c) Usefulness of data sources for health R&D information

The following summary (Insert 6.8) examined the utility of available data sources and the quality of the information:

- *Estimates of total R&D in high-income countries*

Results obtained mainly from S&T databases/surveys and supplemented by data from published reports were good.

- *Estimates on health R&D in low- and middle-income countries and countries in transition*

Results obtained from the methodology developed for three-country studies were good. Improvements are needed in tracking and obtaining disaggregated data at the country level. Results from science and technology surveys and databases gave information on total funds for health research and development. They provided useful information on both performers and funders. Information on countries not researched in this first phase (for example, the People's Republic of China) will be carried out in the second phase.

- *Estimates of resource flows using high-income country funders as sources of data*

Responses to a questionnaire sent to the funders were disappointing and this data collection approach should be abandoned. Results obtained using personal interviews and public documents were useful but required time and repeated efforts from the consultants and staff. Future efforts along these lines should be focused and adequately supported. Disease-specific data was difficult to obtain as few organizations track this information. Funding invested in research capacity strengthening was identified, along with insights for programming of resources by funders. This component should be further developed in the second phase.

Insert 6.8

Usefulness of sources for health R & D data obtained by the resource flows project

	Funder questionnaire	Special survey	Funder surveys/databases	Government S&T surveys	Evaluations/annual reports/websites	Interviews/personal contacts
High-income countries						
Government ministries/public ODA/orgs			x		x	xxx
Other public*			xxx			xx
Pharmaceutical companies			xx		xx	
Non-profit/foundations	x	x	xxx		x	xxx
EC	x				x	xxx
WHO		xx			xxx	xx
World Bank					x	xxx
Low-, middle-income and countries in transition						
Government ministries						xx
State government					xxx	xx
Academic/research institutions		x			x	xx
Hospitals		x				xx
Multilateral/bilateral	x				xx	
NGOs		x			x	xx
Pharmaceutical companies		x			xx	xx
Academic research institutions		x			xx	xx
Total Global R&D Aggregate		xx	xx	xxx		

* Other public: public sector funding other than for ODA such as national research institutes, medical research councils, university-based research
 Blank = of limited or no use x = of some use xx = very useful xxx = extremely useful

(d) Obstacles encountered

The following is a list of obstacles encountered during the process of obtaining financial data:

- Organizations surveyed do not systematically track or monitor health research as per categories defined in this

paper or in the questionnaires. Members of staff surveyed were too busy to provide information beyond the scope of their records.

- While most organizations track some aspects of research capacity strengthening – such as academic degree programme training, postdoctoral training and

international projects – they generally do not maintain records on the low- and middle-income countries' components of international projects with which they collaborate. This adds to the difficulties in determining resource flows to low- and middle-income countries.

- Questionnaires developed as a survey tool for advanced country funders were too lengthy and detailed, thereby contributing to a poor response rate.
- Decentralization of management in ODA and multilateral organizations contributes to problems in obtaining data on financial resources, especially for purposes that are not high priorities for those organizations.
- Impact level measurements for parameters such as research capacity strengthening are infrequently used. As a result, research capacity strengthening is reduced in status as a priority.
- Capturing data for organizations that facilitate and convene rather than execute is difficult.
- The importance and the relevance of the data on resource flows for investor organizations is unclear when compared to other priorities.
- Fluctuations in exchange rates complicate the interpretation of data, especially long-term funding trends.
- Obtaining data from funders in advanced countries on funds actually used for research in low- and middle-income countries by local researchers is difficult. Ascertaining the percentage of funds used for administrative and managerial purposes by advanced countries and multilateral organizations is of importance to obtain a better estimation of funds actually expended in low- and middle-income countries.
- Information from low- and middle-income countries was not readily available. A framework of information about resource flows for health research in low- and middle-income countries was tested as part of this study.

3. Data gaps identified

In the course of this study, no attempt was made to gather data in the following areas (these will be addressed in the second phase of the study):

- Global allocation of funds to R&D for specific diseases.
- Public funding by advanced countries for northern institutions conducting R&D on problems important to low- and middle-income countries.
- Pharmaceutical industry funding in low- and middle-income countries.
- Cost of R&D to develop drugs and vaccines, including the costs of clinical trials.
- Regular budget allocations by UN agencies such as WHO to health research, as differentiated from voluntary contribution.
- Relation between health priorities identified in low- and middle-income countries and projects funded from national and international sources.
- Fraction of public funds invested into fundamental research which eventually leads to a marketed drug.
- Funding for social science research and for health economics research.

