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# Monitoring Financial Flows for Health Research 2008

## Prioritizing research for health equity



2008

**Monitoring Financial Flows for Health Research 2008**
**Prioritizing research for health equity**


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The Global Forum for Health Research is an independent international organization committed to demonstrating the essential role of research and innovation for health and health equity, benefiting poor and marginalized populations, because health equity is a priority.

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# Monitoring Financial Flows for Health Research 2008

## Prioritizing research for health equity

Edited by
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and Stephen A Matlin

# Contents

# List of figures

## Introduction



## Chapter 1



## Chapter 2

# List of tables

## Chapter 2



## Chapter 4

# List of boxes

# Foreword

2008 is a year of anniversaries. It is 60 years since the establishment of the World Health Organization and the adoption in 1948 of its ground-breaking constitution, which defined health in a broad and comprehensive way ("not merely the absence of disease or infirmity") and framed health as a fundamental human right. It is 30 years since the Alma-Ata Declaration launched the movement for primary health care and the aspiration of "Health for All by the Year 2000". And it is 10 years since the Global Forum for Health Research was established in 1998, drawing attention to the imbalance symbolized by the expression "10/90 gap" – an imbalance in the global application of research resources to address the health needs of poor and disadvantaged populations.

The regular tracking of research resources, as reported in annual editions of the Global Forum's *Monitoring Financial Flows for Health Research*, has become widely appreciated as a tool to help promote the closure of this gap and is increasingly being focused upon by the Global Forum and others to draw attention to specific gaps relating to diseases, determinants, conditions and geographical areas.

The Global Forum itself has strongly promoted the widening of attention to include the entire spectrum of research for health – not just the health research and development (R&D) spectrum involving biomedical R&D and areas such as health policy and systems research, behavioural and social sciences, and operational research, but also research encompassing biological, economic, environmental, political, social and other determinants of health, with a particular emphasis on research to enhance health equity. This widened spectrum poses a number of challenges that we begin to address in the 2008 edition of *Monitoring Financial Flows for Health Research*.

Over the course of several decades, the world has accumulated a substantial array of targets, commitments and aspirations relating to resources for development and health in general and for research overall and health research in particular. These targets, commitments and aspirations matter – because the lives and well-being of billions of people depend on the actions of policy-makers who determine how and where funds are used, globally and nationally, which sectors, policies and programmes receive support and whether they are effective. Policy-makers must be held accountable for the actions they have taken to meet the goals set. In this edition of *Monitoring Financial Flows for Health Research*, the Global Forum begins a regular review of targets, commitments and aspirations and of the global progress towards meeting them - a "Report Card" on global efforts relevant to R&D for health.

The regular tracking of resource flows for R&D for health and the complementary filling of the Report Card on resources for development assistance, health and research are designed to provide the evidence base

from which clear arguments will emerge. This is the starting point for the most important aspect of the work in which the Global Forum is engaged: to take the arguments and evidence to policy-makers and to persuade them to make the necessary investments. Only then will research fulfil its potential and the pace of change be accelerated towards achieving the goals of better health and health equity for all.

Gill Samuels
Chair of the Foundation Council
Global Forum for Health Research

# Introduction

## Research for health: signposts to health and health equity

The Constitution of the World Health Organization (WHO) came into force in 1948, defining health comprehensively as *"a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"* and affirming that "*the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition*".

Sixty years on, and thirty years after the 1978 Alma Ata Declaration launched the movement for Primary Health Care and the – sadly unmet - aspiration of "Health for ALL by the Year 2000", the world is still striving to achieve that standard of good health and well-being that is the right of every person. In particular, major differences in life expectancy and burden of disease within and between populations around the globe are markers of persistent health inequities.

Research has a vital role to play in overcoming these health disparities. It helps to understand the root causes, to create solutions and to test and refine these. In 1998, the Global Forum for Health Research was established, founded on the recognition that too little research was being devoted to the health problems of poor and disadvantaged populations and given a mission to increase the research required to tackle these problems.

The need for such research grows ever more pressing.

- At the mid-point to the target date of 2015 for achieving the Millennium Development Goals, many low- and middle-income countries are off track and there are particularly serious concerns about the poor progress with the Millennium Development Goals aiming to decrease maternal and child mortality as well as difficulties in sustaining the momentum in combating HIV/AIDS, malaria and other infectious diseases. Millions of people die every year from a range of communicable diseases – including malaria, tuberculosis, HIV/AIDS and a range of tropical parasitic infections that are often referred to as "neglected diseases" – for which better drugs, vaccines and diagnostics are still needed and which disproportionately affect some of the poorest countries in the world.
- At the same time, the range of health challenges faced by low- and middle-income countries grows wider. Many are already experiencing a new epidemic of noncommunicable diseases such as cancer, diabetes, heart disease, stroke and mental and neurological conditions, which are taking a heavy toll of people in mid-life and contributing to the further impoverishment of families already struggling to survive on the most meagre of resources.
- Rising rates of death and disability from road traffic injuries and health impacts of climate change add to the list of challenges for which the creation of new knowledge and testing of tools and solutions are urgently required.

Reflecting the breadth of the definition of health, a wide spectrum of research is needed to meet these challenges. It spans the well established health field – research into disease prevention and health promotion; research and development (R&D) of drugs, vaccines and diagnostics; attention to medical services for the prevention, diagnosis and treatment of disease states having biological causes. But it also includes research to develop and use measures in a range of sectors – including environmental, economic, political and social – to avoid or ameliorate conditions that contribute to ill-health and to create conditions that provide the opportunity to achieve better health and well-being.

Meeting the challenge requires political will to ensure that the required spectrum of action is undertaken to achieve improved health and health equity, crossing sectoral boundaries and traditional lines of responsibility; and also a determination to ensure that technical, institutional and financial resources are allocated to underpin this multisectoral agenda of action.

Throughout its 10 years of promoting research for the health of the poor, the Global Forum for Health Research has recognized the importance of a wide spectrum of factors beyond biological determinants of health. It has increasingly emphasized the need to expand the scope of "health research" to encompass a wide range of determinants of health beyond biological and health system factors – including economic, environmental, political and social determinants – to improve health and reduce health disparities within and between populations. The Global Forum has therefore adopted the enlarged domain of relevant research that is referred to as "research for health". Like the definition of health, the definition of "research for health" (Box 1) includes the principle of health equity as an intrinsic element.

## Box 1

Research for health

The Global Forum for Health Research defines "research for health" as research undertaken in any discipline or combination of disciplines that seeks to:

1) understand the impact on health of policies, programmes, processes, actions or events originating in any sector – including, but not limited to the health sector itself and encompassing biological, economic, environmental, political, social and other determinants of health;
2) assist in developing interventions that will help prevent or mitigate that impact;
3) contribute to the achievement of health equity and better health for all.

## Global financing of health R&D

An estimate of how much the world spends on R&D in the health field was first reported by the Commission on Health Research for Development in 1990. The Commission found that, in 1986, about US$ 30 billion was spent in total and they estimated that about US$ 1.6 billion (5%) of this was invested in R&D on diseases predominantly affecting people in low- and middle-income countries, where 90% of the burden of preventable mortality was to be found. This imbalance was subsequently captured in the term "10/90 gap", an expression which has come to symbolise an inequitable distribution of research resources compared with the magnitude of the health problems experienced by the poor.

Since its establishment in 1998, the Global Forum for Health Research has focused attention on tracking resources for health R&D. The Global Forum's first reports on *Monitoring Financial Flows for Health Research*, published in 2001 and 2004, provided data on global spending on health R&D for 1998 and 2001 respectively and subsequently reports on the global totals are being issued every two years (dictated by the availability of Organisation for Economic Co-operation and Development (OECD) reports that are published biennially and cover spending three years previously). The 2008 report finds that the world spent US$ 160.3 billion in 2005, up from US$ 125.8 billion in 2003 (Figure 1).

As a result of changes in reporting by some sources, the US$ 160.3 billion in investments identified for 2005 includes approximately US$ 10 billion of new sources of money "found" since the Global Forum's last report. In particular, these additional investments have been recorded for a range of pharmaceuticals and medicines, medical equipment and supplies and health-care services in the United States, the Netherlands and Norway.

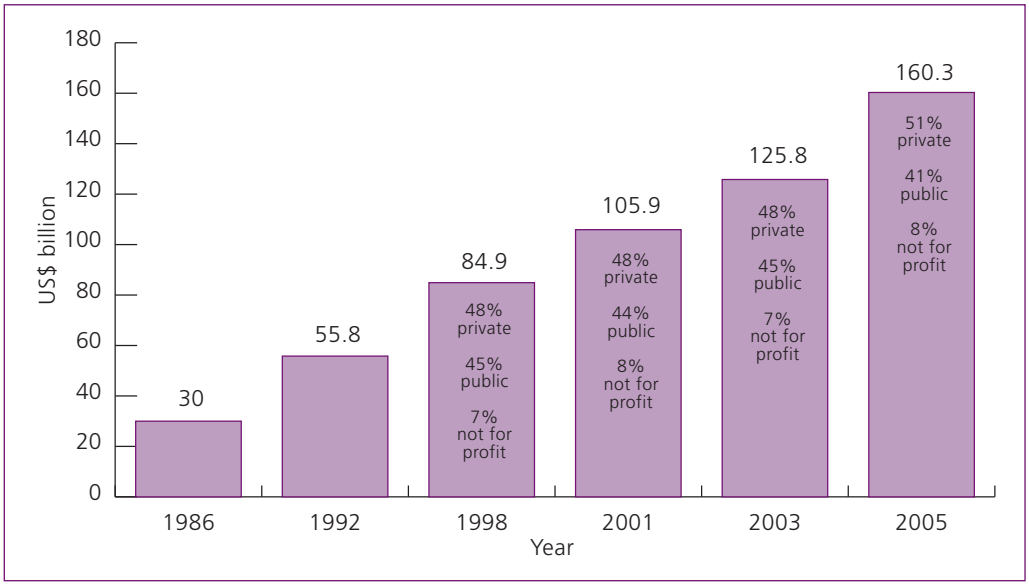
Without this additional "found" money, the total for 2005 would have been US$ 150.4 billion – an increase of US$ 24.6 billion since 2003. Thus, even without the additional US$ 10 billion of new sources of money now identified, the rate of increase in 2003-2005 was averaging US$ 12.3 billion per year, up from an average rate of increase of US$ 10 billion per year in 2001-2003.

There are indications that, to some extent at least, the growth in investments is not just a reflection of inflation or shifts in exchange rates. When data were standardized using either constant 2003 US$ or 2003 purchasing power parities (PPPs), a similar pattern of growth for 2001-3 and flattening for 2003-5 was observed (Figure 2). Work is needed to develop PPPs that can reflect the basket of goods specific to R&D for health. This is especially important for low- and middle-income countries, as using such a basket of goods to assess their investments in R&D for health may give a fairer assessment of their investments in R&D. Costs of doing R&D in these countries may be considerably lower than in high-income countries (HICs), given differences in labour and other fixed costs.

The 2005 global investment in health R&D of US$ 160.3 billion represents 4.1% of total estimated national health investments worldwide, up from 3.6% in 2003, 3.5% in 2001 and 2.8% in 1998.

## Figure 1

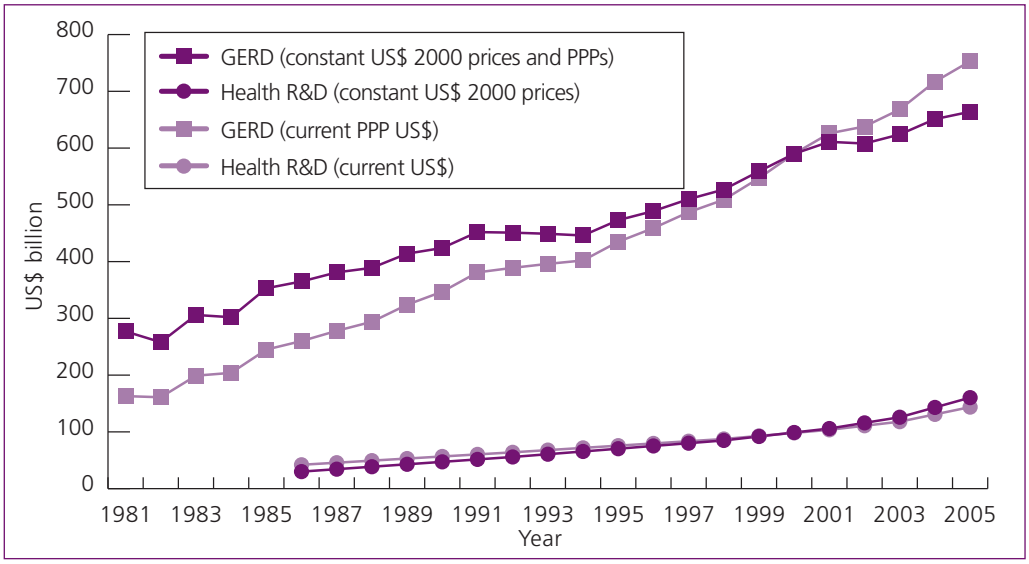
Global investments in health R&D




*Sources:* Global Forum for Health Research estimates based on official data from official reports to OECD, national surveys, pharmaceutical associations and other publications.

## Figure 2

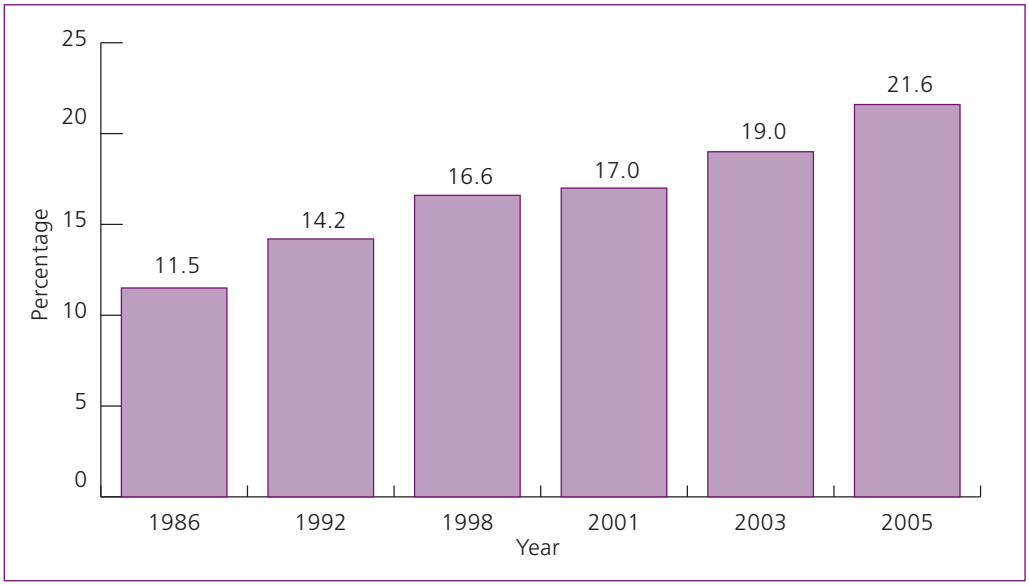
Health R&D investments among OECD-reporting countries, 2001-2005, in current and constant 2003 US$ and PPPs




*Sources:* Global Forum for Health Research estimates based on data from official reports to OECD and WHO.

## Figure 3

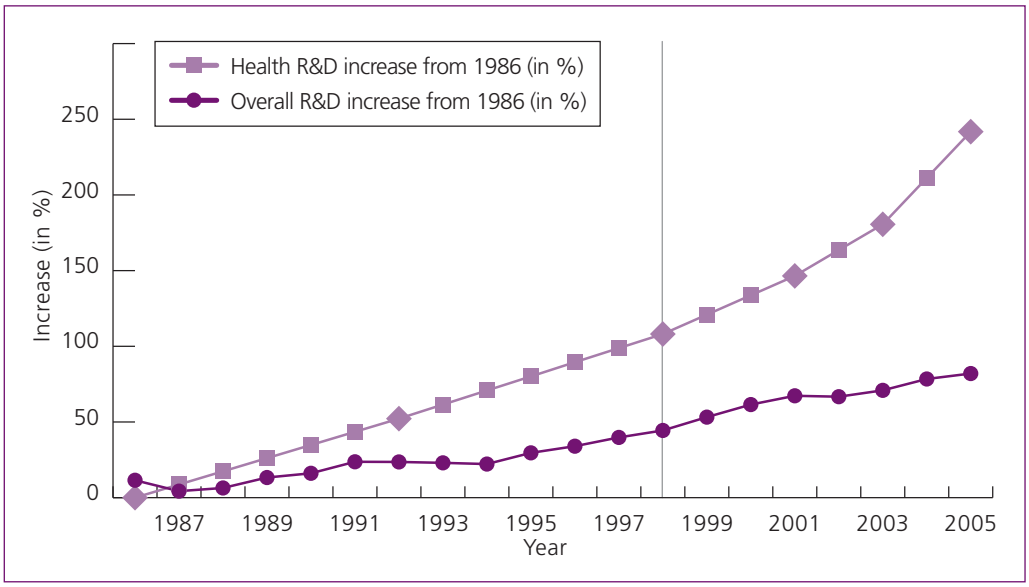
Investments in health R&D as a proportion of overall R&D investments, 1986-2005




*Sources:* Global Forum for Health Research estimates based on data from official reports to OECD and RICYT, national surveys, pharmaceutical associations and other publications.

## Figure 4

Percentage increase in health R&D investments compared to overall R&D investments, 1986-2005




*Sources:* Global Forum for Health Research estimates based on data from official reports to OECD and RICYT, national surveys, pharmaceutical associations and other publications.

Global investment in health R&D has also grown as a proportion of total R&D throughout the period since 1986 (Figure 3), the health R&D component having continued to accelerate while overall R&D has flattened out (Figure 4).

Most (97%) spending on health R&D continues to be by high-income countries, with the remainder (3%) by low- and middle-income countries. Most of the US$ 155.2 billion spent by high-income countries goes towards generating products, processes and services tailored to their own health-care markets.

The United States government was the biggest high-income country investor in health R&D in 2005 at US$ 35.0 billion and accounted for more than half of the total in these countries. Japan followed with US$ 6.3 billion, the United Kingdom US$ 4.2 billion, France US$ 3.5 billion, Germany US$ 3.3 billion, Canada US$ 2.7 billion and Italy US$ 2.5 billion. Together, the G7 countries invested more than 88 per cent of publicly funded health R&D in high-income countries (down from 92% in 2003). Together, all other high-income countries added another US$ 7.3 billion.

A small but increasing investment in health R&D (US$ 5.1 billion in 2005, up from US$ 4.1 billion in 2003) is carried out by low- and middle-income countries. As some of the so-called innovative developing countries (e.g. Argentina, Brazil, China, India, Mexico) continue to invest in health R&D, we could expect this situation to begin changing. Already in 2005, estimates put China's investments in health R&D on a par with those of HICs such as Australia, Belgium, Denmark and the Netherlands, at 1% each. Investments by all other countries account for just 1% of global health R&D investments. Improvements in data collection, reporting and analysis activities in low- and middle-income countries would help considerably in identifying additional investments by low- and middle-income countries in research for health that for the moment remain uncaptured by this global monitoring activity.

There is need for an international consensus on a classification framework for data on research for health and on investments in research for health, in line with the conceptual shift that has taken place widening the understanding of R&D for health from a narrow bio-medical and health systems focus to a broader concept of research for health that would encompass research for health both inside and outside the health sector.

More work is still urgently needed in these areas as there is still not a single country in the world that routinely collects and reports on data on investments in R&D for health.

## Global trends in mortality and morbidity

On average, people are healthier than at the time the Alma-Ata Declaration was signed in 1978, with more access to improved drinking water, sanitation and key health interventions such as childhood immunization. Partly in response, child mortality rates have declined steadily in all regions of the world over the last 30 years and global life expectancy at birth has increased from 60 to 67 years.

However, these health improvements have not been shared equally and there remains a huge gulf between the health expectations of high-income and low-income countries, and health inequalities among and within countries remain entrenched. Child mortality rates in sub-Saharan Africa as a whole were similar to those in the Middle East in the 1960s, but they are now twice those in the Middle East and are approximately four times those in South-East Asia. In the period since 1970, the rate of decline in child mortality has, in fact, been very slow in low-income countries as a whole, much slower than in the richer countries.

The health of populations remains vulnerable to environmental, economic and social changes and civil disruption. Global health trends reveal a complex and a challenging mixture of old and new health problems and further health transformations are projected to take place over the next 25 years.

Almost 10 million children under 5 years still die every year in the world and nearly all child deaths (97%) occur in low-income countries – almost half of them in Africa. A recent assessment of all the available survey evidence on trends in child mortality to age 5 concluded that the rate of progress has not been as rapid as anticipated. Under-five mortality is expected to decrease by only 26% from 1990 to 2015 at current rates; this decline is substantially less than the MDG4 goal of a 67% decline, and substantially slower than the rate of decline observed for the world between 1970 and 1985. This slow progress is determined largely by the slow declines in sub-Saharan Africa, which also has the slowest rates of decline in fertility. Most child deaths could be averted with existing cost-effective technologies. Under-nutrition is an underlying cause in an estimated 30% of all deaths among children under five.

Adult mortality rates have been declining in recent decades in most regions of the world. Life expectancy at age 15 has increased by between 2 and 3 years for most regions over the last 20 years. The notable exceptions are the high-mortality countries in Africa, where life expectancy at age 15 has decreased by nearly 7 years between 1980 and 2001 mainly because of HIV/AIDS, and the former Soviet countries of Eastern Europe, where life expectancy at age 15 has decreased over the same period by 4.2 years for males and 1.6 years for females.

The global burden of disease is shifting from infectious to noncommunicable diseases, with chronic diseases such as heart disease, stroke, diabetes, cancers and chronic respiratory diseases now accounting for more than 60% of deaths globally and 80% of these deaths occurring in low- and middle-income countries. Close to 50% of the chronic disease deaths in low- and middle-income countries occur under the age of 70 years, compared to only 27% in high-income countries.

WHO projections show that the world will experience a substantial shift in the distribution of deaths from younger to older ages and from communicable to noncommunicable diseases during the next 25 years. Large declines in mortality

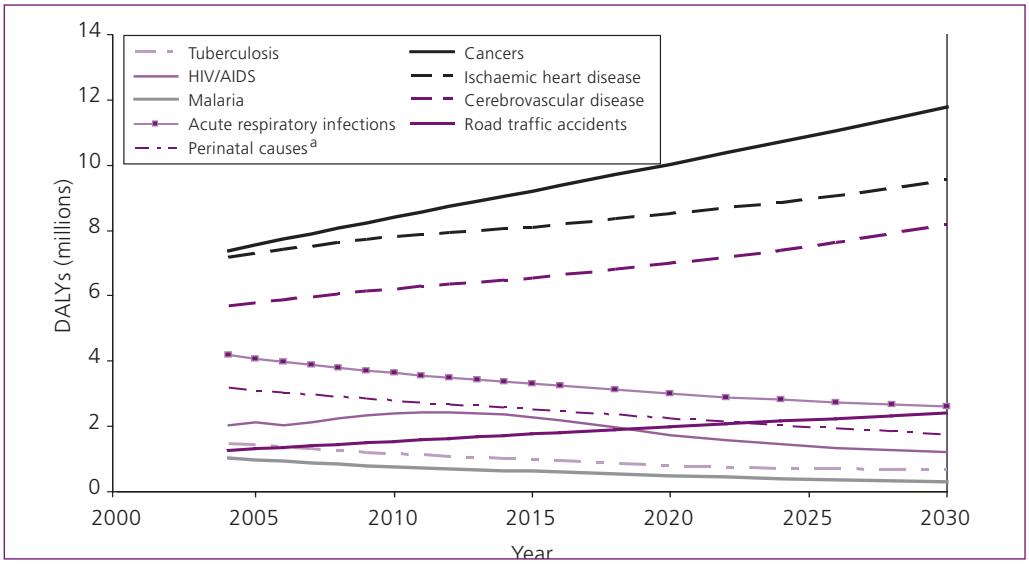
between 2002 and 2030 are projected for all of the principal communicable, maternal, perinatal and nutritional causes including HIV, tuberculosis and malaria. Global HIV/AIDS deaths are projected to rise from 2.2 million in 2008 to a maximum of 2.4 million in 2012 and then to decline to 1.2 million in 2030 under a baseline scenario which assumes coverage with anti-retroviral drugs continues to rise at rates currently being achieved.

Ageing of populations in low- and middle-income countries will result in significantly increasing total deaths due to noncommunicable diseases over the next twenty five years (Figure 5). Global cancer deaths are projected to increase from 7.4 million in 2004 to 11.8 million in 2030, and global cardiovascular deaths from 17.1 million in 2004 to 23.4 million in 2030. Overall, noncommunicable conditions are projected to account for just over three-quarters of all deaths in 2030.

Overall, and despite a continuing improvement in average health status in many low- and middle-income countries, there are widening health inequities within countries, and some regions where health reversals have occurred. Across the world, children are at higher risk of dying if they are poor and malnourished, and the gaps in mortality between the haves and the have-nots are widening. Globally, we are not doing a better job of reducing child mortality now than we were three decades ago. In Africa, those that do make it past childhood are confronted with adult mortality rates that exceed those of 30 years ago. Indeed, the state of adult health is characterized by three major trends: slowing down of gains and widening health gaps, increasing complexity of the burden of disease, and the globalization of adult health risks.

## Figure 5

Projected global deaths for selected causes, 2004–2030




*Sources:* WHO. a. Causes arising in the perinatal period; does not include all neonatal deaths.

## Targets, commitments and accountability: a Report Card on financing research and development for health

Research has a vital role to play in overcoming the current and future health challenges that are faced by poor and disadvantaged populations and in reducing the persisting health inequities they experience. For research to fulfil this potential, it is essential that it be adequately resourced, within the broader context of financing for health and development.

Research for health is situated at the intersection of several inter-locking domains that influence the resources that are available.

- It is located in the broader domain of research of all kinds, receiving financing through the combination of public (research councils, university funding mechanisms, international collaborative research grants, etc) and private (national and international) channels that operate within and across countries.
- Research also receives some of its resources directly from the health sector, through national allocations made within health sector budgets and within international health initiatives.
- Development assistance also contributes to funding of research for health, either explicitly through direct funding of health research and research capacity building or as an included component of funding for the overall health sector.

Over the years, countries have set a number of targets aimed at increasing support for development, improving health and reducing health inequities, including targets related to investments in health R&D. Some have taken the form of firm commitments, while others are expressed as aspirations. What becomes of such targets? How well do countries perform in reaching them and how, if at all, are they held accountable when they do not achieve them? Doest it matter?

When put together, these various targets are impressive: if met, they would result in tens of billions of dollars per year of additional investments in overall development assistance and support to the health sector in low- and middle-income countries and billions of dollars of additional funding for research to support improvements in health and health equity in these countries and to move the world closer to meeting the Millennium Development Goals. Yet, global financing for these fields clearly falls short of this mark to a considerable extent. Why is this the case? Part of the answer may be the lack of an overall monitoring and reporting system that takes a comprehensive approach to development, health and research and that focuses on what the 1990 report of the Commission on Health Research for Development rightly saw as their "*vital link*" to health equity.

The challenge presented by attempting to monitor and report on progress towards the targets relevant to research for health is considerable.

***The Global Forum for Health Research is now taking up this challenge and is proposing the establishment of a regular review of targets, commitments and aspirations and of the global progress towards meeting them – a "Report Card" on global efforts relevant to research and development for health.***

Data in some areas will be lacking, of poor reliability or of limited comparability at the beginning, or relating to different years. But the very act of seeking and compiling what is available and examining the gaps, inconsistencies and mis-matches will form part of the Global Forum's own "aspirational target" – that of gradually establishing and expanding a robust global watchdog function that is respected for its soundness and independence and anticipated eagerly for its messages of success or failure. As part of this long-term effort, the Report Card is being framed in terms of "research and development for health" – aspiring to promote systems for the generation and collection of financial flows data that, over time, will increasingly encompass the whole spectrum of research on all the relevant determinants of health as well as R&D for pharmaceutical products and medical devices and research in the health field such as health policy and systems research and operational research. Acknowledging this combination, the Report Card will discuss information on financing "health R&D" when this is relevant or all that is available, but reviewing it under the umbrella of "R&D for health".

For some areas, especially those most directly concerned with the tracking of overall resources for health R&D, the Global Forum itself is the major source of regular, global data. In other cases, there are already organizations regularly reporting on important areas - for example, the OECD data on the flows of Official Development Assistance (ODA) to low- and middle-income countries. We acknowledge at the outset that the Report Card will utilize and build on this range of information sources.

***We believe that the added value of the Report Card approach is in bringing all the information together in one place and in situating resources for R&D for health within the wider context of a comprehensive analysis of the domains of development cooperation, health and research.***

In this publication we begin by reviewing the different areas of targets, commitments and aspirations that are relevant to research and development for health; propose the framework of a Report Card to cover these areas (Box 2); and examine the current availability of data to fill in the first Report Card.

## Box 2

Report Card for R&D for health

### A. All Countries

A-1. National R&D total investment as a percentage of GDP

A-2. National R&D for health as a percentage of GDP

A-3. National R&D for health as a percentage of national health investments

A-4. National R&D for health as a percentage of total R&D

### B. High-income countries

B-1. Gap between actual ODA investments and commitment to invest 0.7% of GNI on ODA

B-2. Gap between actual annual increase in ODA and commitment to double aid between 2005 and 2010 - an extra US$50 billion worldwide and US$25 billion for Africa

B-3. Gap between actual ODA investments in R&D for health and target to invest 5% of health ODA in R&D for health

### C. Low- and Middle-income Countries

C-1. Gap between actual investments in health and target to spend 15% of domestic public spending on health

C-2. Gap between actual investments in R&D for health and target to spend 2% of national health budgets on health research

### D. Global Health Initiatives and development agencies

D-1. Gap between actual investments and commitment to invest 5% of overall health investment portfolios of Global Health Initiatives and development agencies to support research capacity of countries, dissemination of research findings, and management of knowledge.

## Report Card measures: Cluster A - all countries

### Tracking national investments in all research and in health R&D

*Measure A-1* *National R&D total investment as a percentage of GDP*

*Measure A-2* *National R&D for health as a percentage of GDP*

From the data available in the Global Forum's tracking of resource flows for 2005, the performances for a number of countries are examined in relation to the target for European Union countries of spending 3% GDP on research by 2010 and the target for African Union countries of spending 1% GDP on research by the end of 2008.

In terms of the 3% and 1% targets (set for EU and AU countries, respectively, but used here as a benchmark of performance for high- and low- and middle-income countries generally):

- Sweden, Japan and Finland have already exceeded expenditure of 3% GDP on R&D, while several countries are in the 2%-3% range. Portugal and Greece have yet to reach even the 1% target set for African countries.
- Unfortunately sound data is not yet available for many low- and middle-income countries but, as shown in Figure 4.2, there are few that can so far demonstrate reaching the level of 1% of GDP for research. China is a notable example and Brazil and South Africa come close, the relatively strong national investments in research by these countries being in line with their emergence as "*innovative developing countries*".

***Policy implication:*** An appropriate policy goal for many countries is therefore to increase both their general research and health R&D spending.

*Measure A-3* *National R&D for health as a percentage of national health investments*

*Measure A-4* *National R&D for health as a percentage of total R&D*

There was significant movement in these measures between 2003 and 2005, signalling a growing commitment to investments in R&D for health among some countries, and unfortunately a decline among others. Iceland was placed first among all countries in its commitment to health R&D within its overall R&D and in relation to its total health budget. Switzerland and Sweden have the next highest relative investment in health R&D compared to the size of their health and overall R&D sectors, followed by Denmark and the United Kingdom. Both Switzerland and Denmark increased the proportion of health investments in R&D. Switzerland made huge gains in 2005 relative to its position in 2003 as it also improved in its investments in health R&D as a percentage of overall R&D. The United States maintained a relatively low score in 2005, while several countries improved their relative position. Turkey, Norway and the Czech Republic moved above 2% investments in health R&D relative to investments in health.

A number of Latin American countries and transition countries of the former Soviet bloc whose economies are recovering have relatively higher scores on health R&D as a proportion of overall R&D than countries like China, India, Korea, Russia and Israel.

In 2005, as in 2003, a number of innovative developing countries (Argentina, Brazil, China, India, South Africa) demonstrated relatively similar commitments to health R&D as a proportion of total health budgets, with investments in health R&D that accounted for approximately 1% of their national health investments. However, there was considerable difference in their commitment to health R&D as a percentage of their overall R&D sectors. Argentina showed the strongest commitment, followed by South Africa, Brazil, India and China.

Unfortunately, many low- and middle-income countries could not be examined due to lack of data.

***Policy implication:*** Financing of R&D for health in most low- and middle-income countries and some high-income countries needs to be increased as a proportion of health spending and/or as a proportion of overall research spending, to meet the targets.

## Report Card measures: Cluster B - high-income countries

### Tracking progress on ODA and its proportion allocated to health R&D by high-income countries

*Measure B-1* *Gap between actual ODA and commitment to invest 0.7% of GNI in ODA*

*Measure B-2* *Gap between actual annual increase in ODA and commitment to double aid between 2005 and 2010 – an extra US$ 50 billion worldwide and US$ 25 billion for Africa*

ODA funding increasing for a few years following a slump in the early 1990s, when aid to low- and middle-income countries fell sharply. By 1997, aid reached an all-time low of 0.22 per cent of donor countries' combined national income. By 2002, there was a relative 7.2 per cent real increase in ODA and further increases took place through to 2006, although the OECD projections suggest they may not be sustained beyond this and donors appear to be falling away from meeting the Gleneagles target of doubling of aid by 2010, with an extra US$ 50 billion per year worldwide and US$ 25 billion per year for Africa, compared with 2004.

Among the member countries of the OECD Development Assistance Committee (DAC), just 5 met their 0.7% commitment in 2007, as they did in 2002 when the commitment was made in Monterrey (Table 4.2 and Figure 4.6). Norway and Sweden, the front-runners in 2005, increased their ODA to 0.95%

and 0.93%, respectively, from 0.89% and 0.83% of GNI in 2002. Luxembourg also increased its ODA from 0.77% to 0.90% during that time, placing it in third spot in 2007. Denmark and the Netherlands, the other two countries to reach the commitment, each invested 0.81% of GNI in ODA in 2007. For Denmark this was a drop from its first-ranked spot in 2002, with an investment of 0.96%, while Netherlands made no progress over the period.

Among the G7 countries, none was even close to the target of 0.7% of GNI on ODA in 2007. France invested just 0.39% of its GNI in ODA, Germany 0.37%, the United Kingdom 0.36%, Canada 0.28%, Italy 0.19%, Japan 0.17% and the United States the lowest, at a mere 0.16%.

***Policy implication:*** To reach the ODA targets to which they have made commitments, G7 and other DAC member countries need to increase their ODA substantially during the next few years.

*Measure B-3* ***Gap between actual ODA investments in R&D for health and target to invest 5% of health ODA in R&D for health***

A Kaiser Family Foundation (KFF) report on donor funding for health in low- and middle-income countries for the period 2001-2006 noted that ODA for "health" (including spending on health, population and water programmes) rose from US$ 7.2 billion in 2001 to US$ 16.5 billion in 2005 and US$ 20.1 billion in 2006, an overall increase of 279% in cash terms and an increase in real terms even after adjusting for inflation and currency revaluation. This large increase reflects the start-up of some new global health initiatives during this period. Of the 2006 total, US$ 13.7 billion (68%) was for health/population and US$ 6.3 billion (32%) was for water. Health progressively increased its share of total ODA from 13% in 2001 to 17% in 2006. Funding for health grew at a much faster pace than unadjusted overall ODA (279% compared to 118% between 2001 and 2006) and, other than debt relief, was the fastest growing sector over the period.

The KFF report also noted that the amount spent on "medical research" (general medical research, excluding basic health research) within the total was US$ 0.56 billion out of US$ 20.14 billion (2.8%) in 2006 and had grown from US$ 0.03 billion out of US$ 7.22 billion (0.42%) in 2001.

***Policy implication:*** To reach the 5% target, high-income countries should continue increasing the proportion of health ODA devoted to the broad field of research for health – including, but not limited to, health R&D and research capacity strengthening.

## Report Card measures: Cluster C - low- and middle-income countries

### Tracking progress on health and health R&D by low- and middle-income countries

*Measure C-1* *Gap between actual investments in health and target to spend 15% of domestic public spending on health*

*Measure C-2* *Gap between actual investments in R&D for health and target to spend 2% of national health budgets on health research*

WHO has reported that the world spent US$ 4.4 trillion on health in 2005, with one third of this coming from general government expenditure, excluding social insurance, which accounted for a further quarter of the total. The latest available data from WHO on spending by countries on their health sector is provided in the 2006 World Health Report and covers the years 1999-2003. Among low- and middle-income countries, Andorra, Colombia, Costa Rica, Guatemala, Haiti, Honduras, Liberia, Palau, Panama, Samoa and Tonga had surpassed 15% of government spending on the health sector by 2003 (see last column of Table 4.3) and a number were in the 10-15% range.

As well as the substantial financial resources invested in health R&D in high-income countries, health research is also being funded by many other governments, notably many Central and Eastern European countries; also countries in Central and South America; and by countries in Asia including the most populous ones, China and India. However, few low- and middle-income countries collect and report data on investment in health research. The 2005 study shows that governments in low- and middle-income countries for which data are available spent at least US$ 3.0 billion on health R&D for in 2005, up from US$ 2.4 billion in 2003 and US$ 2.5 billion in 2001.

According to the Global Forum's estimates for 2005, no low- and middle-income countries met the target set by the 1990 Commission on Health Research for Development for investments in R&D for health totalling at least two per cent of national health investments. South Africa came closest to meeting the 2% target in 2005, although it was far from meting its 15% target. The Czech Republic was closest to meeting both targets. India was far from investing 15% of public spending in health; and, despite heavy investments in R&D was not close yet to reaching 2% of the health budget for health R&D. Unfortunately, few of the data needed for these measures are routinely available for Africa, as yet.

***Policy implication:*** To reach the targets, most low- and middle-income countries need to increase government financing for the health sector and, at the same time, accelerate increases in their financing of R&D for health.

## Report Card measures: Cluster D - global health initiatives and development agencies

### Tracking progress towards allocation of 5% of health funds to health R&D

*Measure D-1* *Gap between actual investments and commitment to invest 5% of overall health investment portfolios of Global Health Initiatives and development agencies to support research capacity of countries, dissemination of research findings, and management of knowledge*

The target in this domain is one of the most recent, having been proposed by the Ministers of Health and Heads of Delegation of 14 African countries that attended the High-Level Ministerial Meeting on Health Research for Disease Control and Development which took place in Accra on 17 June 2006. It has not been formally adopted by any of the Global Health Initiatives (GHIs) or development agencies to whom it is addressed and retains the relatively weak status of an aspiration by one group for the performance of another.

Nevertheless, we include this 5% target in the Report Card, because (1) it is, in any case, a sub-component of the broader target set much earlier by the Commission on Health Research for Development that development assistance agencies – which would include all bilateral and multilateral actors – should meet the 5% target; and (2) since the 1990 report of the Commission on Health Research for Development, the size of this sub-component of the development assistance domain has grown hugely and now accounts for many billions of dollars of funding to the health sector in low- and middle-income countries, making it worthy of separate attention.

The two largest GHIs are the Global Fund to Fight AIDS, Tuberculosis and Malaria and the Global Alliance for Vaccines and Immunization:

***Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM):*** Since its creation in January 2002, GFATM has approved a total of US$ 10.8 billion to more than 550 grants in 136 countries, dispersed through seven rounds of grant-making, and in 2008 is preparing to allocated further grants in Round 8, to a projected total of US$ 3.9 billion over a biennium. GFATM has recognized that funding of operational research (OR) is important and would be provided when it was included by applicants in their request for country support.[A] 2007 review of OR in GFATM grants reported that the Global Fund encouraged recipient programmes to spend 5-10% of grant budget on monitoring and evaluation, including OR. Of 363 proposals in Rounds 1-5, 70 (19%) included OR. For all three diseases targeted by GFATM, the proportion of proposals including OR and the proportional budgets for OR increased from Rounds 1-5 to Round 6. Over the total Global Fund portfolio, the budget allocated to OR increased from 0.4% to 3%.

***Global Alliance for Vaccines and Immunisation (GAVI):*** With the availability of new funding streams, programme disbursements by GAVI have been rising steeply in the last few years, reaching over US$ 900 million in 2007. A new "Window 3" mechanism was introduced by GAVI in 2002, permitting the use of GAVI funds for a range of activities including R&D, but with an overall total cap on Window 3 of US$ 30 million per year for the first three years. However, with the recent strengthening of GAVI's activities in supporting health systems development, revised guidelines for this area in 2007 stressed the opportunity for countries to use some of their GAVI funds for health systems operational research that better informs decisions and processes for overcoming health systems barriers to deliver immunization.

Among the internal development agencies, the World Bank and WHO have the two largest health portfolios.

- The World Bank is not a donor but, almost exclusively, a lender to the economies of low- and middle-income countries, including the health sector. There is no commitment to include a specific research allocation in its lending.
- With total biennial budgets that rose to about US$ 3 billion in recent years, WHO provides some funding to health projects and programmes in low- and middle-income countries as well as for its headquarters and global operations. It has been working to ensure that an increased proportion of its overall budget is spent at the country level. WHO has no commitment to include a specific research allocation, either in its overall biennial budget or in its specific contributions to country-level activities.

***Policy implication:*** To reach the target, GHIs need to encourage uptake by countries of the provisions they are willing to make for research within their funding windows. International agencies funding health in low- and middle-income countries should make allocations and set targets for research funding and encourage their uptake by countries.

## Monitoring financial flows for research for health: challenges and opportunities

During the last two decades, clear links have been established between development, health and research, highlighted in a series of world conferences attended by governments and by the reports of the Commission on Health Research for Development in 1990, the Commission on Macroeconomics and Health in 2001 and Commission on Social Determinants of Health in 2008.

Taken together, these milestones provide the visible markers of a global pathway towards reducing inequities, including those in health, between different population groups based on long-standing imbalances in resources and power relationships. They also affirm the importance of increasing knowledge and gathering and using evidence to help determine the best directions for the future and to accelerate progress towards the goals.

In the ten years since the Global Forum for Health Research was established in 1998, the imbalance symbolised by the expression "10/90 gap" – an imbalance in the global application of research resources to address the health needs of poor and disadvantage populations – has become widely recognized. And, the regular tracking of research resources has become widely appreciated as a tool to help promote the closure of this gap.

Global investments in health R&D have continued to rise strongly during the first half of the current decade, according to Global Forum estimates reaching at least US$ 160 billion by 2005. The Global Forum's focus is on determining how much of this is relevant to the health of the poor and in which areas the gaps are greatest and the needs most pressing if health and health equity are to be improved. In addressing these questions, ***we recognize the need for continuing to improve the precision and depth of analysis on two broad fronts***:

- In terms of inputs, the resources for R&D relevant to the health of the poor can be seen as two-dimensional: along one dimension, they are derived from the public sector and the private for-profit and not-for-profit sectors; along the second dimension, the public sector resources are derived from a combination of direct investments in R&D as part of the overall research investments made by countries, government investment in research that is included as a component of spending on the health sector in each country, and foreign resources that are part of ODA provided by high-income countries to low- and middle-income countries.
- In terms of outputs, the resources for R&D are applied to a range of health problems and needs. Traditionally, the main focus has been on biomedical research and development that leads to a better understanding of the nature and origins and diseases and the creation of tools, processes and products for their treatment – an area in which R&D costs have increased dramatically in recent years and which accounts for the vast majority of global R&D spending related to health. But, there has been an increasing recognition of the importance of research in other areas and the "health R&D" spectrum has been acknowledged to include areas such as health policy and systems research, behavioural and social sciences, and operational research. Most recently, a paradigm shift has led to a more comprehensive "research for health" approach, which encompasses research into the whole spectrum of biological, economic, environmental, political, social and other determinants of health.

In moving forward, it will be necessary to tackle a number of substantial challenges. While these are obstacles standing in the way of progress, overcoming the hurdles also presents opportunities to clarify understanding, stimulate cooperation and catalyse greater efforts towards achieving the goals.

***Tracking resources for R&D for health***

As we continue to track R&D financial flows, we will be engaging with five particular challenges:

- building international consensus on a classification system for investments in R&D for health;
- widening the range of data collected, so that it gives a better reflection of the whole range of work implied by "R&D for health" rather than only "health R&D";
- working with the private sector to obtain more complete, detailed and disaggregated data relating to R&D that is relevant to health in low- and middle-income countries;
- encouraging, through a range of partnerships, the development of country capacities in low- and middle-income countries for the regular and systematic gathering, anaysis and reporting of data relating to R&D for health;
- developing a scale of purchasing power parities that is relevant to R&D for health and takes account of the different costs associated with different components of R&D processes in a variety of settings – in the public and private sectors and in countries at different stages of economic development.

***Report Card for development, health and research***

The Report Card recognizes the linkages and inter-dependencies of three pillars on which global progress towards improving health and health equity rest: development, health and research. The Report Card is designed to asses the separate and collective efforts of different global actors towards supporting these three pillars, meeting specific commitments they have made and reaching the targets that have been set. Filling the Report Card presents a number of challenges:

- obtaining comprehensive and disaggregated development data relevant to the ODA commitments of the UN and Gleneagles, including specific information on resource flows for Least Developed Countries and for the country-specific health component of ODA.
- obtaining comprehensive, accurate and up-to-date data relevant to LMIC spending on the health sector
- obtaining comprehensive, accurate and up-to-date data relevant to LMIC spending on the research in general and disaggregated in all the sectors and domains relevant to R&D for health.

The Global Forum will develop the Report Card systematically in the coming years, collecting, analysing and reporting the data that is available and working through advocacy, partnerships and catalytic roles to secure the development of information systems for producing such data where it does not yet exist. As the quality and range of data that can be accessed improves, the initial measures may be refined or new ones added. The regular issuing of the Report Card will provide an increasingly detailed evidence base that can be used for advocacy. The Global Forum itself will not only publish the results but will also take the arguments to policy-makers and those who make the decisions about resources, to encourage them where targets have been set, to hold them to account where commitments have been made, and to make the case where needed for improved performance in the future.

The final objective is not more money for researchers – it is that, through these increases in research resources, there will be more knowledge, processes, tools and products created and utilized, with the result that health and health equity will improve globally and, most especially, for the poorest and least advantaged people in the world.

***Developing a focus on research for health equity***

Increasing resources for general health R&D will not guarantee that the health needs of the poor will be addressed or that health disparities between more and less advantaged populations and groups will be narrowed. An important challenge is therefore to ensure that: whether R&D is focused on creating new drugs, vaccines and diagnostics, on the functioning of health systems or on the wider determinants of health, it is important that the specific circumstances of the poorer and less advantaged are taken into account and that issues of accessibility and affordability, of economic, cultural, social and other local contexts are factored into the analysis and into the design, conduct, interpretation and use of the research.

# Chapter 1

# Prioritizing research for health and health equity

# Prioritizing research for health and health equity

## 1.1 Signposts to health and health equity

It is now 60 years since the constitution of WHO came into force, defining health in a comprehensive way that goes beyond the absence of disease or infirmity (Box 1.1).[1] The breadth of this definition has profound consequences for the spectrum of interventions that need to be considered in order to achieve the highest attainable standard of health:

- It necessitates emphasis on disease prevention and health promotion in the widest sense.
- It requires not only attention to medical services for the prevention, diagnosis and treatment of disease states having biological causes, but also efforts to use measures in a range of sectors – including environmental, economic, political and social – to avoid or ameliorate conditions that contribute to ill-health and create conditions that provide the opportunity to achieve better health and well-being.

### Box 1.1

Health and the right to health

> Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.
>
> The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.
>
> *Source:* WHO Constitution 1948[1].

In emphasizing the right to the highest attainable standard of health, the WHO constitution provided a far-sighted signpost to future action. That the world had not been quick to take up the challenge to achieve this goal was signalled by the efforts to galvanize action 30 years later in the Alma-Ata Declaration[2] launching the movement for primary health care and the – sadly unmet – aspiration of "Health for All by the Year 2000".[3] And it is only in the last 15 years, with the 1993 *World development report*[4] emphasizing the multiple benefits for development of investing in health and the work of the Commission on Macroeconomics and Health[5] and the Commission on Social Determinants of Health,[6] that the focus of attention has begun to turn more strongly to the intersectoral nature of health.

Meeting the challenge requires political will to ensure that the required spectrum

of action undertaken to achieve improved health and health equity crosses sectoral boundaries and traditional lines of responsibility; and also a determination to ensure that technical, institutional and financial resources are allocated to underpin this multisectoral agenda of action. In the 1986 Ottawa Charter for Health Promotion,[7] the first area of action, "Build healthy public policy", placed health on the agenda of policy-makers in all sectors and at all levels, directing them to be aware of the health consequences of their decisions and to accept their responsibilities for health.

An example of collective effort on a regional scale to demonstrate this political will has been provided by the European Union (EU). In accord with the Ottawa Charter, Article 152 of the 1997 Amsterdam Treaty of the European Union[8,9] states that "a high level of human health protection shall be ensured by all Community Institutions in the definition and implementation of all Community policies and activities". This approach of "Health in All Policies" was gradually incorporated into EU collective discussions and was adopted as its main health theme by the Finnish EU Presidency in the second half of 2006 in an effort to explore and promote practical measures in which health impact of decisions in other policy fields both in the European Community and in the Member States could be better taken into consideration. Finland's approach was to examine health determinants that are mainly controlled by policies of sectors other than health in order to address policies in the context of policy-making at all levels of governance in Europe: EU, regional, national and local.[10,11]

The Council of the European Union[12] recognized that policies can have positive or negative impacts on health determinants and that such impacts are reflected in health outcomes and the health status of the population; and that while there is a significant delay between political decisions and their impact on health outcomes, the effects on health determinants can be seen much sooner. It also underlined that the impacts of health determinants are unequally distributed among population groups, resulting in health inequalities. The Council noted that the population's health status can be improved by reducing health inequalities, most effectively achieved by broad intersectoral action; urged the Commission, the Member States and the European Parliament to ensure the visibility and value of health in the development of EU legislation and policies by, inter alia, health impact assessments: and invited these actors to take a variety of steps to achieve the goals of health in all policies (Box 1.2).

## Box 1.2

"Health in All Policies" in the European Union

**The Council of the European Union:**

***14. INVITES the Commission***

- to set out a plan for work in Health in All Policies with a specific emphasis on equity in health and consider including such activities in its new Health Strategy;
- to underline equity and the influences of other policies on public health in its future initiatives on health issues;
- to investigate and where necessary develop further coordination mechanisms to ensure that health considerations are taken into account in decision-making across sectors, including international treaties, in a systematic and structured manner;
- to further develop the knowledge base and methodology necessary for better understanding of health determinants and the ways in which they are affected by public policies at all levels, including evaluation of the relevance of current impact assessment practices for public health by for example ex-post evaluation, working closely with the WHO Commission for the Social Determinants of Health;
- to provide information on trends in health determinants and links between public health and social and economic development in the European Union, at national and regional level;
- to exploit synergies between policy sectors with interrelated objectives for example through programme cooperation, in particular concerning health at work;
- to encourage and support exchange of good practices and information on intersectoral policies between Community sectors, Member States and other stakeholders, with special emphasis on health inequalities; and to support capacity building in intersectoral health policy;
- to cooperate with international organisations on issues related to intersectoral policies;
- to ensure reporting on current Commission practices in health impact assessment and, initially by 2009 and thereafter at appropriate intervals, on the most essential actions to ensure a high level of health protection in all Community policies and actions;

***15. INVITES the Member States***

- to develop the knowledge base on health and its determinants, trends in them, and in health inequalities;

- to take into account in the formulation and implementation of their national policies the added value offered by cooperation between government sectors, social partners, the private sector and the non-governmental organisations for public health;
- to undertake, where appropriate, health impact assessment of major policy initiatives with a potential bearing on health;
- to pay special attention to the impact which major government policies have on equity in health, including mental health, and guarantee necessary efforts to tackle health inequalities;
- to focus on capacity building in policy analysis and development for improved intersectoral policies;

***16. INVITES the European Parliament***

- to apply Parliamentary mechanisms to ensure effective cross-sectoral cooperation for high level of health protection in all policy sectors;
- to take into account and carry out health impact assessments of legislative and non-legislative proposals;
- to consider health impacts, with particular emphasis on equity in health, of decision-making across all policy sectors.

*Source:* Council of the European Union 2006[12].

Given the complexities of the EU and the fact that health is primarily a national rather than a European-level responsibility, it remains to be seen how far and how effectively these actions are implemented.

In framing health in the context of human rights and in comparing the actual health of each human being with that of the highest standard available, the WHO constitution's definition of health (Box 1.1) carries, as an intrinsic factor, the concept of health equity.

That poverty is intimately connected with health has been known for many years. A number of major studies[13] have highlighted the fact that inequities in health and imbalances in the allocation of resources and in access to the products of research are found in all parts of the world and are often underpinned by social inequities and human rights violations. The advantage of taking a human rights perspective for efforts to improve health has recently been illustrated for the area of maternal and neonatal health.[14]

Marmot[15] noted three aspects of the relationship between income and health: through the gross national product of countries, the income of individuals, and the income inequalities among rich nations and among geographical areas. He discussed two ways in which income could be causally related to health: through a direct effect on the material

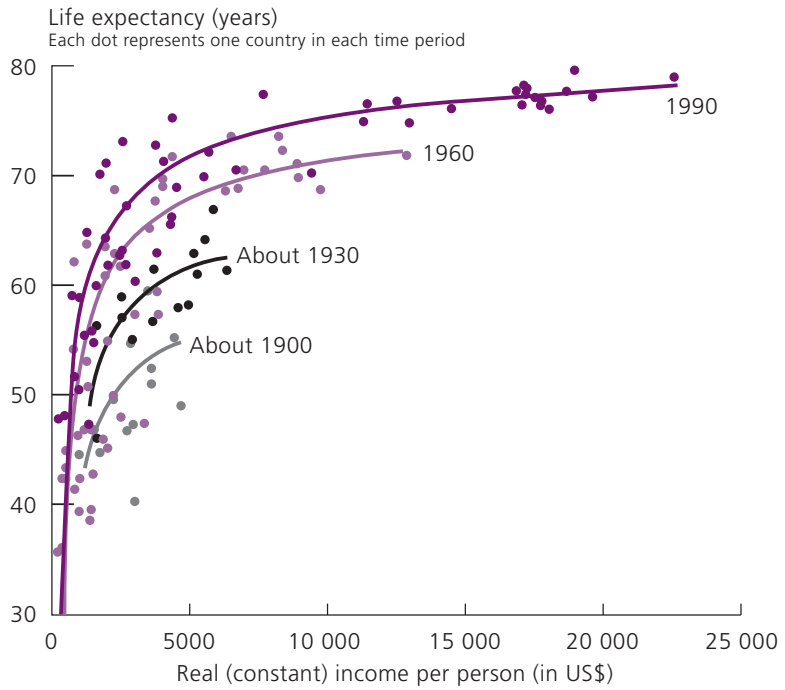
conditions necessary for biological survival, and through an effect on social participation and opportunity to control life circumstances.

The Preston curve (Figure 1.1)[16] demonstrates a clear and long-persisting correlation between average national wealth and life expectancy that favours richer rather than poorer countries. However, as Deaton[17] has observed, there are different interpretations of the positive cross-country correlation between health and income. Some have argued that economic growth is the surest way to improve health, while others have made the case that poor health is one of the most important causes of material deprivation. It is certainly the case that some poor countries (e.g. Cuba, Sri Lanka) have achieved much better health outcomes than others at a similar level of economic development, while others that grew very rapidly (e.g. China after 1980 and India after 1990) showed relatively poor improvements in health.

The lesson seems to be that other factors are very important – especially social factors, as vividly illustrated in the final report, just published, of the Commission on Social Determinants of Health. This argues that the health equity gap can be closed in a generation: an aspiration, not a prediction, which would require far-reaching action on the social determinants of health, globally, nationally and locally. Three principles of action are advanced: improve daily living conditions; tackle the unequal distribution of power, money and resources; and measure and understand the problem and assess the impact of action. The report also notes the growing challenge posed by climate change and the need to bring the agendas concerning climate change and health equity together in a whole-of-government approach that echoes the point of health in all policies.[10]

## Figure 1.1

Preston curve: the relationship between average personal income and life expectancy




*Source:* Dye[16]

As with health, tackling health inequity represents an enormous challenge of political will as well as resource commitment. The United Kingdom's EU Presidency[18] in 2005 took the theme "Health inequalities: a challenge for Europe", providing the opportunity to examine health disparities across Europe and to prompt action to reduce them (Box 1.3).19, 20 One report reviewed the importance of the wider social determinants of health inequality and the challenges associated with integrating attempts to promote social justice and social inclusion and policies to reduce health inequalities.21 It noted the considerable variation in the public policy goals and targets being set in different European countries, but that none of the countries had explicit goals or targets related to the gradient between socioeconomic position and health status across the whole population. Highlighting the importance of research, the report stressed the need for better evidence and monitoring and evaluation (Box 1.3).

## Box 1.3

Health inequalities

***Health inequalities are deeply rooted...***

Overall the persistence of large health inequalities in all countries with available data underscores the fact that these inequalities must be deeply rooted in the social stratification systems of modern societies, and warns that it would not be realistic to expect a substantial reduction in health inequalities within a short period of time.

***...and better evidence and monitoring and evaluation are needed***

One of the biggest challenges facing all member states is to assess the impact of their policies on health inequalities. Several developments are critical. One is the importance of assessing the potential impacts of non-health sector policies on health inequalities. Another is to recognise that monitoring of progress is crucial at all stages of the policy process (development, specification, implementation, impact and, especially, review/learning).

Equally essential is the need for a more integrated approach to evaluation and implementation, using the most robust and sound methodologies and taking advantage of "natural experiments".