4. Donor transition in the late 1990s and early 2000s

In the course of this study, it became evident that important changes were taking place in the health donor community having implications for health research in, and relevant to, low- and middle-income countries. There is clear information on shifts in funding sources in the late 1990s and early 2000s, such as the new Global Fund to Fight HIV, TB and Malaria, and the recommendations of the Commission on Macroeconomics and Health (see Chapter 1). The private sector foundations, particularly Bill and Melinda Gates Foundation, and philanthropic institutions have taken a larger role in funding research. The Bill and Melinda Gates Foundation increased its investments in the health research field to US\$189 million in

2001. Investments by US pharmaceutical companies are increasing in the US but not abroad. The access to the research findings by most of the world's population is a crucial component of health research and should be ensured.

In conclusion, during the late 1990s and early 2000s, there has been greater involvement of foundations, CSOs, national research institutions in advanced countries, and the pharmaceutical industry in international health. This shift is coupled with an increase in investments in health research globally, from governments in both advanced and low- and middle-income countries. The implications of this transition to improve the health of the majority of the world's population, a global public good, are not clear and have to be documented in future. By ensuring that research is conducted on diseases and determinants with the highest magnitude of disease burden, we ensure that the limited available resources have the greatest possible impact on the health of the majority of the world's population, in particular the poorer segments.

5. Conclusions and future steps

At the global level, there is no 'coordination' of health research funding, and perhaps there will never be. This study is certainly not intending to attempt such coordination. In the real world, there is a constellation of institutions working towards similar goals, which may or may not communicate with each other. A platform for discussion and information sharing can be useful to help improve resource allocation for health research.

It is expected that many more organizations will take part in future exercises on resource flows. The following strategies could be considered relevant for the next phase:

a) Measure resource flows in *additional developing/transition countries* using the

methodology developed in this study. This should be implemented at the following levels:

- Government: improve and expand data on selected topics, such as financial flows related to health problems and determinants of disease burden at the country level; cross-check data generated with that reported by external donors.
- Research institutions: encourage analysis of resource flows into defined country health research priorities by:
 - building research capacity to measure resource flows
 - facilitating information exchange on experiences and strategies
 - disseminating lessons learned.

WHO, governments and medical research councils in low- and middle-income countries and institutions like COHRED are in advantageous positions to facilitate this strategy.

b) Improve the amount and international comparability of publicly available data on the level and structure of aggregate spending on health research by encouraging the *entities already compiling health statistics* to pay greater attention to R&D and by encouraging UNESCO and the regional organizations collecting R&D data to give higher priority to health-related series.

c) Periodically obtain disaggregated data from *large investors* in advanced countries including ODA agencies, foundations and pharmaceutical companies. Analyse the information to study the 10/90 gap in health research funding.

d) Influence partners with established interests and expertise in *specific disease areas* to do periodic studies of resource flows for the conditions representing the highest burden now and in the future (e.g. International Union Against TB and Lung Disease, Wellcome Trust, WHO/TDR, NIDI, WHO); assist in the identification of funding for such studies.

Annex 6.1

Resource Flows Advisory Group

The members of the Advisory Group were acting in their individual capacity and were active for varying amounts of time. The names of their institutions are mentioned for identification purposes only. The position indicated for each member is that held at the beginning of the project and does not necessarily reflect the current position.

Chair

Louis J. Currat

Executive Secretary, Global Forum for Health Research

Convenor

Andres de Francisco

Senior Public Health Specialist, Global Forum for Health Research

Members

Bienvenido P. Alano

President, Centre for Economic Policy Research, The Philippines

Wendy Baldwin

Deputy Director, National Institutes of Health, USA

Julio Frenk

Executive Director, Evidence and Information for Policy Cluster, World Health Organization, Geneva

Myint Htwe

Regional Advisor on Medical Research, World Health Organization Regional Office for South East Asia (WHO/SEARO), New Delhi

Adnan A. Hyder

Research Associate, Johns Hopkins University School of Hygiene and Public Health, USA

Catherine Michaud

Senior Research Associate, Harvard Center for Population and Development Studies, USA

Caryn Miller

Research Policy Advisor, U.S. Agency for International Development (USAID) and

Associate, Johns Hopkins University School of Hygiene and Public Health, USA

Barend Mons

The Netherlands Organization for Scientific Research (NWO), The Netherlands

Eric Noehrenberg

Director of Programmes, International Federation of Pharmaceutical Manufacturers Associations, Geneva

Yvo Nuyens

Coordinator, Council on Health Research for Development (COHRED), Switzerland

Tikki Pang

Director, Research Policy and Cooperation, World Health Organization, Geneva

Ulysses B. Panisset

Regional Advisor, Pan American Health Organization (PAHO), Washington DC

Elettra Ronchi

Principal Administrator, Organisation for Economic Cooperation and Development (OECD), Paris

Bruce A. Scoggins

Director, Health Research Council of New Zealand, New Zealand

David Seemungal

Policy Analyst, Wellcome Trust, Great Britain

Adik Wibowo

World Health Organization Regional Office for South East Asia (WHO/SEARO), New Delhi

Alison Young

Organisation for Economic Cooperation and Development (OECD), Paris