Evidence-based guidance derived from comparative national-level analyses is also required about the nature and significance of the relationships between poverty, income inequality and many other manifestations of social exclusion, on the one hand, and different manifestations of health inequality, on the other.

*Sources:* Mackenbach 2006[20]; Judge et al. 2005[21].

## 1.2 Milestones to research for health

While the world has been taking several decades to adjust to the implications of the definition of health for intersectoral policy and action, a similarly gradual process has been under way to adapt the domain of research to include this broad understanding of the nature and determinants of health. Milestones along this route have included:

1986 The WHO Advisory Committee on Medical Research, which had been established in 1959 "to provide the Director-General with the necessary scientific advice in relation to the research programme", was renamed the Advisory Committee on Health Research and provided a first draft of a health research strategy[22] for Health for All by the Year 2000. This first attempt to generate a WHO research strategy utilized a disease framework (how diseases arise, how

they can be prevented and managed) and included diseases "preventable by modification of ways of life" and referred to "determinants of health".

1990 The report[23] of the Commission on Health Research for Development, *Health research: essential link to equity in development*, stressed that health is not only a beneficiary of development but also a spur to it; noted that there was low investment in health research for, in or by developing countries; and highlighted many neglected fields, including epidemiology, the social and policy sciences and management research.

1991 A seminal paper[24] by Dahlgren and Whitehead, *Policies and strategies to promote social equity in health*, provided a broad overview of the many non-biological factors affecting health, including individual lifestyle factors, social and community networks and general socioeconomic, cultural and environmental conditions.

1993 The ground-breaking *World Development Report 1993: investing in Health*[4] drew on the available evidence base to examine the interplay between human health, health policy and economic development. It advocated a three-pronged approach: governments need to foster an economic environment that enables households to improve their own health; government spending on health should be redirected to more cost-effective programmes that do more to help the poor; and governments need to promote greater diversity and competition in the financing and delivery of health systems. This report also provided the first-ever assessment of the global burden of disease, introducing the concept of the disability-adjusted life year (DALY), a summary measure of population health which, while criticized from an equity perspective for some of the assumptions and weightings it incorporates, has been widely used to evaluate trends and to compare burdens of disease within and between populations.[25]

1993 Responding to a resolution of the World Health Assembly, the WHO Advisory Committee on Health Research issued a report[26] entitled *Research for health: principles, perspectives and strategies*, which extended the previous Committee work reported in 1986 and was intended to provide a basis for an organizational research strategy for WHO. It recognized demographic and epidemiological transitions and converging health patterns between developed and developing countries; unforeseen health problems arising as a consequence of new and changing economic situations, rapid industrialization and damage to the environment; and the need for "innovative epidemiological approach and methods, fresh indicators for the study of health status, and research into issues such as intersectoral action". It noted that "Potential contributions … may come from the biological, agricultural, physical, social and environmental sciences". However, it was to be another dozen years

before WHO instituted an organizational effort to develop a research strategy, to be brought to the World Health Assembly for approval in 2009.

1996 The report of the Ad Hoc Committee on Health Research Relating to Future Intervention Options, *Investing in health research and development*, recognized that many factors shape the health of individuals, including genetics, economics, education and advances in scientific knowledge.[27]

1998 The Global Forum for Health Research was established, founded on a broad statement of purpose and on the recognition of a wide range of relevant constituencies, its mission being "to help focus research efforts on the health problems of the poor".[28]

1999 The Declaration on Science and the Use of Scientific Knowledge[29] and the Framework for Action[30] resulting from the World Conference on Science organized by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in Budapest stressed the need for greater interdisciplinary efforts, involving both natural and social sciences, as a prerequisite for dealing with ethical, social, cultural, environmental, gender, economic and health issues. A new relationship between science and society was seen as necessary to cope with such pressing global problems as poverty, environmental degradation, inadequate public health, and food and water security, in particular those associated with population growth. The World Conference observed that what distinguishes the poor (be it people or countries) from the rich is not only that they have fewer assets, but also that they are largely excluded from the creation and the benefits of scientific knowledge. It was recommended that national and regional research programmes aimed at reducing variations in health among communities, such as collecting good epidemiological and other statistical data and communicating corresponding best practice to those who can use it, should be introduced.

2000 The Millennium Development Goals emanating from the United Nations Millennium Summit set a number of goals that intimately linked health and development.[31] In the same year, the Bangkok Declaration produced by the International Conference on Health Research for Development, organized by the Council on Health Research for Development, the Global Forum for Health Research, WHO and the World Bank, highlighted new challenges and opportunities posed by globalization, new understanding of human biology and the revolution in information and communication technologies. It stressed that a focus on social and gender equity must be central to health research and placed emphasis on ethics in research, inclusiveness of all stakeholders and the need to foster effective health research systems. The Action Plan included the promotion of multi- and interdisciplinary health research.[32]

Throughout its 10 years of promoting research for the health of the poor, the Global Forum for Health Research has recognized the importance of a wide range of factors beyond biological determinants of health, as reflected in its annual Forum meetings, publications and work to incubate a number of research networks and initiatives such as those dealing with child health and nutrition, road traffic injuries and sexual violence.[33] Acknowledging that a wide range of determinants of health beyond biological and health system factors – including economic, environmental, political and social determinants – need to be better understood and managed to improve health and reduce health disparities within and between populations, the Global Forum has adopted the enlarged domain of relevant research that is referred to as "research for health".[34,35,36,37,38] Like the definition of health, the definition of "research for health" (Box 1.4) includes the principle of health equity as an intrinsic element.

## Box 1.4

Research for health

The Global Forum for Health Research defines "research for health" as research undertaken in any discipline or combination of disciplines that seeks to:

- understand the impact on health of policies, programmes, processes, actions or events originating in any sector – including, but not limited to, the health sector itself and encompassing biological, economic, environmental, political, social and other determinants of health;
- assist in developing interventions that will help prevent or mitigate that impact;
- contribute to the achievement of health equity and better health for all.

*Source:* Global Forum for Health Research 2008[38].

The Global Ministerial Forum on Research for Health (Bamako, 16–19 November 2008; co-organized by the Council on Health Research for Development, the Global Forum for Health Research, the Government of Mali, UNESCO, WHO and the World Bank) is the first meeting at this level to address the complex array of cross-sectoral issues involved in addressing some of the world's major health challenges through a broad and multidisciplinary approach to research.[39]

## 1.3 Tracking resources for research for health

### 1.3.1 Financial resources for health R&D

An estimate of how much the world spends on R&D in the health field was first reported by the Commission on Health Research for Development in 1990.[23] The Commission found that, in 1986, about US$ 30 billion was spent in total and they estimated that about US$ 1.6 billion of this was invested in R&D on diseases predominantly affecting people in low- and middle-income countries, where 90% of the burden of preventable mortality was to be found. This imbalance was subsequently captured in the term "10/90 gap", an expression that has come to symbolize an inequitable distribution of research resources compared with the magnitude of health problems.[40]

In making its estimates, the Commission had considered that the major burden of mortality and morbidity in low- and middle-income countries at that time was heavily dominated by communicable diseases.[23] Working under the auspices of WHO, in 1996 the Ad Hoc Committee on Health Research Relating to Future Intervention Options reported a further estimate that, in 1992, about US$ 56 billion was spent globally on R&D for health.[27] The Ad Hoc Committee noted that, by the mid-1990s, there was clear evidence that noncommunicable conditions (including heart disease, stroke, diabetes, cancer and mental and neurological conditions) were beginning to become extremely prevalent in low- and middle-income countries. Nevertheless, they focused their attention mainly on infectious diseases and estimated that these continued to account for only a small fraction of global investments in health R&D.

Although relatively crude and approximate in their methodologies, these pioneering efforts awakened an interest in the magnitude of global health R&D efforts and in understanding where these resources were being applied and where there were gaps, especially in relation to health in low- and middle-income countries.

Since its establishment in 1998, the Global Forum for Health Research has focused part of its efforts on tracking resources for health R&D.[41,42,43,44,45] The Global Forum's first reports on *Monitoring Financial Flows for Health Research*, published in 2001 and 2004,[41,42] provided data on global spending on health R&D for 1998 (US$ 84.9 billion) and 2001 (US$ 105.9 billion) respectively and subsequently reports on the global totals are being issued every two years (dictated by the availability of OECD reports, which are published biennially and cover spending three years previously). In the 2004 and 2006 reports,[42,44] data on global spending on health R&D was presented alongside the latest estimates of mortality and the global burden of disease provided by WHO. These highlighted that the epidemiological transition is already very advanced in many low- and middle-income countries – with the result that, in every region except Africa, noncommunicable conditions are now the predominant causes of mortality and morbidity. Consequently, R&D in relation to the prevention, treatment and underlying causes of a range of

(largely preventable) noncommunicable conditions must now be factored in, creating complex challenges in assessing the relevance and potential benefit of such research, and of the products it has generated, to populations in settings that are poor in resources and weak in the capacities of their health systems.

Taking up the challenge of the need for a more refined and disaggregated approach, in the intermediate years (2005, 2007) the volumes[43,45] of *Monitoring Financial Flows for Health Research: Behind the global numbers* have presented studies, conducted by the Global Forum itself and by others, that delve into R&D investments in particular countries and in relation to diseases, conditions, risk factors and determinants of health of especial relevance to the health of the poorest and most disadvantaged populations.

### 1.3.2 Expanding interest in tracking resources for health R&D

The Global Forum is the only organization regularly collecting, analysing and disseminating global spending data on the whole spectrum of research for health and development. The results are cited by many groups, from researchers to leading politicians and donors, as justification for increasing efforts to focus health research on the needs of low- and middle-income countries, and this appears to have been a significant stimulus for recent attention by a number of different actors to tracking health research resources. For example:

- A number of countries have conducted studies to examine their allocation of resources for health research and to make correlations with national (and, increasingly, global) health priorities. Recent examples include the United Kingdom, where in 2006 the Treasury published a report on health research funding,[46] the UK Clinical Research Collaboration[47] reported on health research funding and its relationship to the United Kingdom disease burden, and a report commissioned by Prime Minister Tony Blair was issued in 2007 on the United Kingdom contribution to health in developing countries.[48] The Ministry of Health of Brazil has reported on health research expenditures[49] and studies have been collected by the Global Forum that analyse public spending on health research in Argentina, China, Mexico and the United States of America.[45] Research now tracks annual spending on health R&D in the United States.[50]
- Deans and deputy deans of the Faculty of Medicine, University of Otago, and the Faculty of Medical and Health Sciences, University of Auckland, analysed spending by the Health Research Council, New Zealand's single largest funder of health research. Their report noted that the New Zealand Government allocation for health research was equivalent to NZ$ 10.2 per capita. In comparison, funding in Australia was around NZ$ 34.6 per capita, with NZ$ 54.3 per capita in the United Kingdom and NZ$ 126 per capita in the United States. This information was used to argue the need for a major increase in funding to stem losses in competitiveness.[51]
- There is growing interest in the allocation of financial resources for R&D on communicable diseases.

Single-disease studies of malaria[52] and HIV[53] have been reported, and Shiffman[54] has analysed spending. Recently the Bill and Melinda Gates Foundation has funded a five-year project to track R&D resources for certain neglected tropical diseases.[55]

- Research on noncommunicable diseases has received far less attention. Lewison and colleagues[56,57,58,59] have used bibliometric approaches to estimated R&D investments on a number of diseases, including noncommunicable diseases, and Matlin[60] has argued the need for a systematic and global tracking to be established in this area, since noncommunicable diseases are rapidly advancing in low- and middle-income countries and now represent the largest source of morbidity and mortality in every region except Africa.
- Very few studies have ever been undertaken of resources for research in process areas such as health policy and systems research. The Alliance for Health Policy and Systems Research has estimated the very low expenditures made in this field, particularly in low- and middle-income countries. [61]

As techniques of data gathering and analysis continue to improve, these studies by the Global Forum and others are providing increasingly clear and reliable insights into the resources available for health R&D. Yet much remains to be done to improve the robustness and comprehensiveness of the data available. The studies conducted so far serve to highlight one critical point: while major year-on-year rises in financial flows for health R&D continue to be seen at the global level, there are still many areas that remain severely underfunded, and these are generally mirrors of the areas needing more attention in relation to improving health and health equity and reducing the large health disparities that remain within and between populations: neglected diseases, conditions, health systems and people.

### 1.3.3 Human resources for health R&D

Alongside finances, an adequate supply of human resources is vital to ensuring that countries have the capacity to undertake the research they need to address priority health problems. While much has been invested in strengthening human and institutional capacities for health research in low- and middle-income countries in the last few decades and attention has increasingly focused on organizing functional health research systems,[62,63,64] there remains a critical shortage of health researchers in many countries.[65]

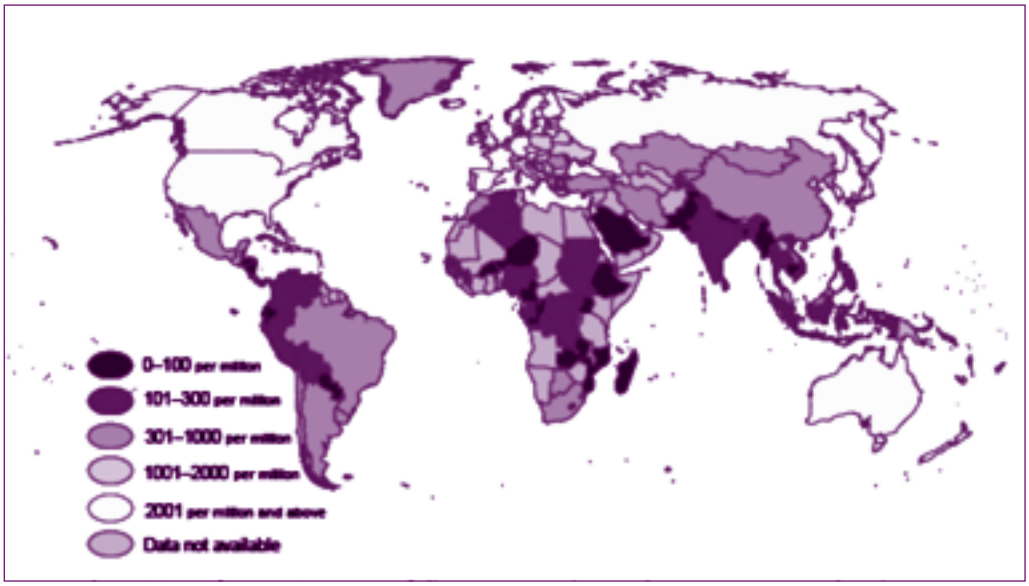
The UNESCO Institute for Statistics (UIS) collects comparable science and technology data (especially R&D-related) from over 200 countries and the data set is available online.[66] For the overall field of R&D, UIS has provided a global perspective on human resources for 2005 (Figure 1.2).[67]

UIS notes that only about 17% of countries have achieved gender parity in science and technology and only a handful of others have more women science and technology researchers than men; while in 103 countries women represent slightly more than one quarter of researchers and in 40% of these countries they represent less than one third.

## Figure 1.2

How many researchers are there?

Researchers per million inhabitants, 2005 or latest available year




*Source:* UNESCO Institute for Statistics[67].

Efforts to map human resources specifically for health research are relatively scarce. In collaboration with WHO, the Global Forum has conducted a mapping of human resources for mental health research in 114 low- and middle-income countries of Africa (52), Asia (32) and Latin America and the Caribbean (30).[68] Over 10 000 relevant articles were identified, along with 4633 mental health researchers and 3829 other stakeholders. The scale of the study makes it the first systematic attempt to confirm the pressing needs for improving research capacity in mental health. These findings were suspected but had never been methodically documented. The publication provides data, analysed by group of stakeholders and by region, on topics such as researchers' profiles; priority-setting process; amount and type of research production; services and technical support available to them; courses and trainings offered; funding patterns; and dissemination of research findings. The appendix provides two extensive lists, by country, of policy and practice that resulted from research evidence, as well as research evidence that was never translated into policy and practice. Nine recommendations indicate how the management of mental health research can be strengthened so that it meets the national needs of low- and middle-income countries as well as contributing to the global fund of knowledge, facilitating evidence-informed decision-making in funding and priority setting in the area of mental health research in such countries.

### 1.3.4 Shifting tracks: from health research to research for health

Following the redirection of research attention from the narrow confines of health research to the broader spectrum of research for health that has been noted above, there is a need to include this wider perspective in the analysis of resources for research. Crucial questions to answer in future will be concerned with how many researchers are studying health-related issues – not only in the field of science and technology but also in social and behavioural sciences, economics, politics, trade, the environment and other fields. How much funding is being allocated in these and many other disciplines to understand the intersectoral connections with health and provide evidence, tools and products that will enhance health and health equity? Where is this money coming from and where and how is it being spent?

Only when global, national and local tracking systems in the public and private sectors have been much further developed will it be possible to answer these questions convincingly.

## 1.4 Looking ahead: targets, commitments and accountability

This publication reports the latest available data on global financial flows for health research (Chapter 2) and trends in mortality and morbidity (Chapter 3).

Over the course of several decades, the world has accumulated a substantial array of targets, commitments and aspirations relating to resources for development and health in general and for research overall and health research in particular. These matter – because the lives and well-being of billions of people depend on the actions of policy-makers and controllers of resources, who determine how and where funds are used, globally and nationally, which sectors, policies and programmes receive support and whether they are effective. Policy-makers must be held accountable for the actions they have taken to meet the goals set. With Chapter 4, the Global Forum begins a regular review of targets, commitments and aspirations and of the global progress towards meeting them – a "Report Card" on global efforts relevant to research and development for health.

Chapter 5 highlights the major challenges that still remain to be tackled in developing robust information on resources for research for health and ensuring that this information is taken into account by decision-makers in the future allocation of resources to tackle priority issues in health and health equity.

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# Chapter 2

# Global financing and flows

# Global financing and flows

## 2.1 Total global investments in R&D for health

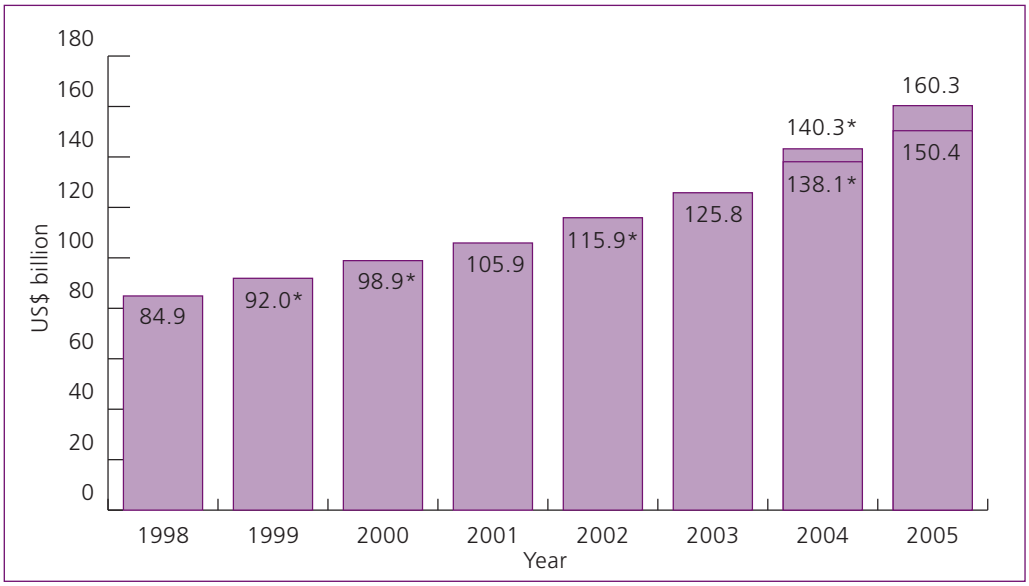
Since the Global Forum for Health Research first started tracking global investments in health R&D[1] in 1998, there has been a steady increase in total investments. Estimates are now made every two years[2,3] and are published in the third year after the year to which they refer – drawing in major part on the important data published every two years by OECD.[4]

The data in this report, as in previous reports, are very rough estimates of investments in health R&D obtained from data reported on overall R&D investments, the only data that are collected and reported regularly. Global Forum estimates are derived from a sophisticated estimation methodology developed over the years[5] based on investments in overall R&D reported to OECD[4] and to the Network on Science and Technology Indicators – Ibero-American and Inter-American (RICYT),[6] and in the cases of non-reporting countries, from available country reports and from pharmaceutical associations.

In this new study by the Global Forum for 2005, an estimated US$ 160.3 billion was spent globally on health research and development (R&D), up from US$ 125.8 billion in 2003, US$ 105.9 billion in 2001 and US$ 84.9 billion in 1998 (Figure 2.1).

### Figure 2.1

Estimates of total investments in health R&D (US$ billion)




*Sources:* Global Forum for Health Research estimates based on official data from official reports to OECD, national surveys, pharmaceutical associations and other publications.
Note: * 1999, 2000, 2002 and 2004 values were obtained by interpolation.

It should be noted that, as a result of changes in reporting by some sources, the figures for 2004 and 2005 include money that has been additionally "found" compared with that reported previously. In particular, the US$ 160.3 billion in investments identified for 2005 includes approximately US$ 10 billion of money «found» since the Global Forum's last report.[3] Table 2.1 provides details of these additional investments.

The additional investments in the United States were identified by the National Science Foundation following a revision to the classification methodology for United States industries.[7] In the Netherlands, the extra investments were identified by the Central Bureau of Statistics during an exercise to identify health R&D, including service-related R&D.[8] Norway's additional pharmaceutical investments were identified through the inclusion in their regular R&D survey of a question on current R&D on selected areas of relevance to health.[9]

These 2005 investments in health R&D represent 4.1% of total estimated national health investments worldwide, up from 3.6% in 2003, 3.5% in 2001 and 2.8% in 1998.

## Table 2.1

New money added to 2005 global estimates of investments in health R&D

| Country | Type of R&D investment | Additional investments (US$ billion) |
|---|---|---|
| United States of America | Pharmaceuticals and medicines (34.798 - 30.969) | 3.829 |
| United States of America | Medical equipment and supplies | 4.343 |
| United States of America | Health-care services | 0.981 |
| Netherlands | Health-care services | 0.562 |
| Norway | Pharmaceuticals | 0.214 |
| **Total** | | **9.930** |

### 2.1.1 Measuring global investments in R&D for health

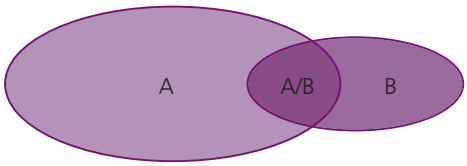
Global investments in R&D for health represent the sum of a complex set of public and private investments. They include the R&D for health funded by high-income countries (HICs), corresponding to area A in Figure 2.2; R&D for health funded by and carried out in low- and middle-income countries, corresponding to area B; and, where these efforts converge and overlap, R&D funded by HICs and carried out in and for the primary benefit of low- and middle-income countries, corresponding to area A/B.

## Figure 2.2

Graphic representation of global investments in R&D for health

A = R&D by high-income countries (HIC)
B = R&D by low- and middle-income countries (LMIC)
A/B = R&D funded by HIC in or for application in LMIC and by LMIC in HIC (see text for details)

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




Since the first global exercise to track investments in health R&D was undertaken in 1990 by the Commission on Health Research for Development,[10] there is now a better understanding of how much is being spent globally on research for health by the key players in high-income countries, what types of research are being funded and how research funds flow within and among countries.

Efforts are still needed to better gauge investments in research for health being made by low- and middle-income countries and, in particular, how well these and the investments by high-income countries are addressing the health needs of low- and middle-income countries.

### 2.1.2 Global distribution of investments in health R&D by high-, middle- and low-income countries and public and private sectors

As Table 2.2 indicates, most (97%) spending on health R&D continues to be by high-income countries, with the remainder (3%) by low- and middle-income countries. Most of the US$ 155.2 billion spent by high-income countries goes towards generating products, processes and services tailored to their own health-care markets.

## Table 2.2

Estimated global total investments in health R&D, 2005 (current US$ billion) compared with 2003, 2001 and 1998

| | 2005 | | 2003 | | 2001 | | 1998 | |
|---|---|---|---|---|---|---|---|---|
| | US$ | % | US$ | % | US$ | % | US$ | % |
| **Total** | **160.3** | **100** | **125.8** | **100** | **105.9** | **100** | **84.9** | **100** |
| Total public sector | 66.3 | 41 | 56.1 | 45 | 46.6 | 44 | 38.5 | 45 |
| Total private sector | 94.0 | 59 | 69.6 | 55 | 59.3 | 56 | 46.4 | 55 |
| Total private for-profit [a] | 81.2 | 51 | 60.6 | 48 | 51.2 | 48 | 40.6 | 48 |
| Total private not-for-profit | 12.8 | 8 | 9.0 | 7 | 8.1 | 8 | 5.9 | 7 |
| ***HIC*** [b] | | | | | | | | |
| Public sector | 63.3 | 39 | 53.8 | 43 | 44.1 | 42 | 36.2 | 43 |
| Private for-profit sector | 79.7 | 50 | 59.3 | 47 | 49.9 | 47 | 40.0 | 47 |
| Domestic pharmaceuticals [c] | 71.0 | 44 | 53.2 | 42 | 44.1 | 42 | 35.0 | 41 |
| Foreign pharmaceuticals [c] | 8.7 | 5 | 6.1 | 5 | 5.8 | 5 | 5.0 | 6 |
| Private not-for-profit [d] | 12.2 | 8 | 8.6 | 7 | 7.7 | 7 | 5.6 | 7 |
| ***Total HIC*** | ***155.2*** | ***97*** | ***121.7*** | ***97*** | ***101.6*** | ***96*** | ***81.8*** | ***96*** |
| ***LMIC*** [e] | | | | | | | | |
| Public sector | 3.0 | 1.9 | 2.4 | 1.9 | 2.5 | 2.4 | 2.3 | 2.7 |
| Public sector domestic | 2.3 | 1.4 | 1.9 | 1.5 | 2.0 | 1.9 | 1.8 | 2.1 |
| Public funding from foreign ODA [f] | 0.6 | 0.4 | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 |
| Public funding for international research [f] | 0.10 | 0.06 | | 0.06 | 0.07 | 0.07 | 0.07 | 0.08 |
| Private for-profit sector: foreign and domestic pharmaceuticals | 1.6 | 1.0 | 1.4 | 1.1 | 1.3 | 1.3 | 1.0 | 1.2 |
| Domestic private not-for-profit | 0.12 | 0.07 | 0.08 | 0.07 | 0.08 | 0.08 | 0.08 | 0.10 |
| Foreign private not-for-profit [f] | 0.4 | 0.3 | 0.3 | 0.2 | 0.3 | 0.3 | 0.2 | 0.3 |
| ***Total LMIC*** | ***5.1*** | ***3.2*** | ***4.1*** | ***3.3*** | ***4.3*** | ***4.0*** | ***3.6*** | ***4.2*** |

*Sources:* Global Forum for Health Research estimates based on data from official reports to OECD, national surveys, pharmaceutical associations and other publications.

(a) The effect of the change in methods and sources of data for the pharmaceutical industry results in an increase of US$ 10.1 billion in 1998.

(b) High-income countries: Israel 2001, Singapore 2001.

(c) Foreign pharmaceutical R&D stands for R&D investment outside the United States by United States-owned PhRMA member companies and R&D conducted abroad by the United States divisions of foreign-owned PhRMA member companies. Domestic pharmaceutical R&D corresponds to the global estimates for the pharmaceutical R&D in high-income countries reduced from foreign pharmaceutical R&D.

(d) Private not-for-profit includes US$ 3.1 billion estimated for private general university funding in 2001, and US$ 2.5 billion in 1998.

(e) Low- and middle-income countries: China (including Taiwan) 2001, Brazil 2001/2003, Chile 2001, Cuba 2001, Philippines 2001, Romania 2001, Russian Federation 2001, Slovenia 2001, South Africa 2001/2003, Venezuela 2001.

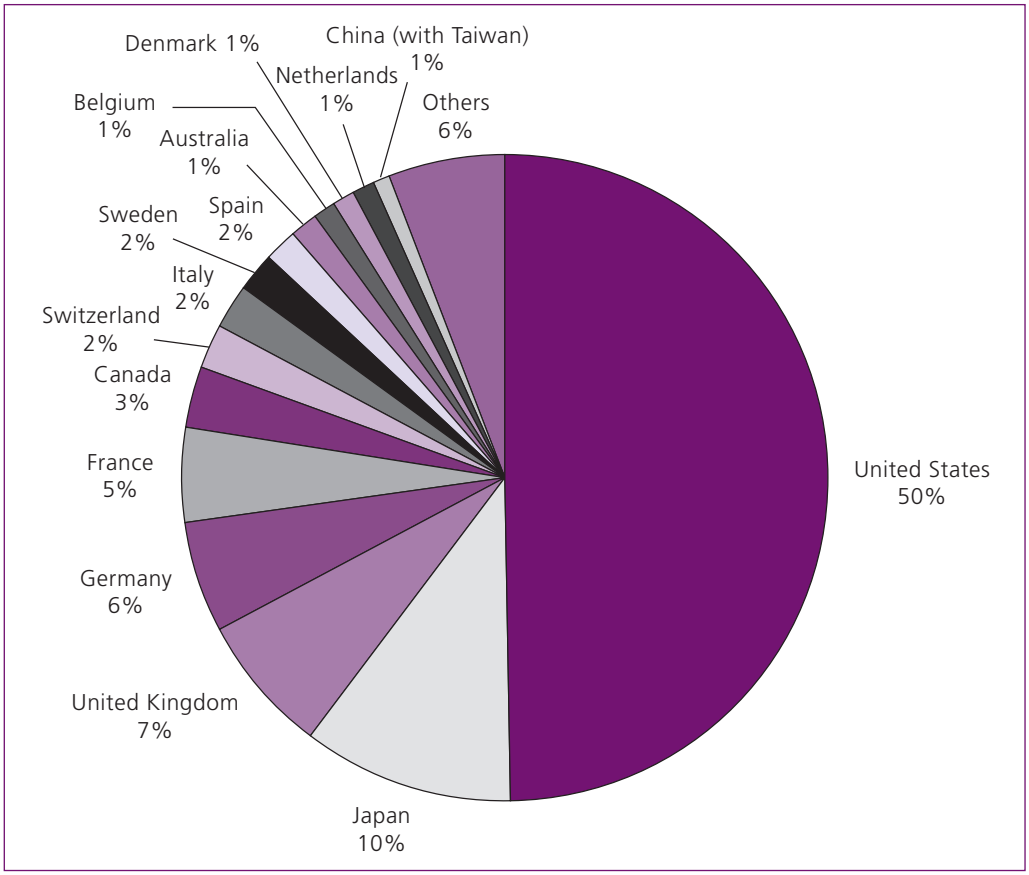
(f) International research, foreign private not-for-profit and foreign official development assistance (ODA) are very rough estimates.

The United States continues to dominate global investments in health R&D, accounting for 50% of investments in 2005, as it did in 2003. Other high-income countries are the next largest investors, with Japan accounting for 10% of the global total, the United Kingdom 7%, Germany 6%, France 5% and Canada 3%. These are followed by Switzerland, Italy, Sweden and Spain at 2% each.

As some of the so-called innovative developing countries (e.g. Argentina, Brazil, China, India, Mexico) continue to invest in health R&D, this situation is beginning to change. Already in 2005, estimates put China's investments in health R&D on a par with those of such high-income countries as Australia, Belgium, Denmark and the Netherlands, at 1% each. Investments by all other countries account for just 1% of global investments (Figure 2.3).

## Figure 2.3

Global distribution of health R&D investments, 2005




*Sources:* Global Forum for Health Research estimates based on official data from official reports to OECD and RICYT, national surveys, pharmaceutical associations and other publications.

A very small share of the total investments reflect investments by high-income countries in research carried out in and for the direct benefit of low- and middle-income countries. However, research in high-income countries into noncommunicable diseases is expected to be of benefit to low- and middle-income countries, where the incidence of such diseases is increasing. The extent of this benefit will depend heavily on the local context, including the affordability of drugs for chronic conditions and the availability and accessibility of health services to support patients on long-term medication in different settings. Moreover, the health situation in Africa has worsened over the last 30 years and is still largely affected by communicable diseases and maternal and child health conditions that are rooted in poverty, violence and other persistent social inequities (see Chapters 1 and 5 of this report). Improving health and reducing health inequities in Africa will require a rethinking and retargeting of research resources to address these root causes if any real progress is to be made.

Encouragingly, a small but increasing investment in health R&D (US$ 5.1 billion in 2005, up from US$ 4.1 billion in 2003) is carried out by low- and middle-income countries for their own health needs, and in the case of some innovative developing countries, also for markets in high-income countries. Improvements in data collection, reporting and analysis activities in low- and middle-income countries would help them identify additional investments in research for health that for the moment remain uncaptured by this global monitoring activity.

Since the first tracking exercise of the Commission on Health Research for Development in 1990 there has been considerable advocacy for building capacity in low- and middle-income countries for country-level tracking of R&D for health investment data embedded within national statistical systems. Importantly, current efforts by the WHO Regional Office for Africa to survey the health research systems across Africa will lay the groundwork for regular follow-up surveys that could be conducted as part of national statistical data collection and analysis activities in partnership with national statistical offices in Africa.[11,12]

There has also been advocacy for international consensus on a classification framework for data on research for health and on investments in research for health, in line with the conceptual shift that has taken place widening the understanding of R&D for health from a narrow biomedical and health systems focus to a broader concept of research for health that would encompass research for health both inside and outside the health sector.

More work is still urgently needed in these areas as there is still not a single country in the world that routinely collects and reports on data on investments in R&D for health.[13]

## 2.2 Growth in global investments in health R&D

### 2.2.1 Measuring growth in global resources for health R&D

Since tracking of global investments in health R&D first began in the late 1980s, there has been a steady increase in overall estimated investments in health R&D. This reflects a growing worldwide commitment to investment in R&D in general, and in health R&D in particular.

The large increase in estimated investments between 2003 and 2005 noted in this report reflects both a real increase in investments and an increase in reported investments as methodologies were refined in the Netherlands, Norway and the United States. Thus, while the data do reflect the best estimates of actual investments, care should still be taken when looking at the apparent growth in global investments.

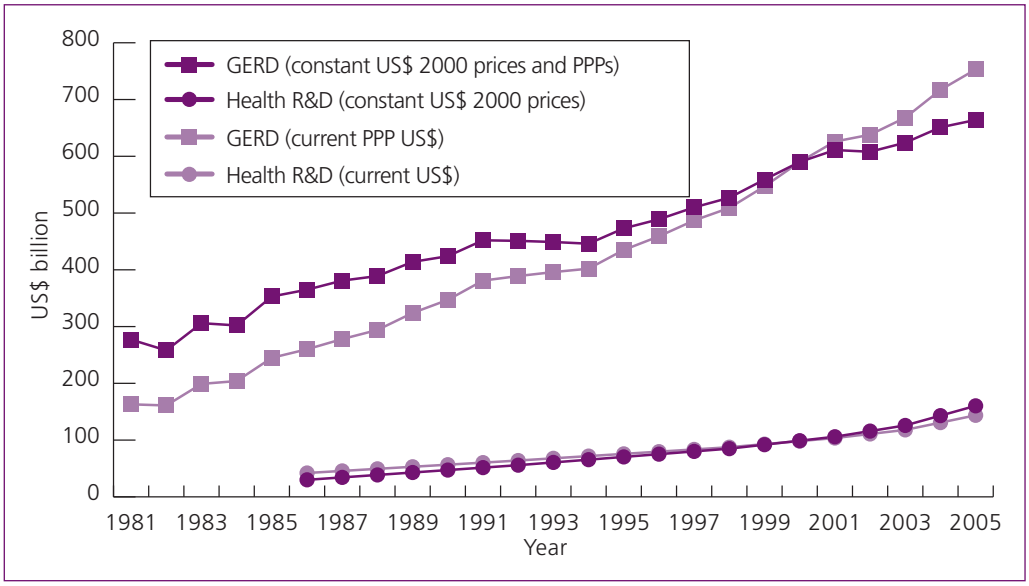
As Figure 2.4 shows, investments in *overall* R&D adjusted using purchasing power parities experienced a much steeper and more continuous increase than when the data are adjusted for inflation only. Investments in overall R&D increased to US$ 753 billion in 2005 from US$ 163 billion in 1981. When data are adjusted for inflation the rate of increase flattens, but the overall trend of rising investments holds true, increasing to US$ 664 billion in 2005 from US$ 277 billion in 1981.

The same relationship holds true for *health* R&D adjusted for inflation, although the overall level of investments is relatively lower. Investments in health R&D, in 2000 constant US$, increased to US$ 143 billion in 2005 from US$ 42 billion in 1986.

Some of the increase in health R&D is due to the fact that the methodology used to produce the estimates assumes a certain degree of stability in the relationship between total investments in overall R&D and investments in health R&D over time. Another part reflects increases in reporting due to improvements in methodologies. As such, caution should be exercised in analysing trends in investments in health R&D over time and among countries.

## Figure 2.4

Global total R&D investments, in constant 2000 US$ and current PPP-adjusted US$




*Sources:* OECD Science, technology and R&D statistics, Volume 2007/1, and Global Forum for Health Research estimates.
Note: GERD = gross expenditure on R&D.

Nonetheless, what is particularly encouraging is that there has been almost a doubling in health R&D investments as a proportion of overall R&D since health R&D investments were first measured. In 2005, health R&D represented 21.6% of overall R&D investments, up from 11.5% in 1986, indicating that global advocacy for increased investments in R&D for health may be paying off (see Table 2.3 and Figure 2.5). Without the additional money "found" since 2003, the increase would have been 20.3%, still close to double the investments first measured.

## Table 2.3

Increase in investments in health R&D as a proportion of overall R&D, 1986–2005 (in constant 2000 US$ in millions and %)

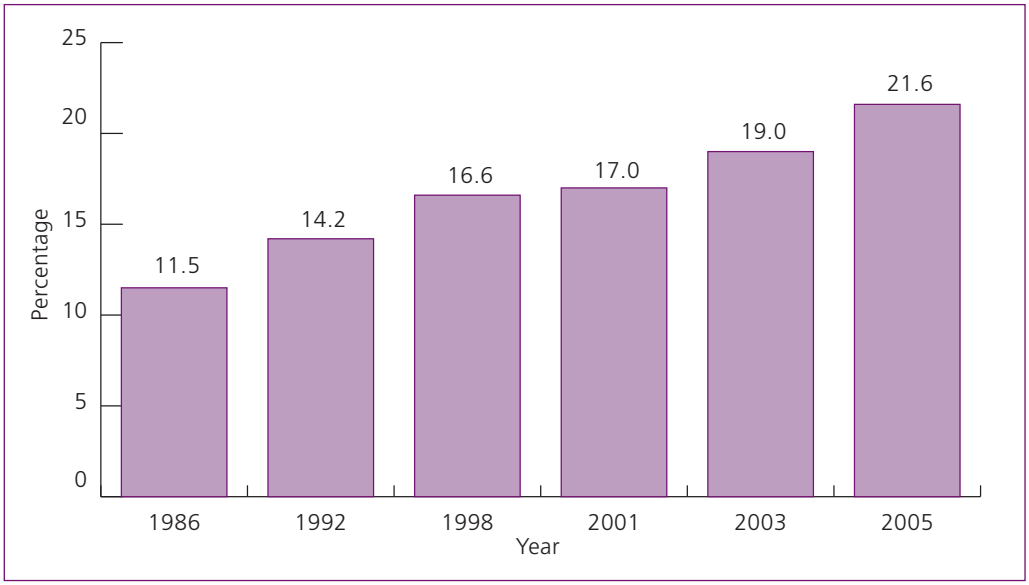
| | 1986 | 1992 | 1998 | 2001 | 2003 | 2005 |
|---|---|---|---|---|---|---|
| Overall R&D, adjusted for inflation | 365.1 | 451.3 | 527.1 | 610.6 | 623.7 | 664.4 |
| Health R&D, adjusted for inflation | 42.0 | 64.0 | 87.5 | 103.6 | 118.0 | 143.7 |
| Health R&D as % of overall R&D | 11.5 | 14.2 | 16.6 | 17.0 | 19.0 | 21.6 |

*Sources:* Global Forum for Health Research estimates based on data from official reports to OECD and RICYT, national surveys, pharmaceutical associations and other publications.

The increase in the proportion of health R&D relative to overall R&D reflects differences in the rate of growth of health R&D investments relative to that of overall R&D. From 1986 to 2005, investments in health research grew by a total of 241% compared with a growth of just 82% in investments in overall R&D (Figure 2.6). Without the "found" money, the increase would have been 221%. Notwithstanding problems of attribution, it is interesting that there has been a sharper percentage increase in investments for health R&D since 1998 (the year the Global Forum for Health Research was established as a forum for advocacy for increased investments in R&D aimed at improving the health of low-income countries and marginalized populations) – as illustrated by the increase in the slope of the line for health R&D in Figure 2.6 – while the overall R&D investment has substantially flattened out during this recent period.

## Figure 2.5

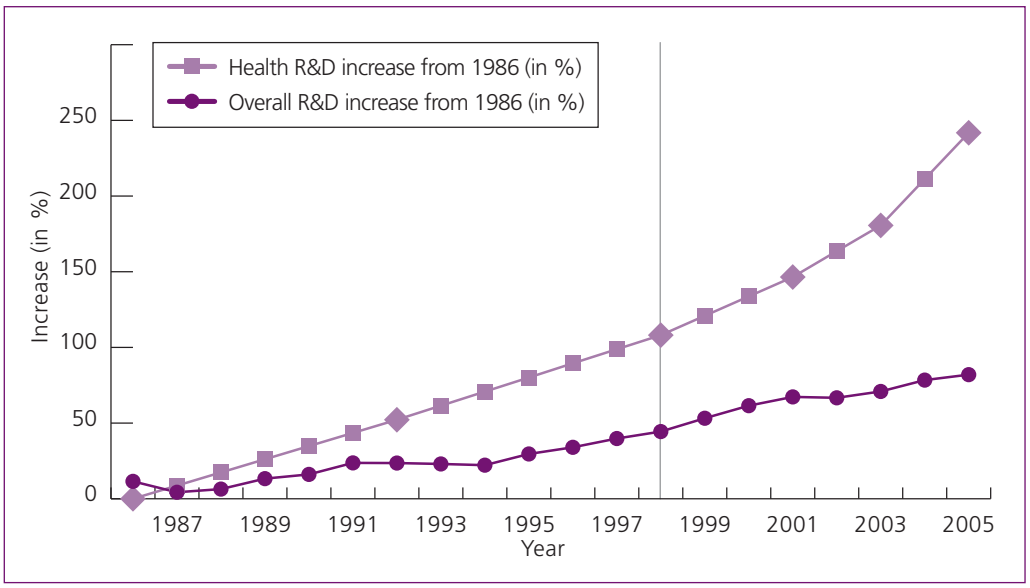
Investments in health R&D as a proportion of overall R&D investments, 1986-2005




*Sources:* Global Forum for Health Research estimates based on data from official reports to OECD and RICYT, national surveys, pharmaceutical associations and other publications.

## Figure 2.6

Percentage increase of health R&D investments compared to overall R&D investments, 1986–2005




*Sources:* Global Forum for Health Research estimates based on data from official reports to OECD and RICYT, national surveys, pharmaceutical associations and other publications.

### 2.2.2 Growth in global resources for health R&D across public and private sectors

The increase in estimated investments in health R&D has come from both the public and private sectors (see Table 2.2). Globally, public investments in health R&D accounted for an estimated US$ 66.3 billion and the private sector for US$ 94.0 billion, split between the for-profit (US$ 81.2 billion) and not-for-profit (US$ 12.8 billion) sectors.

The relative distribution shifted slightly from previous years, with the public sector dropping to 41% of overall health R&D in 2005 from 45% in 2003, the private for-profit increasing to 51% from 48% (largely a reflection of the new "found" money) and the private not-for-profit increasing to 8% from 7% (see Table 2.2).

Of the estimated US$ 75.4 billion increase in health R&D investments since 1998, 37% or US$ 27.8 billion came from the public sector, 54% or US$ 40.6 billion from the private for-profit sector, and 9% or US$ 6.9 billion from the private not-for-profit sector.

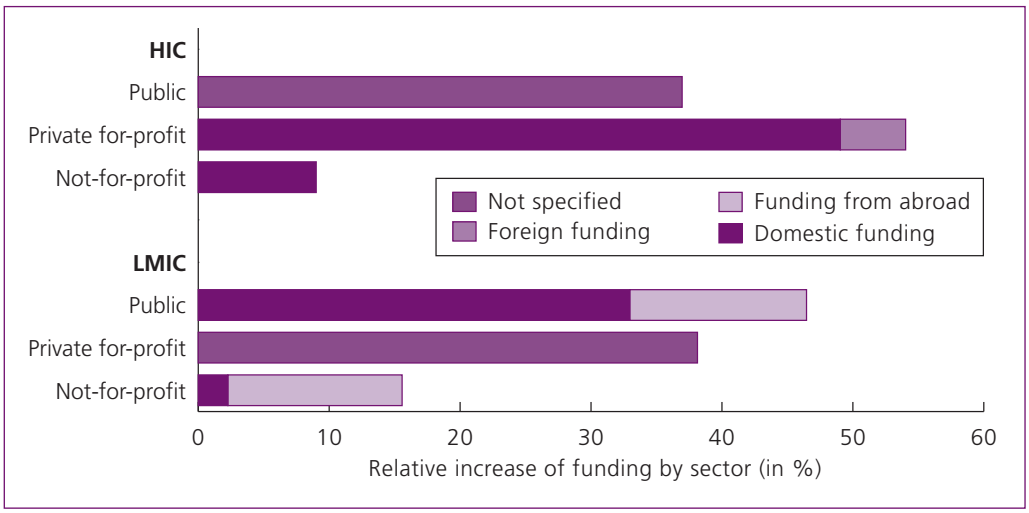
Investments within high-income countries accounted for most of the increase globally and followed a similar distribution with the public sector accounting for 39% of total global health R&D investments in 2005, down from 43% in 2003, the private for-profit sector for 50%, up from 47% in 2003, and the private-not-for-profit sector for 8%, up from 7% in 2003.

Among high-income countries, the private for-profit sector accounted for the largest share of the overall percentage increase from 1998 to 2005, representing 54% of the overall increase, with R&D for domestic pharmaceuticals accounting for 49% and foreign pharmaceuticals for another 6%. The public sector had the next largest share, accounting for 37%, followed by the private not-for-profit sector at 9%.

Among low- and middle-income countries, the public sector accounted for the largest share of the increase at 46.3%, with 33.0% of the increase due to domestic investments and 11.6% from official development assistance (ODA). The private for-profit sector had the next largest share, accounting for 38.1% of the increase, with investments coming from both foreign and domestic investments. The private not-for-profit sector also had a relatively large share of the increase at 15.6%, with most (13.3%) coming from abroad and just 2.3% from domestic sources (see Figure 2.7).

## Figure 2.7

Relative increase of health R&D funding by sector, 1998–2005



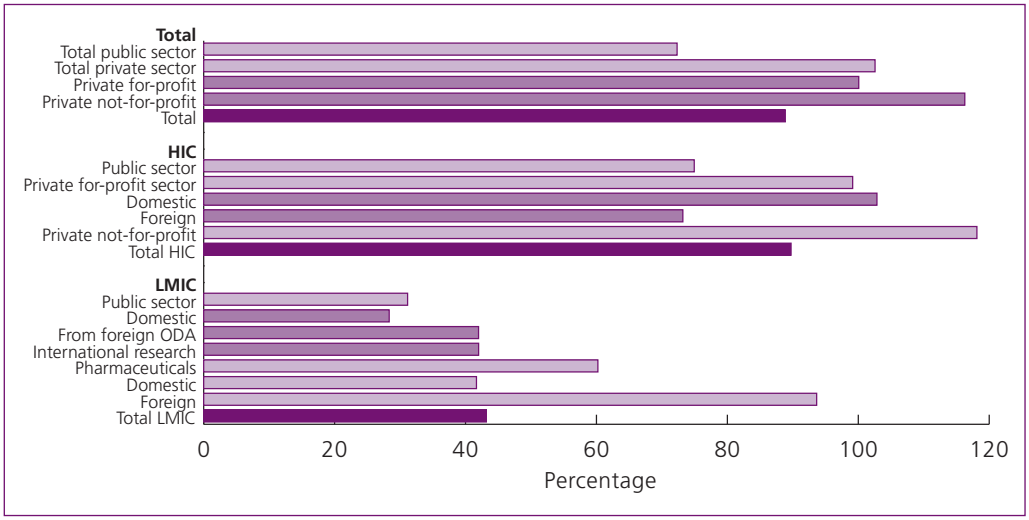

*Sources:* Global Forum for Health Research estimates based on data from official reports to OECD and RICYT, national surveys, pharmaceutical associations and other publications.

In fact, the private not-for-profit sector had the largest relative increase in investments. This is not surprising as with a relatively low share to begin with, even a modest cash increase in investments would result in a fairly large percentage increase. The overall percentage increase was highest in the private not-for-profit sector in high-income countries, increasing 118% over the 1998–2005 period, followed by the domestic pharmaceutical sector in high-income countries at 103%, the foreign not-for-profit sector in low- and middle-income countries at 94%, the public sector in high-income countries at

75%, the foreign pharmaceutical sector in high-income countries at 73%, and public funding for international research in low- and middle-income countries at 60%. The domestic public sector in low- and middle-income countries had the lowest overall percentage increase at just 28%, followed by the foreign not-for-profit sector at 43%, and public sector investments in low- and middle-income countries through ODA and the pharmaceutical sector in low- and middle-income countries at 42% each (see Figure 2.8).

## Figure 2.8

Percentage increase in health R&D investments by sector, 1998–2005

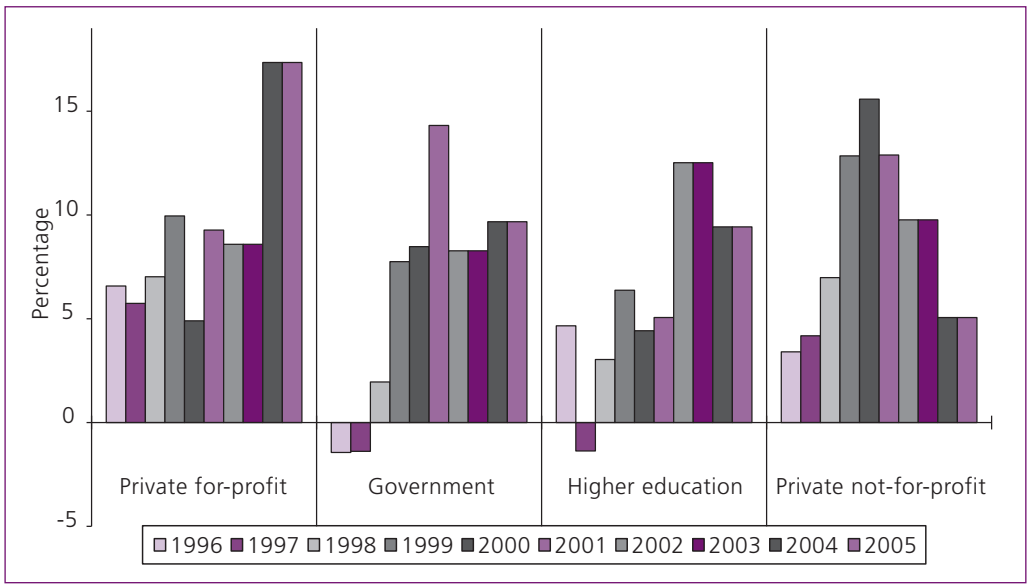



*Sources:* Global Forum for Health Research estimates based on data from official reports to OECD and RICYT, national surveys, pharmaceutical associations and other publications.

During the 2001–2005 period, all sectors in high-income countries experienced growth in investments in health R&D, although growth varied across sectors. The private for-profit sector, at 17.4%, had the highest growth, again reflecting the "found" money for 2005. The higher education (9.4%) and government (9.7%) sectors experienced similar growth in investments in 2005. This was a considerable drop for the higher education sector, from its peak growth in 2003 of 12.5%. The private not-for-profit sector also experienced another drop in its growth to 5.06% in 2005, from 9.8% in 2003 and 15.6% in 2001, whereas both the private for-profit and government sectors had higher growth in 2005 than in 2003 (see Figure 2.9).

## Figure 2.9

Annual growth in health R&D investments for high-income countries, 1996–2005




*Source:* Global Forum for Health Research estimates based on OECD data. For the last four years, estimates were for every two years.

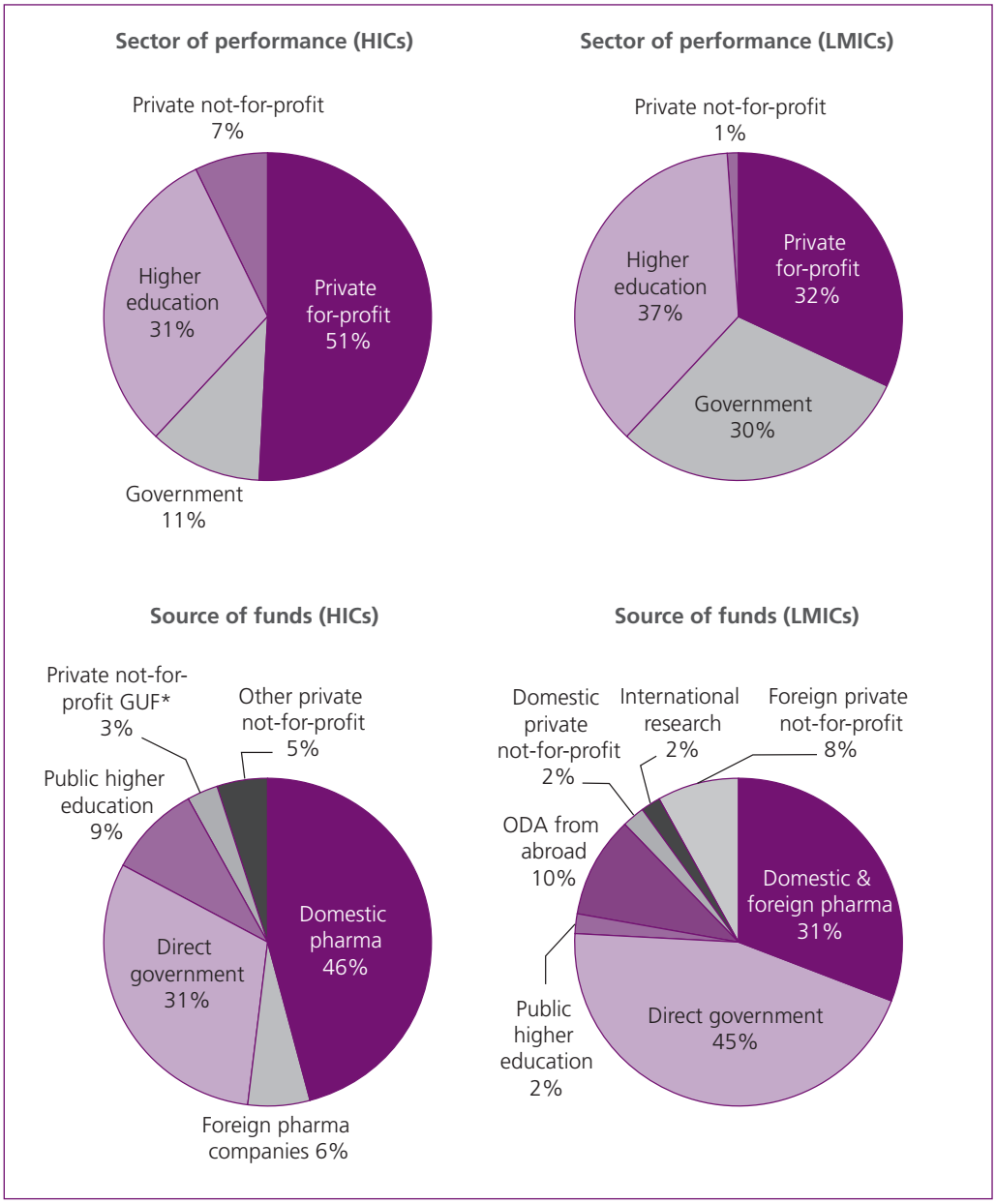
## 2.3 A closer look at investments by sectors of performance and sources of funds

### 2.3.1 Performance sectors

The same four sectors in both high-income and low- and middle-income countries carry out health R&D (see Figure 2.10). The 2005 estimates, based on officially reported data, indicate that the private for-profit sector carried out the majority of research in high-income countries, accounting for 50% of total health R&D, compared to 44% for the public sector. Research funded by the private not-for-profit sector accounts for the remaining 8%, and is carried out by independent researchers in universities. In low- and middle-income countries, most research was carried out within the public sector (67% in 2005 compared to 61% in 2003), while 32% was carried out in the private for-profit sector in 2005, down from 38% in 2003, and the remaining 1% in the private not-for-profit sector.

## Figure 2.10

Sectors of performance and sources of funds for health R&D, 2005




*Sources:* Global Forum for Health Research estimates based on data from official reports to OECD and RICYT, national surveys, pharmaceutical associations, the Foundations Centre and other publications.

* General university funds

### 2.3.2 Funding sources

As in earlier years, funds for health R&D came from four main sources in 2005:

- private for-profit sector
- public sector
- not-for-profit sector
- various public and private non-domestic sources.

**Private for-profit sector**

The private for-profit sector is estimated to be the largest investor in health R&D globally, according to officially reported data. In 2005, the private for-profit sector accounted for 51% of total global investments in health R&D, investing US$ 94 billion, up from US$ 60.6 billion in 2003, US$ 51.2 billion in 2001 and US$ 40.6 billion in 1998.

Multinational pharmaceutical, biotechnology and medical instrument companies are the main actors in the private for-profit sector. Pharmaceutical companies accounted for 52% of overall funds for health R&D in high-income countries in 2005 and 31% in low- and middle-income countries (see Figure 2.10). Companies based in high-income countries invested in their home countries, in other high-income countries and, to a lesser extent, in low- and middle-income countries.

While most of these companies are owned and operate in high-income countries, some operate in low- and middle-income countries. In 2005, 87% of the US$ 81.2 billion private sector investments were domestic investments by companies from high-income countries, and another 11% were foreign investments by companies in high-income countries. Just US$ 1.6 billion, or 2% of investments by private sector companies (both foreign and domestic), was spent in low- and middle-income countries (see Table 2.2).

US-based companies were the biggest spenders globally, followed by companies from Japan, Germany, the United Kingdom, France, Switzerland, Sweden and Canada (Table 2.4).

## Table 2.4

Private for-profit health R&D investments by funders, 2005 (US$ million)

| | | |
|---|---|---|
| **Global total** | **77 207** | **100.0** |
| United States | 38 205 | 49.5 |
| Japan | 10 120 | 13.1 |
| Germany | 5 338 | 6.9 |
| United Kingdom | 4 347 | 5.6 |
| France | 3 350 | 4.3 |
| Switzerland | 3 153 | 4.1 |
| Sweden | 1 688 | 2.2 |
| Canada | 1 609 | 2.1 |
| Other high-income countries | 7 826 | 10.1 |
| **Total high-income countries** | **75 637** | **98.0** |
| China | 595 | 0.8 |
| India | 162 | 0.2 |
| Other low- and middle-income countries | 814 | 1.1 |
| **Total low- and middle-income countries** | **1 570** | **2.0** |

*Sources:* Global Forum for Health Research estimates based on data from OECD, national sources and pharmaceutical associations.

As reported in *Monitoring Financial Flows 2006*, a few innovative developing countries are also supporting the development of indigenous pharmaceutical and biotechnology industries, which bears watching over the coming years, especially with the explosive growth in some of these countries in investments in genomics research and newly convergent technologies – nanotechnology, biotechnology, information technology and cognitive science (NBIC) (see Box 2.1). While the NBIC industry may be poised to become a big player in the next few years, for the moment the pharmaceutical industry remains the biggest actor in the private for-profit sector.

## Box 2.1

Update on nanoscale science and technologies

Gregor Wolbring, University of Calgary

### Scope and definition of NBIC

The growth of NBIC technologies – embracing nanoscience and nanotechnologies, biotechnology and biomedicine, information technology, and cognitive science (including neuro-engineering) – was flagged in *Monitoring Financial Flows* 2004 and 2006 as an emerging trend to watch. NBIC illustrates the effect of different sciences and technologies converging at the nanoscale. Emerging fields are being included in this nanoconvergence, for example synthetic biology, which in its most ambitious vision involves the bottom-up synthesis of genomes from base pairs.[i, ii, iii] Moves are under way to provide one common definition for "nanotechnology" through the International Organization for Standardization Technical Committee 229 on Nanotechnology (ISO/TC229), an organization that is charged with producing standards for classification, terminology and nomenclature, basic metrology, calibration and certification, and environmental issues related to nanotechnology. The ISO definition will very likely become the official working definition worldwide.

At present, ISO's definition of nanotechnology is based on scale and not on any particular application. It includes:

- understanding and control of matter and processes at the nanoscale, typically, but not exclusively, below 100 nanometres in one or more dimensions, where the onset of size-dependent phenomena usually enables novel applications, where 1 nanometre is one thousand millionth ($10^{-9}$) of a metre;
- utilizing the properties of nanoscale materials that differ from the properties of individual atoms, molecules and bulk matter to create improved materials, devices and systems that exploit these new properties.[iv]

The ISO/TC229 business plan states:

> Nanotechnology is expected to evolve through four overlapping stages of industrial prototyping and commercialization. The first stage, already begun, involves the development of passive nanostructures: materials with fixed structures and functions often used as parts of a product. Products containing nanomaterials already in the marketplace mainly involve manufactured nanoparticles (metal oxides, quantum dots, carbon nanotubes, etc) serving as raw materials, ingredients or additives in existing products. These products include paints, fuel cells, batteries, fuel additives, catalysts, lubricants, military battle suits, self-cleaning windows, sunscreens and cosmetics, explosives, propellants and pyrotechnics, disinfectants, abrasives and food additives. Thousands of new patents are being announced in this area each year and

> there are dozens of engineered nanoscale materials and particles at the research stage that could soon enter the commercial world. The second stage, also already begun, focuses on active nanostructures that change their size, shape, conductivity or other properties during use. For example, drug-delivery particles that release therapeutic molecules in the body when they reach their targeted diseased tissues. The third stage (projected to begin around 2010) will see the further development of expertise with systems of nanostructures and the directing of large numbers of intricate components to specified ends (for example, the guided self-assembly of nanoelectronic components into three-dimensional circuits and whole devices). Medicine could employ such systems to improve the tissue compatibility of implants, or to create scaffolds for tissue regeneration. In the fourth stage (projected to begin around 2015–2020), nanotechnology will expand to include molecular nanosystems – heterogeneous networks in which molecules and supramolecular structures serve as distinct devices. Computers and robots could be reduced to extraordinarily small sizes. Medical applications might be new types of genetic therapies and anti-aging treatments and there might be new interfaces linking people directly to electronics.[iv]

The four stages outlined by ISO include every aspect of envisioned and existing nanoscale products and processes, including molecular manufacturing, whereby a product is built from the bottom up, using atoms as its basic building blocks. All of the stages will generate various products from drugs and implants to modifiers of the physical environment, all of which will have an impact on various health policy and care areas. The recent report by the Council of Canadian Academies, *The State of Science and Technology in Canada*,[v] lists the top 197 research and development science and technology fields in Canada identified in a recent survey. It looks at how these fields are affected by nanoscale processes and products.[vi] Of the 197 fields, eight contain the term "nano", 51 can be seen to have nanoscale as a subfield within their field soon and another 90 can be seen to be indirectly affected by nanoscale materials and other nanoscale advances. Only 48 are not affected by nanoscale applications. Of the 149 affected research fields, all would have a potential impact on the health status of people, including on their medical condition and social well-being.[vi]

**Products produced**

The growing ability to manipulate, handle and create products and processes at the nanoscale is increasingly leading to a whole new set of products and capabilities, with accompanying impacts on health policy, care and industry. Nanoscale science and technology increasingly moves from the discovery to the commercialization stage. In 2006, US$ 50 billion of nanoscale-enabled products were sold, and pharmaceutical firms sold more than US$ 3 billion worth of

nanoformulated drugs.[vii] US$ 30 billion of nanoscale-enabled products were sold in 2005, compared to less than US$ 15 billion in 2004.[viii]

### Government funding

Global government funding of nanoscale science and technology from 2004 to 2010 (actual and projected) is follows:

| Year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|
| Amount (US$ billion) | 4.2 | 4.8 | 5.6 | 6.2 | 7.9[a] | 8.0[a] | 8.2[a] |

*Source:* Cientifica 2008[9].
a. Projected.

The European Community is the leading funder of nanoscale science and technology with the United States second, Japan third and the Russia Federation fourth, by actual dollars spent.[vii, ix] However, if purchasing power parity is taken into account, a different situation emerges: while the European Community would still be in first place, the Russian Federation would move into second place, China to third place and the United States to fourth place.[ix]

### Corporate funding

Industry started to outspend government in 2003.[ix] It is estimated that by 2010, 83% of nanoscale research and development funding will come from industry[ix]. Asian companies spend most on corporate nanotech R&D.[vii] Global corporate expenditure on nanotechnology research and development from 2005 to 2010 (actual and projected) is follows:

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|
| Amount (US$ billion) | 7473 | 8853 | 12 319[a] | 17 325[a] | 26 043[a] | 41 110[a] |

*Source:* Cientifica 2008[9].
a. Estimated/projected.

Private venture capital funding spending reached US$ 699 million in 2006[vii] but both Lux Research and Cientifica characterize venture capital nanotech involvement as rather limited.[vii, ix]

### Future trends

The main nanoscience and nanotechnology areas of investment are aero-defence, automotive, chemicals, conglomerate, electronics, food, pharmaceutical and health care and semiconductors. Of these, semiconductors are responsible for half of the R&D spending; projections indicate that this will still be the case in 2010.[ix] Most strikingly, pharmaceutical and health care nanotechnology applications are projected to move into second spot by 2010, with expenditures increasing from around US$ 282 million in 2005 to US$ 8.2 billion by 2010.[ix]

Cientifica predicts that "some 80% of the 2015 US$ 1.5 trillion market will be accounted for by applications of nanotechnologies in the pharmaceuticals and healthcare sectors".[x]

Given these trends, it can be safely predicted that, on the one hand, the health system and its consumer behaviour will strongly shape the direction of nanoscale science and technology research and development, while, on the other hand, nanoscale science and technology research and development and products will have a big impact on the cost of health systems, what products can be expected to be sold under the heading "health", what people expect from the health system, and the "10/90 gap".

*References (box)*


i. Wolbring G. Bio-tech, NanoBio-tech, SynBio-tech, NanoSynBio-tech? the changing face of biotech law? Part I. *Journal of International Biotechnology Law*, 2007, 4(4):177–186.

ii. Wolbring G. Bio-tech, NanoBio-tech, SynBio-tech, NanoSynBio-tech? the changing face of biotech law? Part II. *Journal of International Biotechnology Law*, 2007, 4(6)221–227.

iii. Wolbring G. *Synthetic biology 3.0*. Innovationwatch.com, 2007 (http://www.innovationwatch.com/choiceisyours/choiceisyours-2007-07-15.htm).

iv. *International Organization for Standardization (ISO) Business Plan ISO/TC 229 Nanotechnologies*. ISO, 2008 (http://isotc.iso.org/livelink/livelink/fetch/2000/2122/4191900/4192161/TC_229_BP_2007-2008.pdf?nodeid=6356960&vernum=0).

v. Council of Canadian Academies. *The state of science and technology in Canada*. Committee on the State of Science and Technology in Canada, 2006 (http://www.scienceadvice.ca/study.html,.www.scienceadvice.ca/documents/Complete%20Report.pdf 0-9781778-0-0).

vi. Wolbring G. *Canadian R&D priorities impacted by nanoscale and synthetic biology*. International Center for Bioethics, Culture and Disability, 2007 (http://www.bioethicsanddisability.org/CanadianRandDnano.html).

vii. *The nanotech report, 5th edition*. Lux Research, 2007 (http://www.luxresearchinc.com/press/2007-lux-research-nanotech-report-5.pdf).

viii. *The nanotech report, 4th edition*. Lux Research, 2006 (http://www.luxresearchinc.com/reference.html,.http://www.luxresearchinc.com/TNR4_TOC.pdf).

ix. *The nanotechnology opportunity report, third edition*. Cientifica Ltd, 2008 (http://www.cientifica.eu/index.php?option=com_virtuemart&page=shop.product_details&flypage=shop.flypage&product_id=34; http://www.cientifica.eu/images/Whitepapers/nor-sample.pdf).

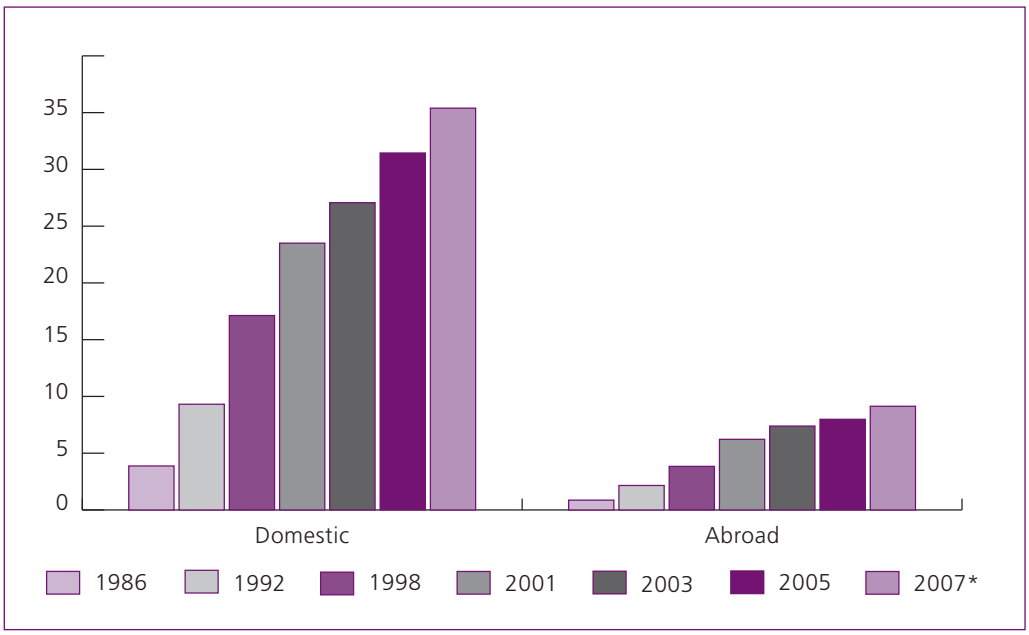
x. *Half way to the trillion dollar market? a critical review of the diffusion of nano-technologies*. Cientifica Ltd, 2007 (http://www.cientifica.eu/index.php?option=com_content&task=view&id=68&Itemid=111;http://www.cientifica.eu/files/Whitepapers/A%20Reassessment%20of%20the%20Trillion%20WP.pdf).

By 2007, R&D investments by Pharmaceutical Research and Manufacturers of America (PhRMA) member companies totalled US$ 44.5 billion. While most of this was spent on domestic R&D, US$ 9.1 billion or 20.5% of total PhRMA investments were spent abroad (Figures 2.11 and 2.12 and Table 2.5). Non-PhRMA pharmaceutical research companies spent an additional US$ 14.3 billion in 2007, up from US$ 12.7 billion in 2006, bringing the total of United States pharmaceutical spending to a record US$ 58.8 billion in 2007.[14]

The portion of overall investments by pharmaceutical companies on basic research may be overestimated, according to a study conducted for the Global Forum for Health Research.[15] Of the gross reported global investment of US$ 9.2 billion by pharmaceutical companies on basic research, US$ 2.9 billion was estimated to be subsidized by taxpayers. This left a net contribution by private sector companies of US$ 6.3 billion, 32% lower than reported by industry.

## Figure 2.11

Trends in pharmaceuticals R&D by Pharmaceutical Research and Manufacturers of America (PhRMA) companies, 1986–2007 (US$ million)

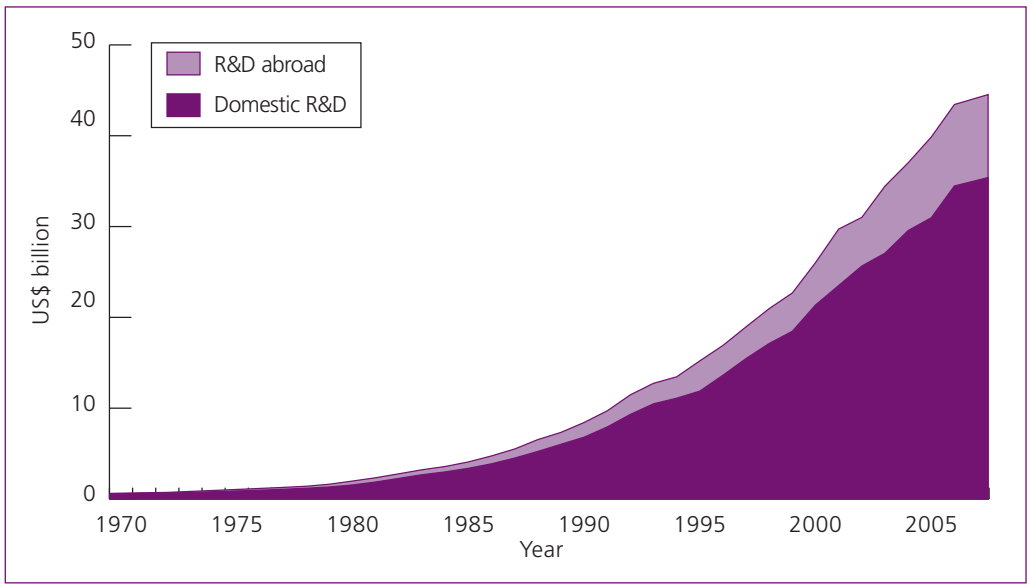



*Source:* PhRMA pharmaceuticals industry profile 2008.
* 2007 estimated.

*Notes:* R&D abroad includes expenditure outside the United States by United States-owned PhRMA member companies and R&D conducted abroad by the United States divisions of foreign-owned PhRMA member companies. R&D performed abroad by the foreign divisions of foreign-owned PhRMA member companies is excluded. Domestic R&D, however, includes R&D expenditures within the United States by all PhRMA member companies.

## Figure 2.12

Domestic R&D and R&D abroad by PhRMA member companies, 1970–2007




*Source:* Pharmaceutical Research and Manufacturers of America (PhRMA) annual membership survey, 2008.

## Table 2.5

R&D by geographical area, PhRMA member companies, 2006 (US$ million)

| Geographical area | US$ million | Share (%) |
|---|---|---|
| Africa | 25.0 | 0.1 |
| Americas | | |
| United States | 34 467.8 | 79.3 |
| Canada | 528.5 | 1.2 |
| Mexico | 32.2 | 0.1 |
| Brazil | 25.6 | 0.1 |
| Other Latin America & Caribbean | 85.7 | 0.2 |
| Asia-Pacific | | |
| Japan | 826.2 | 1.9 |
| China | 32.1 | 0.1 |
| India | 8.7 | 0.0 |
| Other Asia-Pacific | 172.2 | 0.2 |
| Australia & New Zealand | 135.2 | 0.3 |
| Europe | | |
| France | 424.9 | 1.0 |
| Germany | 574.2 | 1.3 |
| Italy | 245.9 | 0.6 |
| Spain | 190.8 | 0.4 |
| United Kingdom | 2 280.4 | 5.2 |
| Other Western European | 2 990.0 | 6.9 |
| Central & Eastern Europe (incl. Cyprus & Malta) | 132.2 | 0.3 |
| Russian Federation and Newly-Independent States | 125.1 | 0.3 |
| Middle East | 38.9 | 0.1 |
| Uncategorized | 97.4 | 0.2 |

*Source:* PhRMA pharmaceutical industry profile 2008.

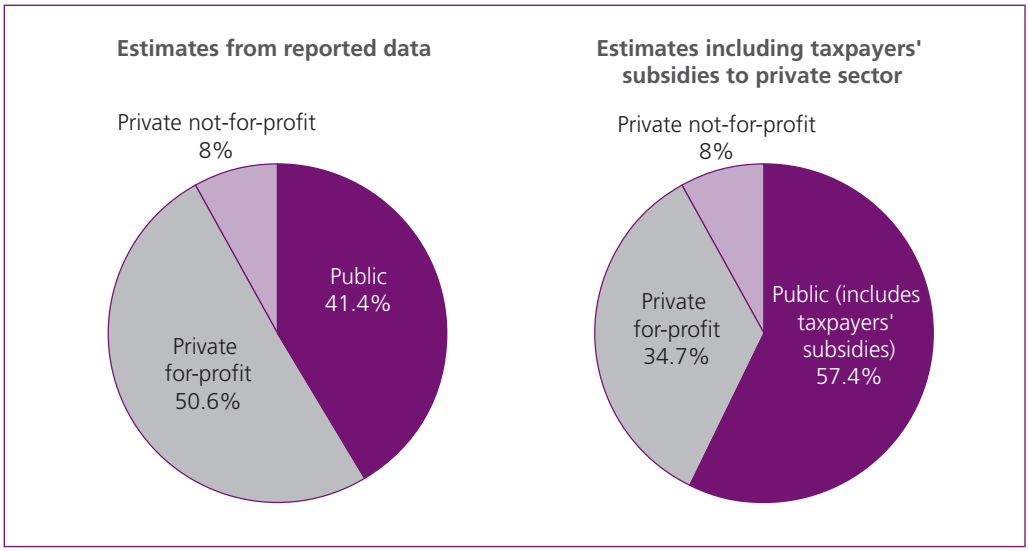
### Public sector

Public contributions to global investments in health R&D continue to represent a high proportion of overall investments. In 2005, governments were estimated to be the next largest funders after the private sector, accounting for 41% of overall funds in high-income countries and 59% in low- and middle-income countries. Government support to research for health is funded through allocations to ODA, higher education, and direct investments in R&D. In addition, the public sector provides direct and indirect support to research carried out by the private sector, in the form of tax deductions, credits and other indirect supports to private sector companies, such as payments for graduate and advanced training of researchers and for the laboratories they use. According to the study[15] carried out for the Global Forum, this would have added another 16% of overall global investments on health R&D from the public sector; applied to the new estimates for 2005, this would have the effect of increasing the public sector share from 41% to 57%.

Conversely, the private sector share in 2005 would drop from 51% to 35% (see Figure 2.13). While acknowledging that "these estimates and calculations are necessarily crude, because the industry does not provide verifiable figures and details about its R&D budget", the study suggests that estimated taxpayers' subsidies to industry may in fact be underestimated.

## Figure 2.13

Estimates of health R&D funding by sector, with and without taxpayers' subsidies to industry, 2005




*Sources:* Global Forum for Health Research estimates based on data from official reports to OECD and RICYT, national surveys, pharmaceutical associations and calculations from D. Light.

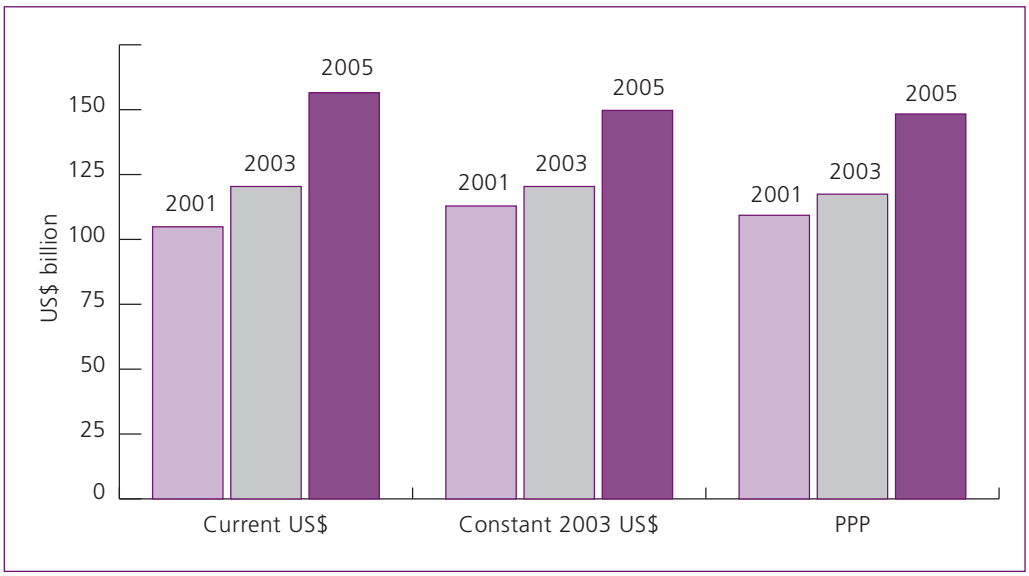
**Public investments in high-income countries**

Governments in high-income countries contributed an estimated US$ 63.3 billion to R&D for health in 2005, up from US$ 53.8 billion in 2003, US$ 44.1 billion in 2001 and US$ 36.2 billion in 1998, excluding foreign ODA (see Table 2.2).

Indications are that this growth in investments is real and not just a reflection of inflation or shifts in exchange rates. When data were standardized using either constant 2003 US dollars or 2003 purchasing power parities, a similar pattern of growth was observed (Figure 2.14). Work is needed to develop PPPs that can reflect the basket of goods specific to R&D for health. This is especially important for low- and middle-income countries, as using such a basket of goods to assess their investments in R&D for health may give a fairer assessment of their investments in R&D. This is because one would assume that the costs of doing R&D in these countries may be considerably lower than in high-income countries, given differences in labour and other fixed costs.

## Figure 2.14

Health R&D investments among OECD-reporting countries, 2001–2005, in current and constant 2003 US$ and PPPs




*Sources:* Global Forum for Health Research estimates based on data from official reports to OECD and WHO.

**Global distribution of investments by high-income countries**

The United States Government was the biggest high-income country investor in health R&D in 2005 at US$ 35.0 billion and accounted for more than half of the total in these countries. Japan followed with US$ 6.3 billion, the United Kingdom US$ 4.2 billion, France US$ 3.5 billion, Germany US$ 3.3 billion, Canada US$ 2.7 billion and Italy US$ 2.5 billion. Together, the G7 countries invested more than 88% of publicly funded health R&D in high-income countries (down from 92% in 2003). All other high-income countries added, in total, another US$ 7.3 billion (Table 2.6).

## Table 2.6

Public funding of health R&D in high-income countries, 1998–2005

| | 2005 Current US$ million | 2003 Current US$ million | 2001 Current US$ million | 1998 Current US$ million |
|---|---|---|---|---|
| **Funder reported** | | | | |
| Austria | 737 | 532 | 408 | 375 |
| Belgium | 463 | 208 | 117 | |
| Denmark | 489 | 287 | 204 | 223 |
| Finland | 353 | 287 | 200 | 201 |
| France | 3 507 | 3 142 | 2 448 | 2 242 |
| Germany | 3 302 | 3 154 | 2 297 | 2 393 |
| Greece | 71 | 47 | 35 | 45 |
| Iceland | 35 | 24 | 7 | |
| Ireland | 120 | 66 | 23 | 16 |
| Israel | 110 | 204 | 179 | |
| Italy | 2 520 | 2 006 | 1 218 | |
| Republic of Korea | 484 | 321 | 169 | |
| Netherlands | 902 | 761 | 605 | 542 |
| New Zealand | 63 | | 20 | 38 |
| Portugal | 99 | 78 | 63 | |
| Spain | 1 574 | 620 | 367 | 302 |
| Sweden | 1 008 | 506 | 369 | 458 |
| United Kingdom | 4 189 | 2 184 | 1 692 | 1 789 |
| United States | 35 044 | 33 823 | 28 600 | 19 527 |
| **Performer reported** | | | | |
| Australia | 878 | 740 | 553 | 506 |
| Canada | 2 692 | 1 650 | 980 | 754 |
| Japan | 6 302 | 5 591 | 2 952 | 2 896 |
| Norway | 488 | 298 | 205 | 205 |
| Switzerland | 568 | 320 | 250 | |
| Total | 64 694 | 55 997 | 43 303 | 32 137 |

### Private not-for-profit sector

The private not-for-profit sector, comprising private universities, foundations and charities, has an increasingly strong commitment to health R&D. The sector accounted for an estimated US$ 12.8 billion in investments in 2005, up from US$ 9.0 billion in 2003, US$ 8.1 billion in 2001 and US$ 5.9 billion in 1998 (see Table 2.2).

Almost all of this funding (US$ 12.2 billion) came from private foundations and universities in high-income countries for health R&D carried out in these countries. Domestic private foundations and universities in low- and middle-income countries contributed US$ 0.12 billion, an increase from US$ 0.8 billion in 2003 and US$ 0.07 billion in 2001 and 1998. Foreign not-for-profit

organizations, such as foundations and universities, also contributed an estimated US$ 0.4 billion in 2005 towards health R&D in low- and middle-income countries, a figure that has remained relatively stable since 1998. The private not-for-profit sector was the source of 8% of funds in 2005 for high-income countries and 10% for low- and middle-income countries. ODA accounted for 10% of total funds in low- and middle-income countries (see Figure 2.10).

Foundations remain key global and country-level partners in health R&D. The majority of foundations have no overseas activities; most international funding comes from a small number of foundations that directly fund activities abroad (e.g. Wellcome Trust and Bill and Melinda Gates Foundation), or the activities relevant to international issues are addressed through giving to domestic institutions. In principle, foundation investments in international development activities are reported in OECD Development Assistance Committee statistics as part of the roughly US$ 12.8 billion attributed to not-for-profit spending. However, underreporting within countries is evident; attempts to improve data collection are under way.[16]

United States foundations account for about half of private foundations contributions to international development activities. Available data for United States foundations show the extent of their investment, and the overall importance of this sector. In 2006, United States foundations gave an estimated US$ 39 billion to a broad range of international development activities, up from US$ 30.3 billion in 2003, and up substantially from US$ 8.8 billion in 1990. Investment data for international giving overseas were not available for 2006 but probably remain a relatively small proportion of the overall total, as in previous years (Table 2.7).

## Table 2.7

Number of United States foundations, total and estimated international giving (US$ billion)

| Year | Numbers of foundations | Total giving | International giving | International: % of total | International giving overseas | International giving overseas: % of total |
|---|---|---|---|---|---|---|
| 2006 | 72 477 | 39.0 | n/a | n/a | n/a | n/a |
| 2005 | 71 095 | 36.4 | 3.8 | 10.4 | 1.3 | 3.7 |
| 2004 | 67 736 | 31.8 | 3.5 | 11.0 | 1.0 | 3.2 |
| 2003 | 66 395 | 30.3 | 3.2 | 10.6 | 1.2 | 3.9 |
| 2002 | 64 843 | 30.4 | 3.2 | 10.5 | 1.2 | 4.0 |
| 2001 | 61 810 | 30.5 | 3.3 | 10.8 | 1.0 | 3.4 |
| 2000 | 56 582 | 27.6 | 3.1 | 11.2 | 1.1 | 4.1 |
| 1998 | 46 832 | 19.3 | 1.6 | 8.2 | 0.6 | 3.3 |
| 1994 | 38 807 | 11.3 | 1.0 | 8.8 | n/a | n/a |
| 1990 | 32 401 | 8.8 | 0.8 | 8.7 | n/a | n/a |

*Sources:* International Grantmaking Update, The Foundation Center, 2006, and Grantmaker Information, Foundation Center Statistics (http://foundationcenter.org/findfunders/statistics/listing01.html).

n/a: Not available.

*Note:* This table provides aggregate financial information on the active independent, corporate, community and grant-making foundations in the United States. Estimates on international giving overseas are based on the percentage of international giving overseas of a sample of foundations as a proportion of international giving reported by all foundations.

## Endnotes and references


1. See the first report on *Monitoring financial flows* in 2001, and subsequent reports annually from 2004: De Francisco A, Currat LJ. *Monitoring financial flows for health research*. Geneva, Global Forum for Health Research, 2001 (http://www.globalforumhealth.org/Site/002__What%20we%20do/005__Publications/004__Resource%20flows.php).

2. Burke MA, De Francisco A, eds. *Monitoring financial flows for health research*. Volume 2. Geneva, Global Forum for Health Research, 2004 (http://www.globalforumhealth.org/Site/002__What%20we%20do/005__Publications/004__Resource%20flows.php).

3. De Francisco A, Matlin SA, eds. *Monitoring financial flows for health research 2006: the changing landscape of health research for development*. Geneva, Global Forum for Health Research, 2006 (http://www.globalforumhealth.org/Site/002__What%20we%20do/005__Publications/004__Resource%20flows.php). http://www.globalforumhealth.org/Site/002__What%20we%20do/005__Publications/004__Resource%20flows.php

4. *Statistics portal*. Paris, Organisation for Economic Co-operation and Development (OECD), 2008 (http://www.oecd.org/statsportal/0,3352,en_2825_293564_1_1_1_1_1,00.html).

5. See chapters by Alison Young and Andrew Kennedy in *Monitoring financial flows for health research: work in progress for discussion and feedback on the occasion of Forum 7*. Geneva, Global Forum for Health Research, 2003.

6. Network on Science and Technology Indicators – Ibero-American and Inter-American (RICYT) (http://www.ricyt.org).

7. For further information about this revision and its impact on the data, see the NSF Infobrief *Revised industry classification better reflects structure of business R&D in the United States* (http://www.nsf.gov/statistics/infbrief/nsf07335).

8. Netherlands statistics.

9. Norway statistics.

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12. Sadana R. *Health research systems analysis: toolkit for use in low- and middle-income countries*. Expert Workshop on Comparative Analysis of National Research Systems, UNESCO Forum on Higher Education Research and Knowledge, Paris, 16–18 January 2008 (ttp://portal.unesco.org/education/en/files/55785/12009314645WHO_HRSA_Presentation_Sadana.pdf/WHO%2BHRSA%2BPresentation%2BSadana.pdf).

13. Burke MA, De Francisco A, eds. *Monitoring financial flows for health research 2005: behind the global numbers*. Geneva, Global Forum for Health Research, 2005 (page 10) (http://www.globalforumhealth.org/Site/002__What%20we%20do/005__Publications/004__Resource%20flows.php).

14. Pharmaceutical Research and Manufacturers of America (PhRMA) (http://www.phrma.org/news_room/press_releases/us_biopharmaceutical_companies_r&d_spending_reaches_record_$ 58.8_billion_in_2007/).

15. Light D. Basic research funds to discover new drugs: who contributes how much? Chapter 3 in: *Monitoring financial flows for health research 2005: behind the global numbers*. Geneva, Global Forum for Health Research, 2005 (http://www.globalforumhealth.org/Site/002__What%20we%20do/005__Publications/004__Resource%20flows.php).

16. For example, the Global Forum for Health Research collaborates with AFRISTAT and the Health Metrics Network to encourage capacity building for statistical work in low- and middle-income countries.

# Chapter 3

# Global trends in mortality and morbidity

# Global trends in mortality and morbidity

## 3.1 Introduction

On average, people are healthier, wealthier and more educated than they were at the time the Alma-Ata Declaration was signed in 1978. They have more access to improved drinking water, sanitation and key health interventions such as childhood immunization. Partly in response, child mortality rates have declined steadily in all WHO regions over the last 30 years and global life expectancy at birth has increased from 60 to 67 years. The overall global improvement in health status worldwide over the last century is a major achievement to which health professionals, the public health movement, national governments and international health actors have all contributed.

However, these health improvements have not been shared equally and there remains a huge gulf between the health expectations of high-income and low-income countries, and health inequalities among and within countries remain entrenched. Child mortality rates in sub-Saharan Africa as a whole were similar to those in the Middle East in the 1960s, but they are now twice those in the Middle East and are approximately four times those in South-East Asia.[1] In the period since 1970, the rate of decline in child mortality has, in fact, been very slow in low-income countries as a whole, much slower than in the richer countries.[2]

The health of populations remains vulnerable to environmental, economic and social changes and civil disruption. Global health trends reveal a complex and challenging mixture of old and new health problems. This chapter provides an overview of global trends in mortality and morbidity and highlights the health transformations that are projected to take place over the next 25 years.

## 3.2 Ageing population: demographic transition

### 3.2.1 Life expectancy

Life expectancy at birth in 2006 ranged from 80 years in high-income countries down to 51 years in sub-Saharan Africa (Figure 3.1). Female life expectancy in high-income countries reached an average of 82 years in 2006, and was 86 years in Japan. Overall, for the entire population of the world, average life expectancy at birth in 2006 was 67 years, an increase of 11 years over the last quarter century.

As shown in Figure 3.1, life expectancy increased during the 1990s for most regions of the world, with the notable exception of Africa and the low- and middle-income countries of Europe. Life expectancy started to decline in parts of sub-Saharan Africa during the mid-1980s because of HIV, while life expectancy for males declined in the mid-1990s for some of the transition economies in Europe. Although both trends have now reversed, they show that continual improvements in life expectancy over time cannot be assumed.

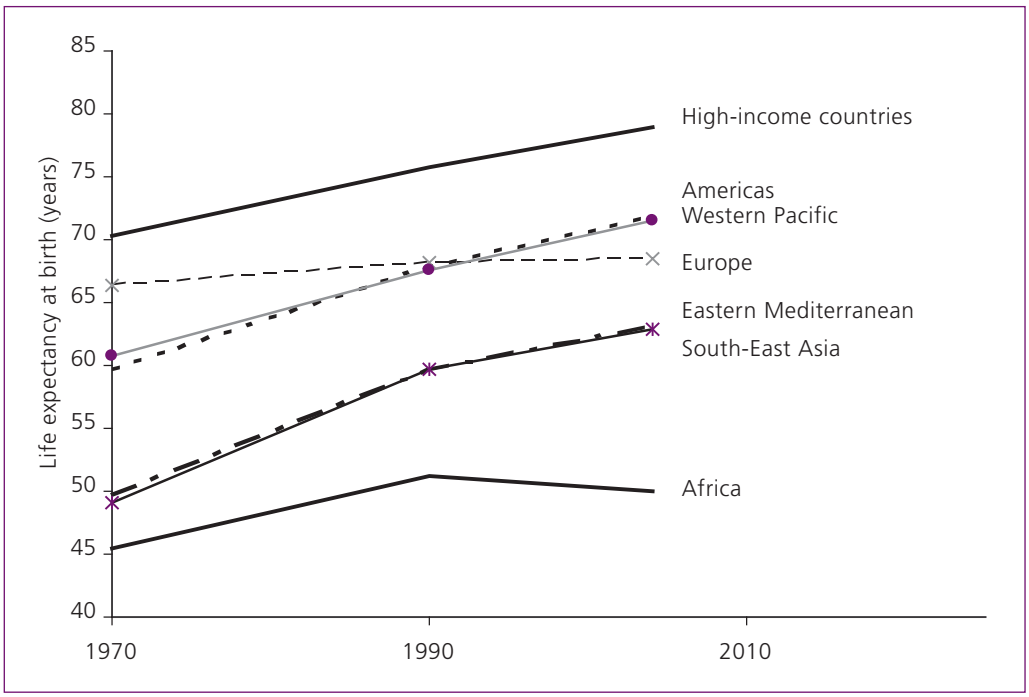
Life expectancy at birth has increased from a global average of 46 years in 1950 to 67 years in 2006. However, many populations in poor countries and even

a few in wealthy countries still have life expectancies and disease profiles typical of European countries a century ago. Life expectancy at birth in high-income countries is almost double that of the most disadvantaged countries.

Regional and national life expectancy data also hide important national and within-country differences and trends. For example, within the United States the racial differences are large, with Afro-American men having a life expectancy at birth up to 20 years lower than white men.[3] Life expectancy at birth of women in Djibouti is 23 years less than the life expectancy of women in Cyprus.

## Figure 3.1

Trends in average life expectancy at birth from 1970 to 2004 by country income and WHO region




*Sources:* United Nations Population Division (Population Prospects 2006 revision), and World Health Organization 2008.[4]

*Note:* High-income countries are shown separately as a single group, low- and middle-income countries are grouped by WHO region.

### 3.2.2 Trends in child mortality

Although almost 10 million children under 5 years still die every year in the world, enormous strides have been made since 1970, when over 17 million child deaths occurred. Today nearly all child deaths (97%) occur in low-income countries, and almost half of them in Africa.

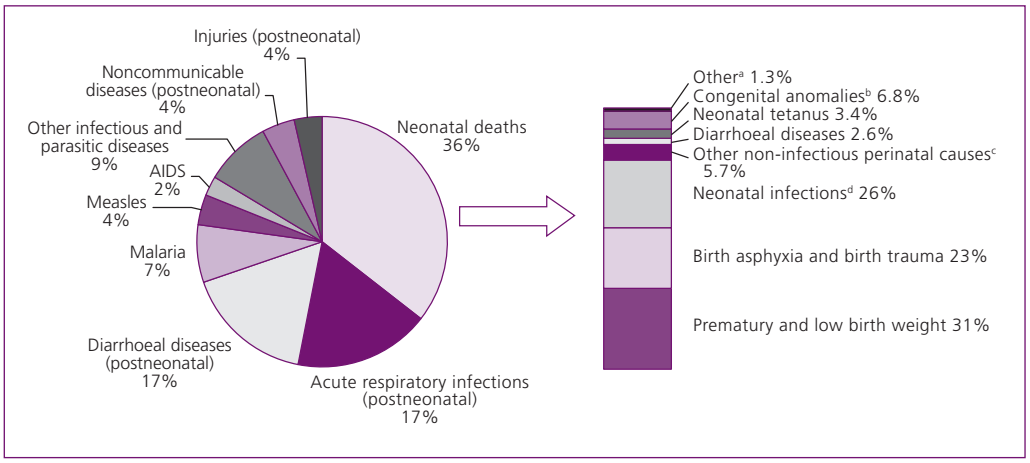
There is now a very substantial database for data on levels of child mortality and on coverage of key interventions for child health, with many countries having national surveys approximately every five years. A recent assessment of all the available survey evidence on trends in child mortality to age 5 concluded that the rate of progress has not been as rapid as anticipated. Under-5 mortality is expected to decrease by only 26% from 1990 to 2015 at current rates; this decline is substantially less than the MDG 4 target of a 67% decline, and substantially slower than the rate of decline observed for the world between 1970 and 1985.[2] This slow progress is determined largely by the slow declines in sub-Saharan Africa, which also has the slowest rates of decline in fertility.[2]

Seven out of 10 deaths in children under the age of 5 years still occur in low-income countries and can be attributed to six major causes: pneumonia, diarrhoea, malaria, neonatal infections, preterm delivery and asphyxia at birth (Figure 3.2). Most could be averted with existing cost-effective technologies.[5] Undernutrition is an underlying cause in an estimated 30% of all deaths among children under 5.

These conditions overlap and are exacerbated by poverty. While there have been impressive reductions in diarrhoeal disease and measles deaths, malaria and neonatal causes remain as substantial challenges. A recent analysis estimated that 35% (or 3.5 million) child deaths under age 5 were attributable to malnutrition and suboptimal breastfeeding.[6]

## Figure 3.2

Trends in average life expectancy at birth from 1970 to 2004, by WHO region




*Source:* World Health Organization 2008[4].

a. Includes other noncommunicable diseases (1%) and injuries (0.3%)

b. ICD-10 codes Q00-Q99. Another 1.2% of neonatal deaths are due to genetic conditions classified elsewhere.

c. Other non-infectious causes arising in the perinatal period.

d. Includes all neonatal infections except diarrhoeal diseases and neonatal tetanus.

Slow progress is also reflected in data on the coverage of interventions to improve child health. Coverage of different interventions varied widely both between and within countries. Coverage has increased only slowly since 1990 for all except vitamin A supplementation and perhaps vaccination of mothers with tetanus toxoid at the time of delivery. In fact, the use of oral rehydration therapy for children with diarrhoea seems to have fallen. The most rapid increases in coverage were seen for immunization, which also received significant investment during the past decades.[7] There is also a notable recent increase in the use of insecticide-treated nets.[8] A systematic analysis of the coverage of maternal, newborn and child interventions in developing countries found that the gaps in coverage of a set of interventions within countries ranged from an average of 29% for the wealthiest quintile up to 54% for the poorest quintiles of the population.[9] Differences between the poorest and the wealthiest were largest for the maternal and newborn health intervention area and smallest for immunization.

### 3.2.3 Trends in adult mortality

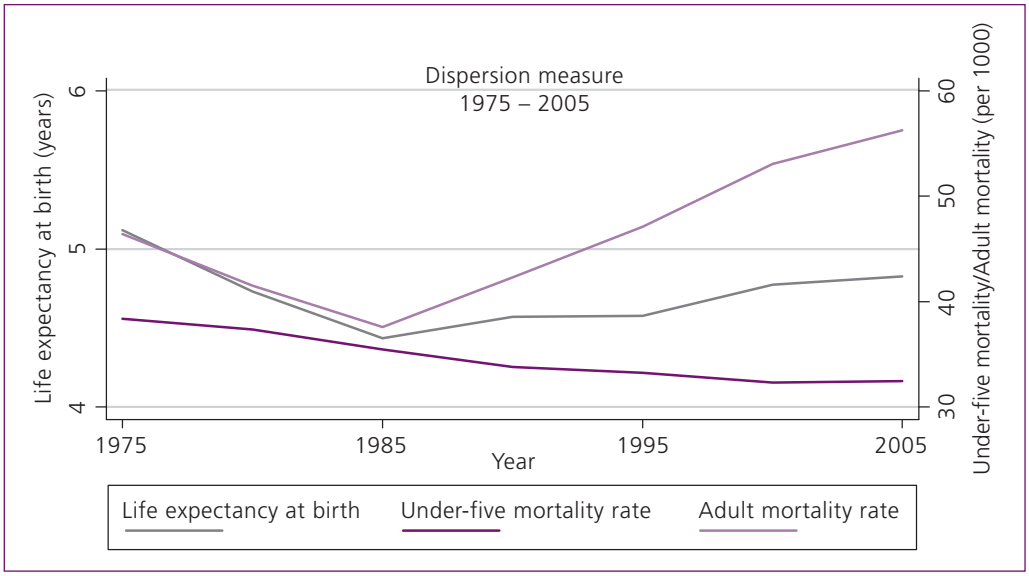
Adult mortality rates have been declining in recent decades in most regions of the world. Life expectancy at age 15 has increased by between 2 and 3 years for most regions over the last 20 years. The notable exceptions are the high-mortality countries in Africa, where life expectancy at age 15 has decreased by nearly 7 years

between 1980 and 2001 mainly because of HIV, and the former Soviet Union countries of Eastern Europe, where life expectancy at age 15 has decreased over the same period by 4.2 years for males and 1.6 years for females.

Because many of the richer countries are approaching the lower bound for child mortality, inequalities across countries in child mortality have been falling. This is shown in Figure 3.3, where the lines reflect a simple measure of dispersion across countries in the health outcome, although the results are robust for a variety of possible measures of inequality. Lower dispersion scores mean less inequality in the health outcome across countries. On the other hand, reductions in adult mortality have been substantially higher in the richer countries so that the dispersion across countries in adult life expectancy has risen since 1985. This increasing inequality outweighs the reduced inequality for child mortality rates, to the extent that inequalities in life expectancy at birth across countries have risen.

## Figure 3.3

Diverging trends in child and adult mortality rates




*Source:* Moser, Leon and Gwatkin 2005[10] with modification.

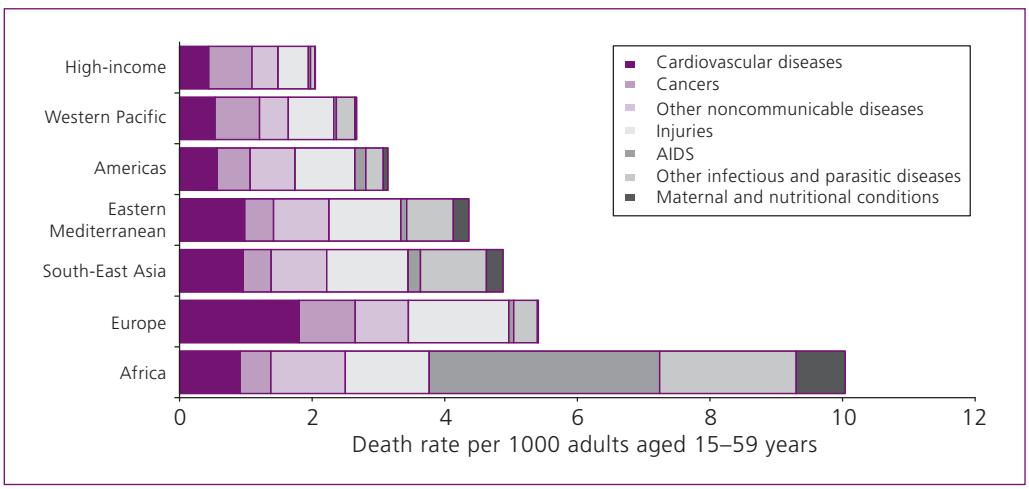
## 3.3 Epidemiological transition: disease burden and risk factors

The global burden of disease is shifting from infectious diseases to noncommunicable diseases, with chronic diseases such as heart disease, stroke, diabetes, cancers and chronic respiratory diseases now accounting for more than 60% of deaths globally, with 80% of these deaths occurring in low- and middle-income countries. Close to 50% of the chronic disease deaths in low- and middle-income countries occur under the age of 70 years, compared to only 27% in high-income countries. Figure 3.4 shows estimated death rates for selected causes of death in 2004 for high-income countries, and low-and middle-income countries grouped by WHO regions.

WHO has estimated that over 70% of cardiovascular disease deaths and around 50% of all chronic disease deaths are attributable to a small number of known risk factors.[11] Four of the most important are unhealthy diet, physical inactivity, tobacco use and high blood pressure. Globally, these risk factors are increasing as people's dietary habits change to foods high in fats, salt and sugars, and people's work and living situations are much less physically active. The number of people who are overweight or obese will rise from 1 billion to more than 1.5 billion by 2015 if current trends continue. Tobacco use is also increasing in low- and middle-income countries. Tobacco use continues to increase in developing countries, suggesting that the global impact on disease will also increase. Current estimates suggest that there are 3.9 million preventable tobacco-caused deaths each year; projections for the year 2030 suggest that this number will increase to 8.4 million.[12]

### Figure 3.4

Adult mortality rates by major cause group and region, 2004



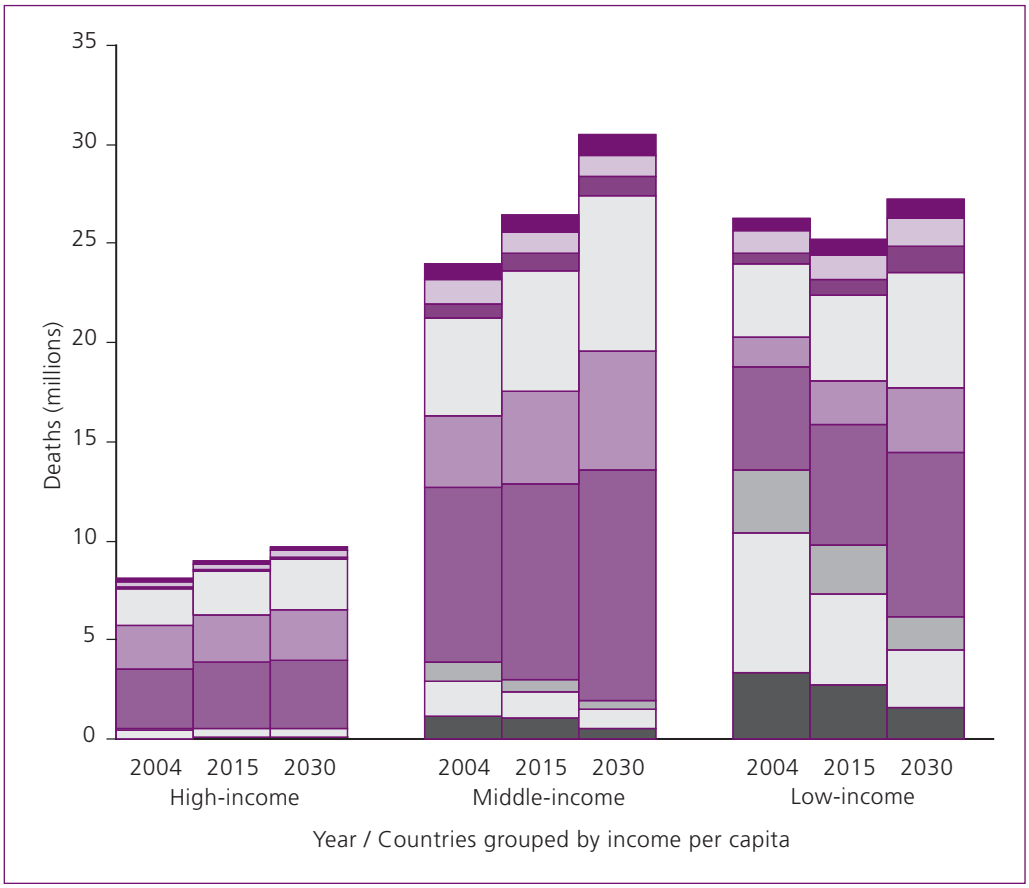

*Source:* World Health Organization 2008[4].

## 3.4 Projections: future trends in mortality and morbidity

According to revised projections carried out by WHO,[13] the world will experience a substantial shift in the distribution of deaths from younger to older ages and from communicable diseases to noncommunicable diseases during the next 25 years (Figure 3.5). These revised projections take into account the latest projections by the Joint United Nations Programme on HIV/AIDS (UNAIDS) and WHO for HIV, and also updated World Bank forecasts for economic growth.

### Figure 3.5

Projected deaths by cause for high-, middle- and low-income countries



Large declines in mortality between 2002 and 2030 are projected for all of the principal communicable, maternal, perinatal and nutritional causes, including HIV, tuberculosis and malaria. Global AIDS deaths are projected to rise from 2.2 million in 2008 to a maximum of 2.4 million in 2012 and then to decline to 1.2 million in 2030 under a baseline scenario that assumes coverage with antiretroviral drugs continues to rise at rates currently being achieved.

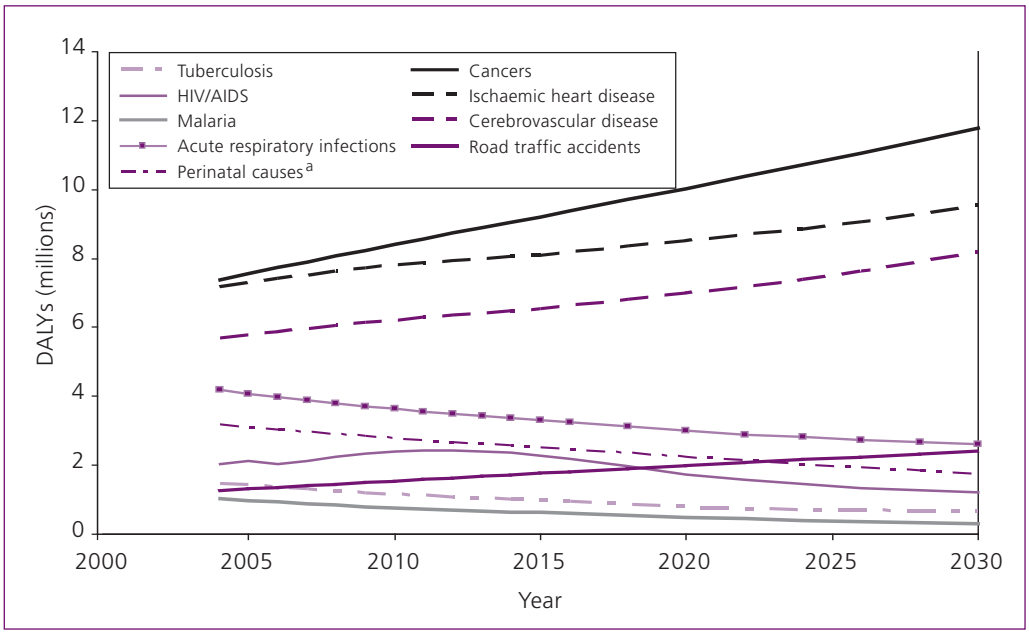
Ageing of populations in low- and middle-income countries will result in significantly increasing total deaths due to noncommunicable diseases over the next 25 years (Figure 3.6). Global cancer deaths are projected to increase from 7.4 million in 2004 to 11.8 million in 2030, and global cardiovascular deaths from 17.1 million in 2004 to 23.4 million in 2030. Overall, noncommunicable conditions are projected to account for just over three quarters of all deaths in 2030. For noncommunicable diseases, demographic changes in all regions will tend to increase total deaths substantially, even though age-sex-specific death rates are projected to decline for most causes other than lung cancer. The impact of population ageing is generally much more important than population growth.

The projected 28% increase in global deaths due to injury between 2004 and 2030 is predominantly due to the increasing numbers of road traffic accident deaths, which, together with increases in population numbers, will more than offset small declines in age-specific death rates for other causes of injury. Road traffic accidents are projected to rise from the ninth leading cause of death globally in 2004 to the fifth leading cause.

Is increasing life expectancy associated with increased or reduced levels of disability and poor health? In the 1980s James Fries hypothesized that not only death but also morbidity was being compressed towards the later part of life in what he called "compression of morbidity".[14,15] The contrary "expansion of morbidity" hypothesis postulates that the decline in mortality is largely due to decreasing fatality rates for diseases rather than to reductions in their incidence or progression. Consequently the decline in mortality is accompanied by an increase in chronic illness and disability.[16] Manton suggested that the decline in mortality may be partly due to decreased fatality rates, but at the same time the incidence and progression of chronic diseases may be decreasing, leading to a "dynamic equilibrium" of morbidity.[17]

## Figure 3.6

Projected global deaths for selected causes, 2004–2030




*Sources:* WHO. a. Causes arising in the perinatal period; does not include all neonatal deaths.

Although there are higher prevalences of disabling conditions such as dementia and musculoskeletal disorders in countries with longest life expectancies according to *Global Burden of Disease* estimates,[4] this is offset by lower levels of disability for diseases such as cardiovascular disease and chronic respiratory diseases, where incidence and mortality rates are also lower. At least cross-sectionally, this international perspective provides some support for the compression of morbidity hypothesis.

Evidence is mixed on whether compression or expansion of morbidity is occurring as mortality risks continue to decline. The international evidence suggests that health will continue to improve, but that certain causes of disability will become more prominent. Expansion of morbidity will occur if decreases in mortality rates at older ages are predominantly due to treatment interventions that reduce case fatality without reducing disabling outcomes. On the other hand, if further mortality reductions are predominantly due to prevention and treatment interventions, and possibly to healthier lifestyles among a more affluent and better educated older population, then there should be reductions in disability prevalence and severity among older people.

## 3.5 Discussion and conclusions

Improvements in global health status as measured by gains in life expectancy and other measures and the reductions in preventable deaths have been accompanied by a widening health and poverty gap between and within countries. People living in poor countries not only face lower life expectancies than those in richer countries but also live a higher proportion of their lives in poor health.

While morbidity and disability assessment is of growing significance in all countries, mortality as a health status measure is still of great importance in the poorer countries. Of the estimated 59 million deaths worldwide each year, 9 out of 10 occur in low- and middle-income countries, reinforcing the fundamental importance of improving mortality statistics as a measure of health status in the developing world.

Despite a continuing improvement in average health status in many developing countries, there are widening health inequities within countries, and some regions where health reversals have occurred. Across the world, children are at higher risk of dying if they are poor and malnourished, and the gaps in mortality between the haves and the have-nots are widening. Globally, we are not doing a better job of reducing child mortality now than we were three decades ago. Those that do make it past childhood are confronted with adult mortality rates that exceed those of 30 years ago. Indeed, the state of adult health is characterised by three major trends: slowing down of gains and widening health gaps, increasing complexity of the burden of disease, and the globalization of adult health risks.

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# Chapter 4

# Targets, commitments and accountability: establishing a Report Card on financing research and development for health

# Targets, commitments and accountability: establishing a Report Card on financing research and development for health

## 4.1 Targets, commitments, aspirations and accountability

Setting targets or goals in fields related to financing development and health is not a new phenomenon. For example, in the early 1970s, the United Nations set the target that high-income countries should commit a minimum of 0.7% of their gross domestic product (GDP) or gross national income (GNI) to official development assistance for low- and middle-income countries. Towards the end of that decade, WHO set a goal of "Health for All by the Year 2000", and early in the 21st century launched the "3 by 5 Initiative", aiming to have 3 million people living with HIV on antiretroviral therapy by 2005.

What becomes of such targets or goals? How well do countries perform in reaching them and how, if at all, are they held accountable when they do not achieve them? In a few cases, efforts have been made to monitor progress, but in many instances there appears to be a complicit silence.

Of course, there are different kinds of health-related targets – both quantitative and qualitative – and not all receive definitive and binding commitments by governments. Indeed, in the health field the establishment of treaties or conventions to which States become signatories is extremely rare – the Framework Convention on Tobacco Control[1] being the first example to come into force and to be associated with formal reporting mechanisms. In other cases, governmental assent in international conferences or world assemblies may be given but no formal accountability defined. Some targets remain "aspirational", providing a rallying point for advocacy and for galvanizing effort towards a challenging goal. The 3 by 5 Initiative has been described in this way: it lacked formal commitment from many governments but has been credited with making unacceptable the idea that poor people in developing countries could be left without the life-saving benefits of antiretroviral therapy and paved the way for the massive funding that has been channelled through the United States President's Emergency Plan for AIDS Relief (PEPFAR)[2] and the Global Fund to Fight AIDS, Tuberculosis and Malaria[3] into the purchase of drugs for low- and middle-income countries.[4]

In a narrow sense, in the specific field of health research for development there has been one major pair of quantitative financing targets set: the recommendation by the Commission on Health Research for Development in its 1990 report[5] that low- and middle-income countries should aim to spend 2% of their government health budgets on health research and research capacity strengthening and that this should be complemented by donors committing 5% of their health aid similarly.

However, this raises a range of questions about related areas of spending. If financing targets are expressed as proportions of health or development assistance budgets, how large are these budgets and what are the targets and commitments for how these should grow over time, either in absolute terms or relative to gross national product/ gross national income[6] (GNP/GNI) or to GDP[7]? How can the appropriate amounts to be allocated to health research be determined in countries where development assistance is a major part of the national budget and often channelled through a complex array of basket arrangements, sectorwide approaches and general budget support mechanisms? Furthermore, health research cannot be seen in isolation – even more so now that its dimensions are widening with the shift to "research for health" (see Chapter 1) – and it should be considered in relation to the whole research system in a country. Then, what are the targets for funding the research sector as a whole, either in absolute terms or relative to GDP, and are there also targets for the proportion of research that should be devoted to health?

These are not academic questions. It is evident that these targets matter to billions of individuals whose lives and well-being depend on government budgets, development assistance, health spending and the new tools, products and knowledge that result from research and innovation. States bear the primary responsibility for the health and rights of their citizens and many have agreed to international targets on financing development, health and research. It is therefore reasonable to hold policy-makers accountable for the actions they have taken to meet the goals set.

Over the years, countries have set a number of targets aimed at increasing support for development, improving health and reducing health inequities, including targets related to investments in health research and development (R&D). When put together, these various targets are impressive: if met, they would result in tens of billions of dollars per year of additional investments in overall development assistance and support to the health sector in low- and middle-income countries and billions of dollars of additional funding for research to support improvements in health and health equity in these countries and to move the world closer to meeting the Millennium Development Goals. Yet, global financing for these fields clearly falls short of this mark to a considerable extent. Why is this the case? Part of the answer may be the lack of an overall monitoring and reporting system that takes a comprehensive approach to development, health and research and that focuses on what the Commission on Health Research for Development rightly saw as their "essential link" to health equity[5].

## 4.2 Report Card: setting the frame and acknowledging the challenges

Holding countries and organizations accountable for meeting their commitments and moving towards their aspired targets is urgent if progress is to be accelerated towards achieving the Millennium Development Goals, improving overall health and reducing health inequities. Tracking the performance of actors vis-à-vis the

relevant targets may help in this regard by providing an advocacy evidence base that can enable assessment against the targets set and comparisons between countries in similar circumstances.

The challenge presented by attempting to monitor and report on progress towards the targets relevant to research for health is considerable. In particular, there are problems associated with:

- **Data availability.** A major obstacle is the difficulty of obtaining relevant data. Often, the desired information does not exist – because it is not collected at all in countries that have weak or inefficient reporting systems, or because it is included in aggregates that do not allow the necessary distinctions to be made between different categories of spending. This is often a problem even in high-income countries, where financial flows data may not be disaggregated by sector, disease, relevant health indicator or geographical focus, may not distinguish between direct research costs and overheads, or may be heavily protected because of potential commercial significance.
- **Definitions and standards.** In the absence of globally recognized definitions and standards for all the relevant categories of spending, the comparability of available financing data is often poor.
- **Health research or research for health?** The focus of attention of the Global Forum for Health Research is now on the wider field of "research for health", which, as discussed in Chapter 1, recognizes the importance of research in many disciplines relevant to a wide range of determinants of health. However, many of the financing data currently available (see Chapter 2) refer only to the more traditional field of "health research" and are heavily dominated by the large investments made in basic sciences, in R&D for new drugs and vaccines and in the clinical sciences.
- **Different time lags in reporting data.** Some of the relevant financing data are available in the year following spending, while other important data may not appear until two to three years later. Data available may reference calendar or tax years or bienniums.

*The Global Forum for Health Research is now taking up this challenge and is proposing the establishment of a regular review of targets, commitments and aspirations and of the global progress towards meeting them – a "Report Card" on global efforts relevant to research and development for health.*

Data in some areas will be lacking, of poor reliability or of limited comparability at the beginning, or relating to different years. But the very act of seeking and compiling what is available and examining the gaps, inconsistencies and mismatches will form part of the Global Forum's "aspirational target" – that of gradually establishing and expanding a robust global watchdog function that is respected for its soundness and independence and anticipated eagerly for its messages of success or failure. As part of this long-term effort, the Report Card is being framed in terms of "research and development for health" – aspiring to promote systems for the generation and

collection of financial flows data that, over time, will increasingly encompass the whole spectrum of research on all the relevant determinants of health as well as R&D for pharmaceutical products and medical devices and research in the health field, such as health policy and systems research and operational research. Acknowledging this combination, the Report Card will discuss information on financing "health R&D" when this is relevant or all that is available, but reviewing it under the umbrella of "R&D for health".

For some areas, especially those most directly concerned with the tracking of overall resources for health R&D, the Global Forum itself is the major source of regular, global data. In other cases, there are already organizations regularly reporting on important areas – for example, OECD data on the flows of ODA to low- and middle-income countries. We acknowledge at the outset that the Report Card will utilize and build on this range of information sources. *We believe that the added value of the Report Card approach is in bringing all the information together in one place and in situating resources for R&D for health within the wider context of a comprehensive analysis of the domains of development cooperation, health and research.*

The Global Forum for Health Research aims to regularly update and publish the Report Card to track progress towards a range of targets relevant to R&D for health. Countries and agencies can use this Report Card to see where they are with regard to targets that have been set, and where they need to make improvements.

In the rest of this chapter the different areas of targets, commitments and aspirations that are relevant to R&D for health are reviewed; the framework of a Report Card to cover these areas is proposed; and the current availability of data to fill in the first Report Card is examined.

## 4.3 Cataloguing the targets

Research for health is situated at the intersection of several interlocking domains that influence the resources that are available (Figure 4.1). It is located in the broader domain of research of all kinds, receiving financing through the combination of public (research councils, university funding mechanisms, international collaborative research grants, etc.) and private (national and international) channels that operate within and across countries. Research also receives some of its resources directly from the health sector, through national allocations made within health sector budgets and within international health initiatives. Development assistance also contributes to funding of research for health, either explicitly through direct funding of health research and research capacity building or as an included component of funding for the overall health sector.

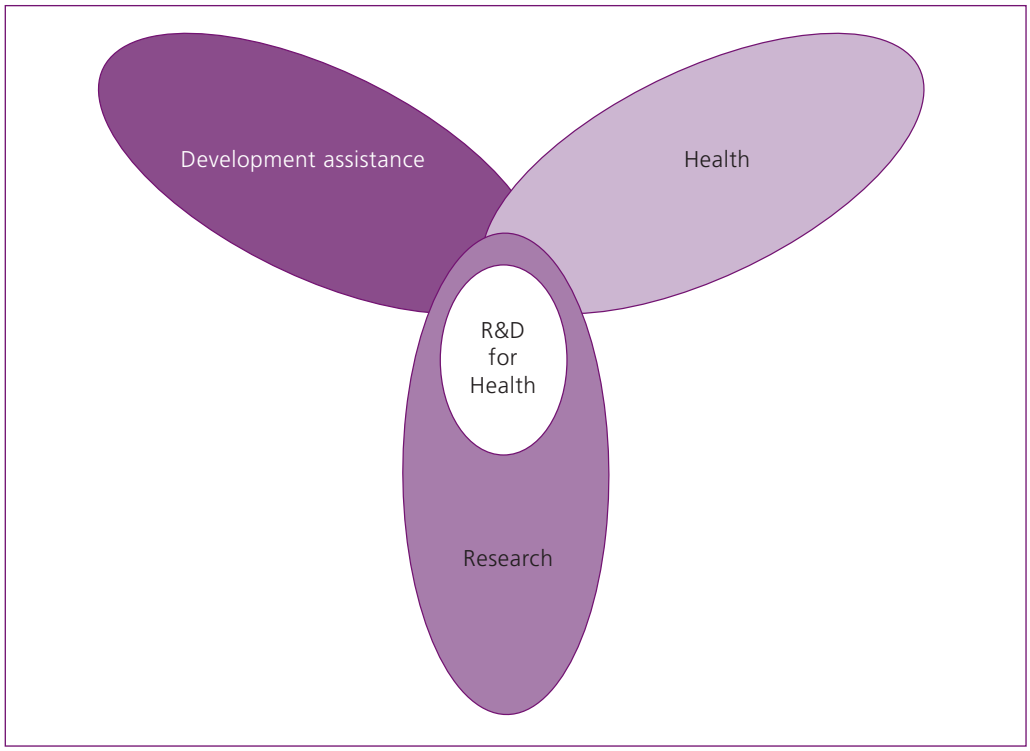
Relevant targets that need to be considered may therefore include:

- Resources for R&D for health in relation to:
  - National research budgets
  - National health budgets
  - ODA for health

- Resources for health in relation to:
  - National government budgets
  - GNP/GNI
- Resources for research in relation to:
  - National government budgets
  - GNP/GNI
- Resources for ODA in relation to:
  - GNP/GNI

## Figure 4.1

Situating resources for R&D for health within the domains of development cooperation, health and research




In practice, financing targets have been set in the last few decades for most of these areas, making them potentially appropriate for inclusion in a Report Card. However, the extent to which the relevant actors have made firm and time-bound financial commitments concerning each of these targets is extremely variable: in some cases there are clear and precise commitments while in others the targets may have little more status than being aspirations (sometimes aspirations for what the actors themselves should do; in other cases aspirations of one group of actors for what they would like another group to do).

An overview of the situation for key targets that need to be considered in relation to R&D for health is set out in Table 4.1.

## Table 4.1

Targets and commitments for investments related to development assistance, health, research and health R&D

| Target | Year | Body | Status of target | Responsibility for action | Report Card measure |
|---|---|---|---|---|---|
| ***Development assistance*** | | | | | |
| 0.7% of GNP/GNI[a] on ODA | 1970 | United Nations General Assembly: resolution 2626 (XXV)[8] | Adopted by United Nations General Assembly in 1970 as part of the International Development Strategy for the Second United Nations Development Decade. Paragraph 43 stated:<br>Each economically advanced country will progressively increase its official development assistance to the developing countries and will exert its best efforts to reach a minimum net amount of 0.7 per cent of its gross national product at market prices by the middle of the Decade. | High-income countries | B |
| | 2001 | Third United Nations Conference on Least Developed Countries (LDCs)[9] | Commitment 7, paragraph 83:<br>Donor countries will implement the following actions that they committed to at the second United Nations Conference on the Least Developed Countries as soon as possible:<br>(a) Donor countries providing more than 0.20 per cent of their GNP as ODA to LDCs: continue to do so and increase their efforts;<br>(b) Other donor countries which have met the 0.15 per cent target: undertake to reach 0.20 per cent expeditiously;<br>(c) All other donor countries which have committed themselves to the 0.15 per cent target: reaffirm their commitment and undertake either to achieve the target within the next five years or to make their best efforts to accelerate their endeavours to reach the target. | High-income countries | |
| | 2002 | Monterrey Consensus on Financing for Development[10] | Heads of State and Government in Monterrey:<br>urge developed countries that have not done so to make concrete efforts towards the target of 0.7 per cent of gross national product (GNP) as ODA to developing countries… | High-income countries | |

| Target | Year | Body | Status of target | Responsibility for action | Report Card measure |
|---|---|---|---|---|---|
| Doubling of aid by 2010: an extra US$ 50 billion per year worldwide and US$ 25 billion per year for Africa, compared with 2004 | 2005 | Gleneagles G8 Summit[11] | G8 Gleneagles Summit Statement on Africa, paragraph 28:<br>On the basis of donor commitments and other relevant factors, the OECD estimates that official development assistance from the G8 and other donors to all developing countries will now increase by around US$ 50 billion a year by 2010, compared to 2004. | G8 countries (G7 plus Russian Federation)[b] | B |
| ***Health*** | | | | | |
| 15% of domestic public spending on health | 2001 | Abuja Declaration[12] on HIV, Tuberculosis and Other Related Infectious Diseases, Abuja, Nigeria, 26–27 April 2001 | Heads of State and Government of the Organization of African Unity: paragraph 26:<br>WE COMMIT OURSELVES to take all necessary measures to ensure that the needed resources are made available from all sources and that they are efficiently and effectively utilized. In addition, WE PLEDGE to set a target of allocating at least 15% of our annual budget to the improvement of the health sector. | Members of the Organization of African Unity (OAU) – now African Union (AU) | C |
| ***Research*** | | | | | |
| Spend total of 3% of GDP[c] on R&D by 2010 | 2002 | European Union[13] | At the 2002 Barcelona European Council, Heads of State and Government agreed that R&D investment in the EU must be increased with the aim of approaching 3% of GDP by 2010, up from 1.9% in 2000. | Countries in the EU | A |

| Target | Year | Body | Status of target | Responsibility for action | Report Card measure |
|---|---|---|---|---|---|
| Increase public spending on R&D to at least 1% of GDP within five years | 2003 | First NEPAD Ministerial Conference on Science and Technology, Johannesburg, South Africa,[14] Declaration and Outline of a Plan of Action adopted in Johannesburg, 3–7 November 2003 | Ministers of science and technology of 20 African countries reaffirmed their commitment to increasing public spending on R&D to at least 1% of GDP within five years. | African countries | A |
| ***Health R&D*** | | | | | |
| 2% of national health budgets of low- and middle-income countries on health research | 1990 | Commission on Health Research for Development[5] | The Commission recommended:<br>Countries should invest at least 2% of national health expenditures to support essential national health research studies and a long-term strategy of building and sustaining research capacity. | low- and middle-income countries | C |
| | 2004 | Mexico Statement on Health Research[15] | Ministers of Health and other participants from 52 countries:<br>CALL FOR ACTION BY National governments to commit to fund the necessary health research to ensure vibrant health systems and reduce inequity and social injustice.[d] | | |

| Target | Year | Body | Status of target | Responsibility for action | Report Card measure |
|---|---|---|---|---|---|
| | 2005 | World Health Assembly[16] | While the 2004 Mexico Statement issued by the Ministerial Summit on Health Research had only cited the "2% and 5%" target as an example in a footnote, the subsequent debate on this at the 2005 World Health Assembly strengthened the language. Resolution WHA58.34:<br>URGES Member States …to consider implementing the recommendation made by the Commission on Health Research for Development in 1990 that "developing countries should invest at least 2% of national health expenditures in research and research capacity strengthening, and at least 5% of project and program aid for the health sector from development aid agencies should be earmarked for research and research capacity strengthening". | | |
| | 2006 | Abuja Communiqué,[17] High Level Ministerial Meeting on Health Research, 8–10 March 2006 | 11 African countries – Algeria, Cameroon, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Nigeria, Senegal, South Africa, Sudan – agreed:<br>To strive to ensure the allocation of at least 2% of the national health budget and to further mobilize other resources from national and international sources for health research. | 11 African countries | |
| | 2006 | Accra Communiqué,[18] High Level Ministerial Meeting on Health Research for Disease Control and Development, Accra, Ghana, 17June 2006 | The ministers of health and heads of delegation (of 14 African countries) commit:<br>To meet the earlier recommendation by the Commission on Health Research for Development that developing countries should invest at least 2% of the national health budget on research and research capacity strengthening. | 14 African countries | |

| Target | Year | Body | Status of target | Responsibility for action | Report Card measure |
|---|---|---|---|---|---|
| | 2008 | Algiers Declaration[19] | We, ministers of health and heads of delegation of the African countries, meeting in Algiers on 26 June 2008 for the Ministerial Conference on Research for Health in Africa, commit ourselves to launching before the end of 2009 the actions that follow:<br>j. Allocate at least 2% of national health expenditures and at least 5% of health external project and programme aid to research and research capacity building; and invest more on research aimed at improving health systems. | African countries | |
| 5% of ODA by high-income countries on health research and research capacity strengthening in low- and middle-income countries | 1990 | Commission on Health Research for Development[5] | The Commission recommended: Development assistance agencies should increase their programme aid for research and commit at least 2% of health project aid for essential national health research and research capacity building. | High-income countries | B |
| | 2004 | Mexico Statement on Health Research[15] | Ministers of health and other participants from 52 countries:<br>CALL FOR ACTION BY National governments to commit to fund the necessary health research to ensure vibrant health systems and reduce inequity and social injustice.[d] | | |
| | 2005 | World Health Assembly[16] | While the 2004 Mexico Statement issued by the Ministerial Summit on Health Research had only cited the "2% and 5%" target as an example in a footnote, the subsequent debate on this at the 2005 World Health Assembly strengthened the language. Resolution WHA58.34:<br>URGES Member States …to consider implementing the recommendation made by the Commission on Health Research for Development in 1990 that "developing countries should invest at least 2% of national health expenditures in research and research capacity strengthening, and at least 5% of project and program aid for the health sector from development aid agencies should be earmarked for research and research capacity strengthening". | | |

| Target | Year | Body | Status of target | Responsibility for action | Report Card measure |
|---|---|---|---|---|---|
| | 2008 | Algiers Declaration[19] | We, ministers of health and heads of delegation of the African countries, meeting in Algiers on 26 June 2008 for the Ministerial Conference on Research for Health in Africa, commit ourselves to launching before the end of 2009 the actions that follow:<br>j. Allocate at least 2% of national health expenditures and at least 5% of health external project and programme aid to research and research capacity building; and invest more on research aimed at improving health systems. | | |
| 5% of overall health investment portfolios of global health initiatives and development agencies to support research capacity of countries, dissemination of research findings, and management of knowledge | 2006 | Accra Communiqué,[18] High Level Ministerial Meeting on Health Research for Disease Control and Development, Accra, Ghana, 17 June 2006 | The ministers of health and heads of delegation (of 14 African countries) urge:<br>9.iii Global Health Initiatives and development agencies to devote at least 5% of their overall health investment portfolio to support research capacity of countries, dissemination of research findings and management of knowledge. | Global health initiatives and development agencies | D |

a. Since 2001, the World Bank refers to gross national product (GNP) as gross national income (GNI)[6].

b. Although a member of the G8, the Russian Federation contributes little to international development assistance and the following analysis therefore concentrates on the performance of the other seven members – the G7.

c. GDP: gross domestic product (equivalent to GNP/GNI without net foreign income).

d. For example, the Commission on Health Research for Development in 1990 recommended that "developing countries should invest at least 2% of national health expenditures in research and research capacity strengthening, and at least 5% of project and program aid for the health sector from development aid agencies should be earmarked for research and research capacity strengthening". WHO should consider allocating a proportion of its country budgets to support high-quality health systems research.

## 4.4 Structuring the Report Card for R&D for health

While the above analysis focuses on the magnitude and nature of the targets set and commitments made or aspirations expressed, the Report Card is structured around what particular sets of actors are doing towards meeting specific targets – an approach that makes it easier to assess how each actor is performing.

The Report Card for R&D for health (Box 4.1) addresses four categories of actors, looking at a total of 10 targets that apply to (A) all countries; (B) high-income countries; (C) low- and middle-income countries; and (D) global health initiatives and development agencies. As stressed earlier (sections 4.1 and 4.2):

- Some of the targets have the status of firm commitments by the actors to whom they apply – e.g. spending on ODA by high-income countries was a resolution of the United Nations General Assembly, reaffirmed and strengthened with timescales by Heads of States and Governments attending the Monterrey Financing for Development Conference in 2002.
- In other cases the target may be aspirational – e.g. the target urged by African countries attending the High Level Ministerial Meeting on Health Research for Disease Control and Development in Accra in 2006, that global health initiatives and development agencies should allocate 5% of their overall health investment portfolios to support the research capacity of countries, dissemination of research findings and management of knowledge.

## Box 4.1

Report Card for R&D for health

### A. All Countries

A-1. National R&D total investment as a percentage of GDP

A-2. National R&D for health as a percentage of GDP

A-3. National R&D for health as a percentage of national health investments

A-4. National R&D for health as a percentage of total R&D

### B. High-income countries

B-1. Gap between actual ODA investments and commitment to invest 0.7% of GNI on ODA

B-2. Gap between actual annual increase in ODA and commitment to double aid between 2005 and 2010 - an extra US$ 50 billion worldwide and US$ 25 billion for Africa

B-3. Gap between actual ODA investments in R&D for health and target to invest 5% of health ODA in R&D for health

### C. Low- and Middle-income Countries

C-1. Gap between actual investments in health and target to spend 15% of domestic public spending on health

C-2. Gap between actual investments in R&D for health and target to spend 2% of national health budgets on health research

### D. Global Health Initiatives and development agencies

D-1. Gap between actual investments and commitment to invest 5% of overall health investment portfolios of Global Health Initiatives and development agencies to support research capacity of countries, dissemination of research findings, and management of knowledge.

## 4.5 Filling the Report Card for R&D for health, 2008

### 4.5.1 Report Card measures: Cluster A - all countries

**Tracking national investments in all research and in health R&D**

The first set of Report Card measures track and analyse investments in research for health along four key dimensions:

*A-1* *National R&D total investment as a percentage of GDP*
*A-2* *National R&D for health as a percentage of GDP*
*A-3* *National R&D for health as a percentage of national health investments*
*A-4* *National R&D for health as a percentage of total R&D*

Countries that scored high on the first measure would be investing in R&D in general. Countries that scored well on the remaining three measures would be making relatively large investments in R&D for health.

While the long-term objective in cluster A will be to capture all research relevant to the full spectrum of determinants of health, it is recognized that, at present, the data available are almost entirely restricted to the narrower field of health R&D, which has a biomedical and health systems focus.

In the following analysis, comparisons are made between the current 2008 study of data for 2005 and the previous data we published in the 2006 report[20] covering 2003; and also, in a few instances, the data published in the 2004 report[21] covering 2001.

*Measure A-1* *National R&D total investment as a percentage of GDP*
*Measure A-2* *National R&D for health as a percentage of GDP*

From the data available in the Global Forum's tracking of resource flows for 2005, the performances for a number of countries are plotted in Figure 4.2. The vertical dotted lines in Figure 4.2 indicate the target for European Union countries[13] of spending 3% GDP on research by 2010 and the target for African Union countries[14] of spending 1% GDP on research by the end of 2008 (see Table 4.1).

In Figure 4.2, the further the score is from the vertical axis, the larger the investment in R&D as a proportion of total GDP. The higher up a score is on the vertical axis, the larger the investment in health R&D as a proportion of GDP.

Sweden scores very high in both overall R&D and health R&D, increasing investments in health R&D relative to GDP in 2005 compared with 2003, as indicated by an upward shift in its position relative to the diagonal axis. Denmark, France, Switzerland and the United States also have strong investments in both areas, as they did in 2003, although there was a slight drop in investments by France and the United States, while Denmark and the United States slightly improved their positions relative to the diagonal axis as they increased investments in overall R&D as a

percentage of their GDP. Austria, Finland, Germany, Japan and the Republic of Korea do well in overall R&D but relatively less so in R&D for health than other high-income countries, placing themselves below the diagonal axis, as in 2003.

Iceland was highest above the horizontal axis of any country again in 2005, and with the exception of Finland, Japan, Korea, Sweden and Switzerland, had higher investments in overall R&D relative to its GDP than did other countries.[22] Switzerland also scored extremely well, just below Iceland relative to the horizontal axis, but slightly ahead relative to the vertical axis.

The clustering of low- and middle-income countries at the lower end of the diagonal line demonstrates low investments in R&D relative to GDP. Countries that fall above the diagonal line, even if they are near the bottom, such as Argentina, Cuba, Greece, Panama, Poland, Slovakia, South Africa and Trinidad and Tobago, are making higher investments in health R&D relative to investments in overall R&D than countries below the diagonal, such as Brazil, China, India, Luxembourg, Mexico, Republic of Korea, Russian Federation and Slovenia, which make stronger investments in overall R&D relative to investments in health R&D.

The next cluster of countries along the diagonal axis includes Hungary, Ireland, Italy, Spain and Turkey, which all score above the diagonal line. The Czech Republic, the Netherlands and Norway are close by but fall below the diagonal line, indicating that they have a weaker commitment to health R&D than to overall R&D.

Belgium, Canada, Singapore and the United Kingdom follow further along, securing their position above the diagonal line again in 2005. Austria, Finland, France, Germany and Japan fall below the diagonal again in 2005, indicating that they have not improved their investments in health R&D relative to overall R&D investments.

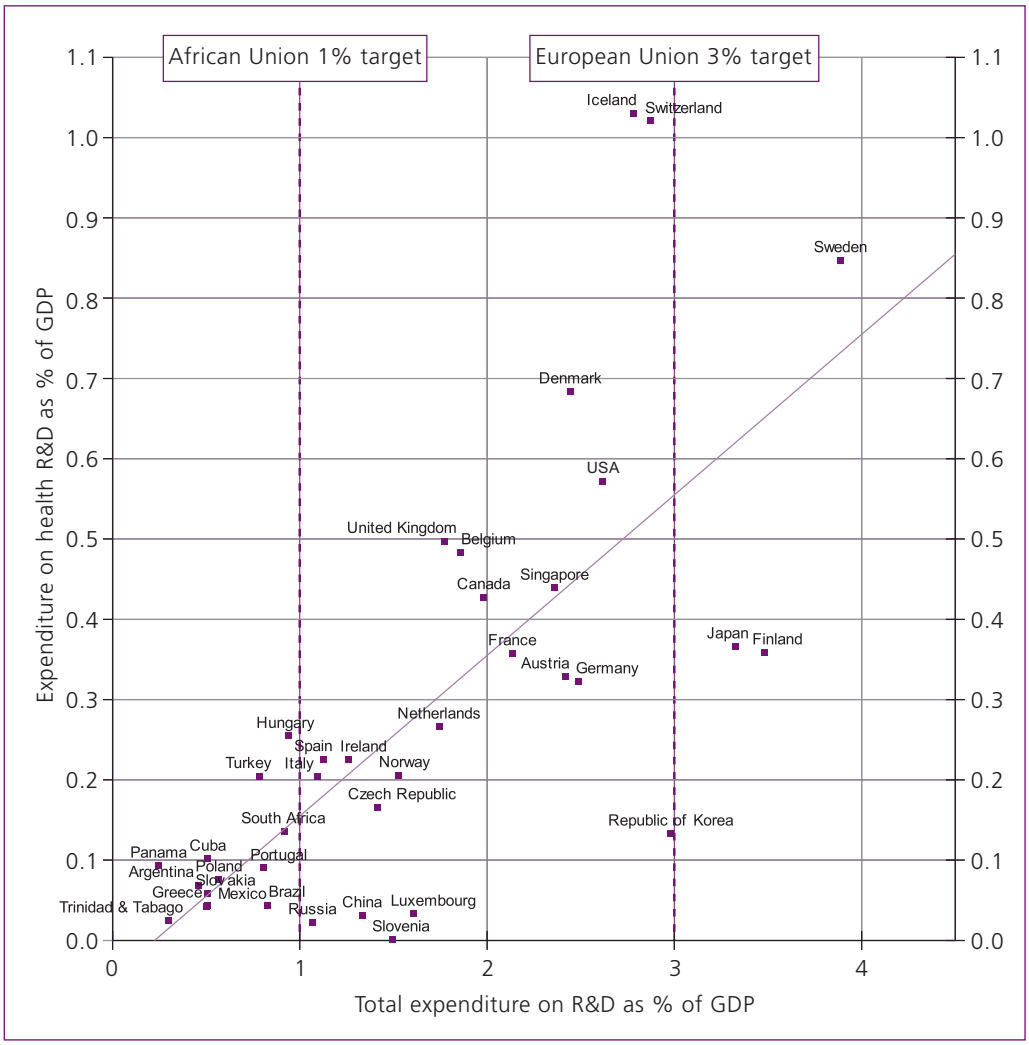
In terms of the 3% and 1% targets (set for EU and African Union countries, respectively, but used here as a benchmark of performance for high-income countries and low- and middle-income countries generally):

- Finland, Japan and Sweden have already exceeded expenditure of 3% GDP on R&D, while several countries are in the 2% to 3% range. Greece and Portugal have yet to reach even the 1% target set for African countries.
- Unfortunately sound data are not yet available for many low- and middle-income countries but, as shown in Figure 4.2, there are few that can so far demonstrate reaching the level of 1% of GDP for research. China is a notable exception and Brazil and South Africa come close, the relatively strong national investments in research by these countries being in line with their emergence as innovative developing countries.[23]

**Policy implication.** An appropriate policy goal for many countries is therefore to increase both their general research and health R&D spending to shift their scores towards the upper right quadrant of Figure 4.2.

## Figure 4.2

R&D for health and national R&D as a percentage of GDP, 2005




*Measure A-3* *National R&D for health as a percentage of national health investments*

*Measure A-4* *National R&D for health as a percentage of total R&D*

Figure 4.3 plots investments by countries in health R&D relative to the sizes of their health sector and R&D sector. Countries with scores above the diagonal line have above-average investments in health R&D relative to the size of their health sectors. The farther away the score is from the vertical axis, the higher the investment in health R&D as a proportion of total R&D.

There has been much more movement in Figure 4.3 between 2003 and 2005 compared to Figure 4.2, signalling a

growing commitment to investments in R&D for health among some countries, and unfortunately a decline among others. Once again, Iceland is highly placed among all countries in its commitment to health R&D within its overall R&D and in relation to its total health budget, placing it in the far upper right quadrant of the figure.

Sweden and Switzerland have the next highest relative investment in health R&D compared to the size of their health and overall R&D sectors, followed by Denmark and the United Kingdom. Both Denmark and Switzerland increased the proportion of health investments in R&D. Switzerland made huge gains in 2005 relative to its position in 2003 as it also improved in its investments in health R&D as a percentage of overall R&D. The relatively low score of the United States, and its position below the diagonal once again in 2005 reflects a relative emphasis on private sector investments in health R&D compared with the overall national investment in health.

In 2005, several countries improved their relative position. The Czech Republic, Norway and Turkey increased their distance above the diagonal compared to 2003, moving above 2% investments in health R&D relative to investments in health.

Turkey's gain is remarkable, although it still falls below the diagonal. In 2005, Turkey increased its investments in health R&D to close to 4% of overall health investments, from just 1% in 2003. At the same time, it increased its share of overall R&D spent on health R&D. Cuba is also of interest, but unfortunately because its investments in 2005 fell off considerably along both axes, relative to 2003.

Below the diagonal, a number of Latin American countries and transition countries of the former Soviet bloc whose economies are recovering have relatively higher scores on health R&D as a proportion of overall R&D than countries above the line, such as China, India, Israel, Republic of Korea and Russian Federation.

Attention is being paid globally to research developments in a number of countries known as "innovative developing countries". These include Argentina, Brazil, China, India, Indonesia, Malaysia, South Africa and Thailand. As the Global Forum data set includes most of these countries – Argentina, Brazil, China, India and South Africa – we are able to see how they are faring relative to each other and to other countries.

In 2005, as in 2003, each of these innovative developing countries demonstrated relatively similar commitments to health R&D as a proportion of total health budgets, with investments in health R&D that accounted for approximately 1% of their national health investments. However, there was considerable difference in their commitment to health R&D as a percentage of their overall R&D sectors, as reflected by their relative distance from the vertical axis. Argentina showed the strongest commitment, followed by South Africa, Brazil, India and China.

The 2006 and 2004 reports drew attention to Hungary, as illustrative of a transition country experiencing economic growth. In 2001, Hungary spent the same share

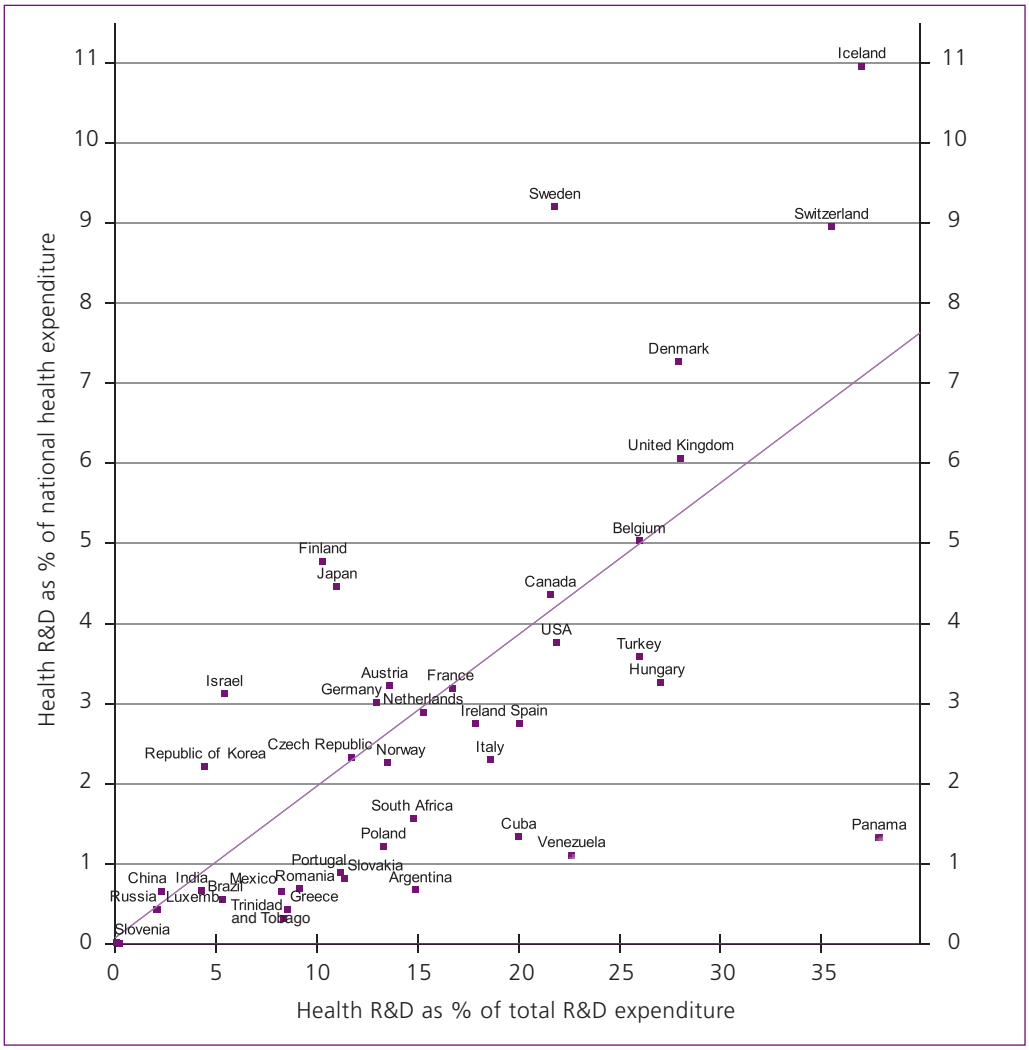
of its R&D on health as many of the G7 countries; but as a share of overall health investments its health R&D was more in line with Brazil and the Republic of Korea. Hungary is continuing its climb, according to the Global Forum's estimates for 2005. While still below the diagonal, it has shifted further to the right and much further up the vertical axis in 2005 relative to 2003.

Unfortunately, many low- and middle-income countries could not be plotted due to lack of data.

**Policy implication.** Financing of R&D for health in most low- and middle-income countries and some high-income countries needs to be increased as a proportion of health spending and/or as a proportion of overall research spending, to meet the targets.

## Figure 4.3

Strength of investments in health R&D, 2005



### 4.5.2 Report Card measures: Cluster B - high-income countries

**Tracking progress on ODA and its proportion allocated to health R&D by high-income countries**

This section tracks and measures progress towards two related groups of targets for high-income countries – those relating to overall ODA and those that specify what proportion of the ODA that goes to the health sector should be allocated to health R&D and research capacity strengthening:

B-1 Gap between actual ODA investments and commitment to invest 0.7% of GNI in ODA

B-2 Gap between actual annual increase in ODA and commitment to double aid between 2005 and 2010 – an extra US$ 50 billion worldwide and US$ 25 billion for Africa

B-3 Gap between actual ODA investments in R&D for health and target to invest 5% of health ODA in R&D for health

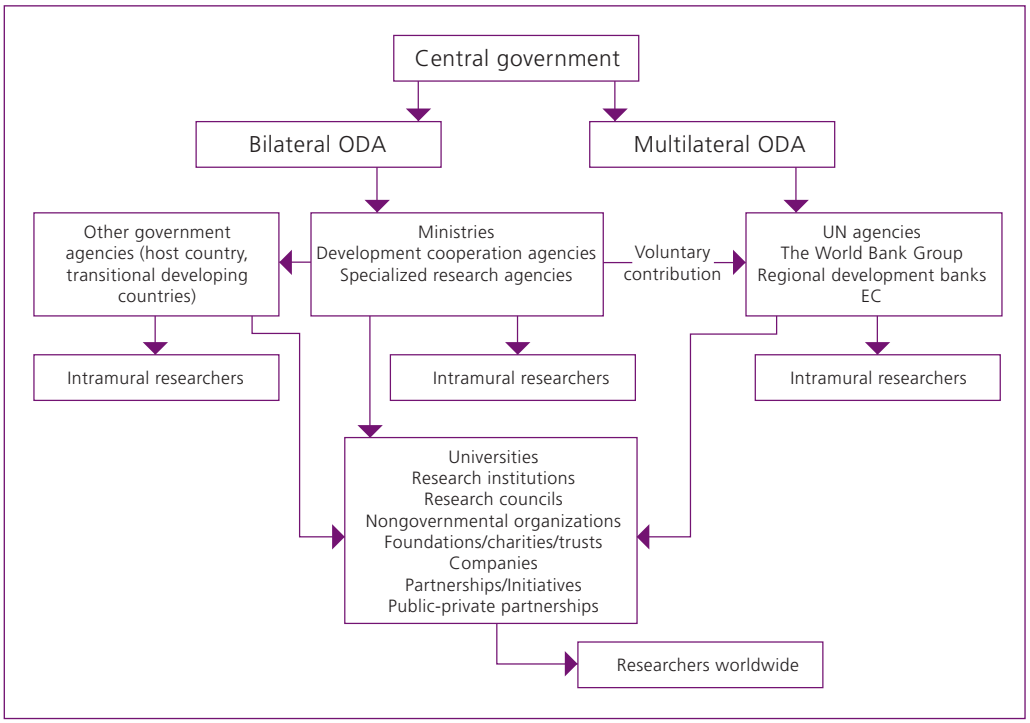
*Measure B-1* *Gap between actual ODA investments and commitment to invest 0.7% of GNI in ODA*

*Measure B-2* *Gap between actual annual increase in ODA and commitment to double aid between 2005 and 2010 – an extra US$ 50 billion worldwide and US$ 25 billion for Africa*

ODA is administered by countries in a variety of ways: e.g. through independent ministries of development cooperation, or through specialized development cooperation or development aid agencies that may be quasi-autonomous or linked with ministries of foreign affairs. Bilateral ODA may be administered through a different agency or ministry than multilateral ODA. From whichever sources these finances arise, some of the resources find their way into the research domain through a variety of different channels (Figure 4.4).

## Figure 4.4

Distribution of ODA and channels to research




At a supranational level, ODA financial flows are monitored by the Development Assistance Committee (DAC) of OECD, which comprises the 22 member countries listed in Table 4.2 plus the European Commission.[24] The DAC member countries contributed over US$ 100 billion in 2007 (Table 4.2), accounting for at least 95% of worldwide ODA. Aggregated health and health research data are collected annually from DAC members. Selected data are made available to the public in annual reports; health and population data are always reported, but health and population research data are not.

ODA funding has been increasing over the past several years, following a slump in the early 1990s when aid to low- and middle-income countries fell sharply. By 1997, aid reached an all-time low of 0.22% of donor countries' combined national income. By 2002, there was a relative 7.2% real increase in ODA (Figure 4.5) and further increases took place through to 2006, although the OECD projections suggest they may not be sustained beyond this (Table 4.2 and Figure 4.5) and donors appear to be falling away from meeting the Gleneagles target.[25]

## Table 4.2

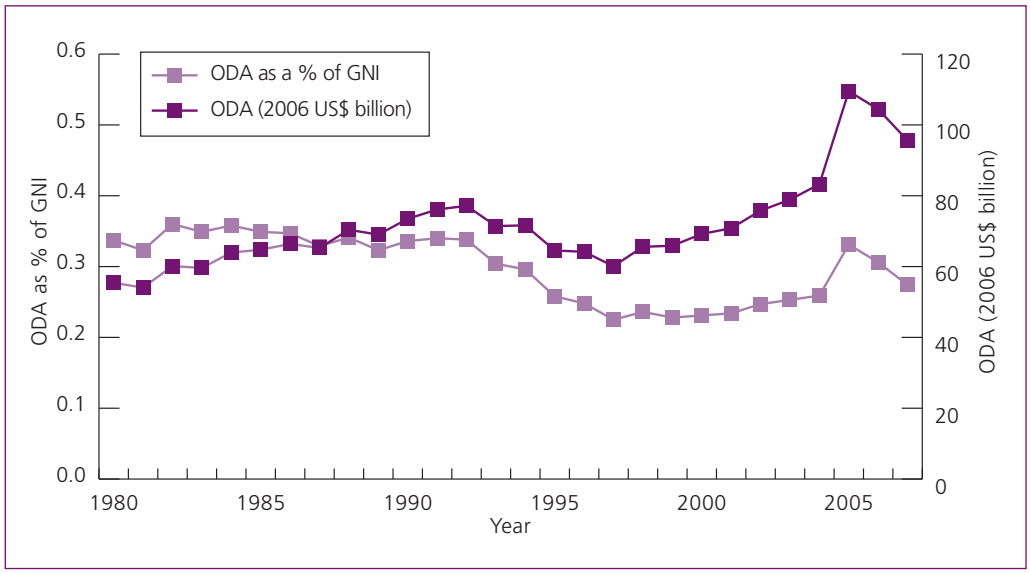
ODA contributed by DAC members, including prospects for 2007

| | Net ODA in 2002 | ODA/GNI in 2002 | Net ODA in 2007 | ODA/GNI in 2007 | Real change in ODA, 2007 over 2002 Current US$ | |
|---|---|---|---|---|---|---|
| | US$ million | % | US$ million | % | US$ million | % |
| Austria | 520 | 0.26 | 1 798 | 0.49 | 208 | 40 |
| Belgium | 1 072 | 0.43 | 1 953 | 0.43 | 162 | 15 |
| Denmark | 1 643 | 0.96 | 2 563 | 0.81 | –112 | –7 |
| Finland | 462 | 0.35 | 973 | 0.40 | 136 | 29 |
| France | 5 486 | 0.38 | 9 940 | 0.39 | 1 892 | 34 |
| Germany | 5 324 | 0.27 | 12 267 | 0.37 | 1 775 | 33 |
| Greece | 276 | 0.21 | 501 | 0.16 | 239 | 87 |
| Ireland | 398 | 0.40 | 1 190 | 0.54 | 273 | 69 |
| Italy | 2 332 | 0.20 | 3 929 | 0.19 | 1 863 | 80 |
| Luxembourg | 147 | 0.77 | 365 | 0.90 | 60 | 41 |
| Netherlands | 3 338 | 0.81 | 6 215 | 0.81 | 228 | 7 |
| Portugal | 323 | 0.27 | 403 | 0.19 | 102 | 32 |
| Spain | 1 712 | 0.26 | 5 744 | 0.41 | 616 | 36 |
| Sweden | 1 991 | 0.83 | 4 334 | 0.93 | 256 | 13 |
| United Kingdom | 4 924 | 0.31 | 9 921 | 0.36 | 1 982 | 40 |
| **EU Members' total** | **29 949** | **0.35** | **62 095** | **0.40** | **32 147** | **107** |
| Australia | 989 | 0.26 | 2 471 | 0.30 | 100 | 10 |
| Canada | 2 006 | 0.28 | 3 922 | 0.28 | 723 | 36 |
| Japan | 9 283 | 0.23 | 7 691 | 0.17 | 1 217 | 13 |
| New Zealand | 122 | 0.22 | 315 | 0.27 | 32 | 26 |
| Norway | 1 696 | 0.89 | 3 727 | 0.95 | 370 | 22 |
| Switzerland | 939 | 0.32 | 1 680 | 0.37 | 204 | 22 |
| United States | 13 290 | 0.13 | 21 753 | 0.16 | 6 249 | 47 |
| **DAC members' total** | **58 274** | **0.23** | **103 655** | **0.28** | **55 061** | **94** |

*Source:* OECD.

## Figure 4.5

DAC members' total ODA from 1980, in 2006 US$ and as a share of GNI



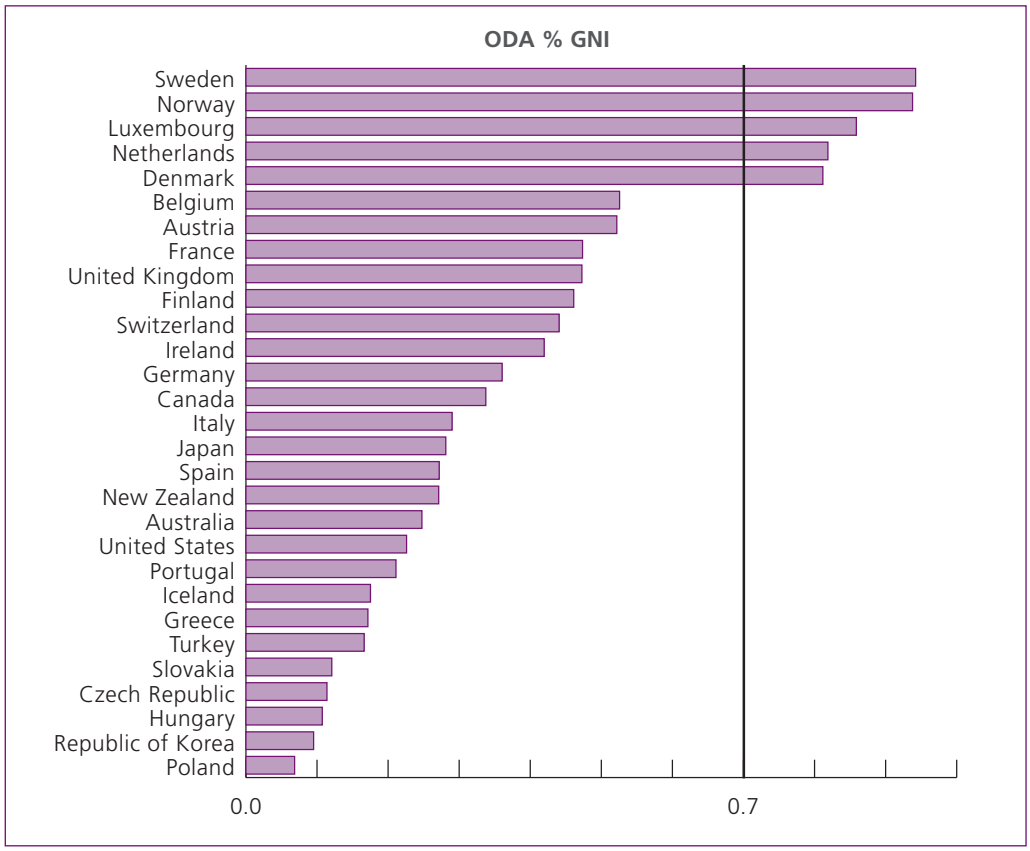

*Source:* OECD.

Among the DAC member countries, just five met their 0.7% commitment in 2007, as they did in 2002 when the commitment was made in Monterrey (Table 4.2 and Figure 4.6). Norway and Sweden, the front-runners in 2005, increased their ODA to 0.95% and 0.93%, respectively, from 0.89% and 0.83% of GNI in 2002. Luxembourg also increased its ODA from 0.77% to 0.90% during that time, placing it in third spot in 2007. Denmark and the Netherlands, the other two countries to reach the commitment, each invested 0.81% of GNI in ODA in 2007. For Denmark this was a drop from its first-ranked spot in 2002, with an investment of 0.96%, while Netherlands made no progress over the period.

Among the G7 countries, some of the richest countries in the world, none was even close to the target of 0.7% of GNI on ODA in 2007. France invested just 0.39% of its GNI in ODA, Germany 0.37%, the United Kingdom 0.36%, Canada 0.28%, Italy 0.19%, Japan 0.17% and the United States, the lowest, a mere 0.16%.

## Figure 4.6

Net ODA as a percentage of GNI, 2005

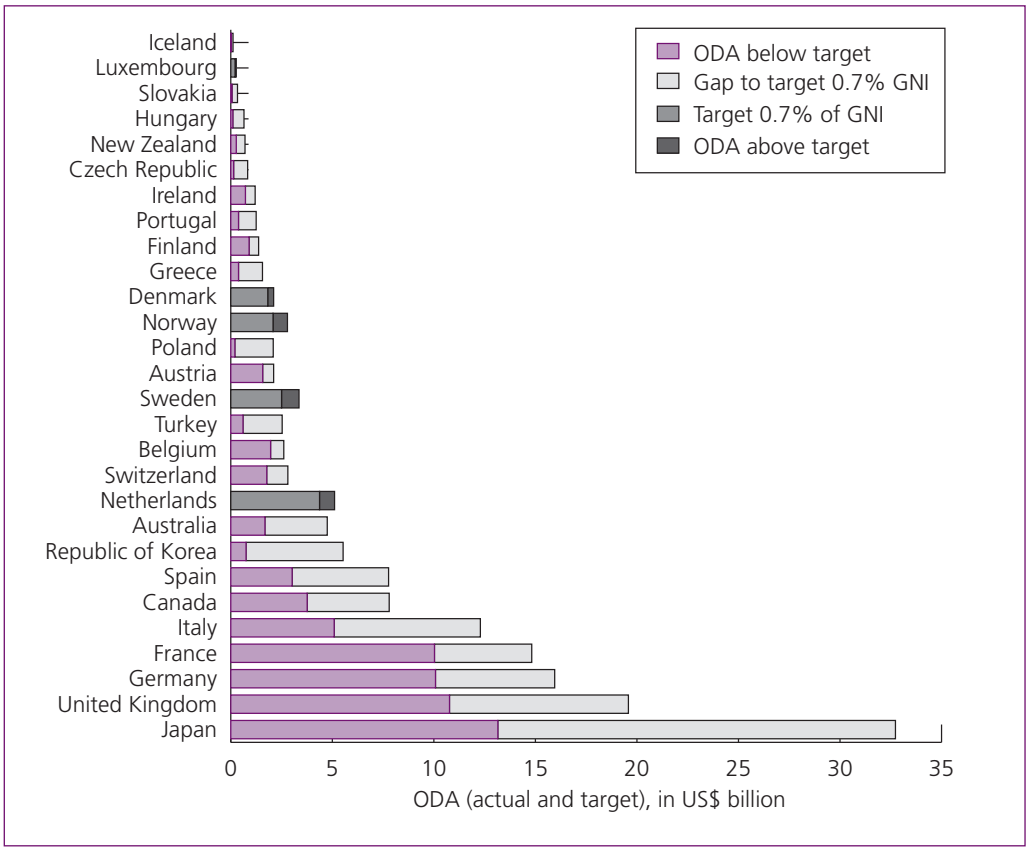



*Source:* OECD, StatExtracts.

If each DAC member country met its commitment, a considerable amount of additional money would be available for investments in the health needs of the poor, including for investments in research for health. Figure 4.7 shows the gap in US$ billion for each of the countries (with the exception of the United States, which is shown in Figure 4.8 with the other G7 countries, given the difference in scale of investment required from the United States).

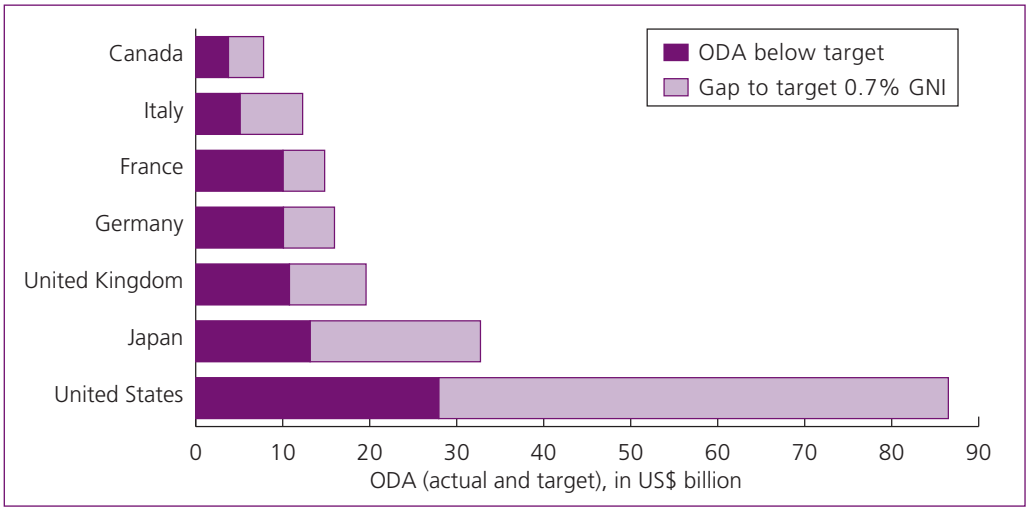
## Figure 4.7

Comparison of 2005 ODA to the 0.7% of GNI target, for DAC members (US$ billion)




## Figure 4.8

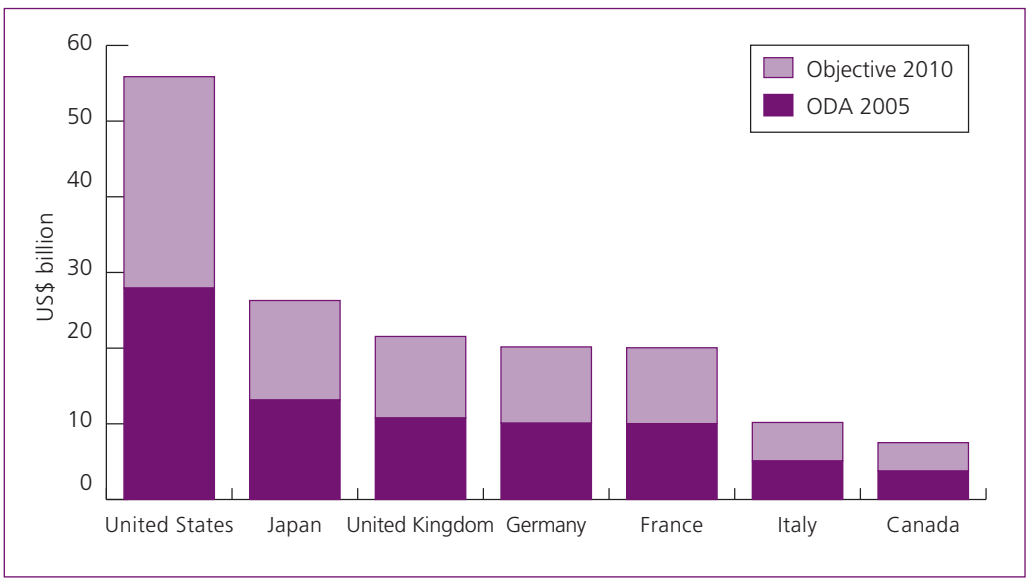
Comparison of 2005 ODA to the 0.7% of GNI target, for the G7 countries (US$ billion)



It is still too soon to tell whether the G7 and other donor countries will meet the Gleneagles commitment to double aid by 2010 – an extra US$ 50 billion worldwide and US$ 25 billion for Africa – but the prospects based on the latest OECD data (Figure 4.5) do not look promising. Figure 4.9 sets the 2010 goalpost for each of the countries. Progress towards this target – and the related target within the overall ODA envelope of channelling part of this support to least developed countries (Table 4.1) – will be tracked in the Report Card in subsequent *Monitoring Financial Flows* reports. In 2008, the United States's reauthorization of PEPFAR at almost US$ 50 billion over the five years, may significantly boost progress towards the wider ODA target, if it is not at the expense of other aid programmes[26].

## Figure 4.9

G7 engagements on total ODA for 2010 (US$ billion)




**Policy implication.** To reach the ODA targets to which they have made commitments, G7 and other DAC member countries need to increase their ODA substantially during the next few years.

*Measure B-3* *Gap between actual ODA investments in R&D for health and target to invest 5% of health ODA in R&D for health*

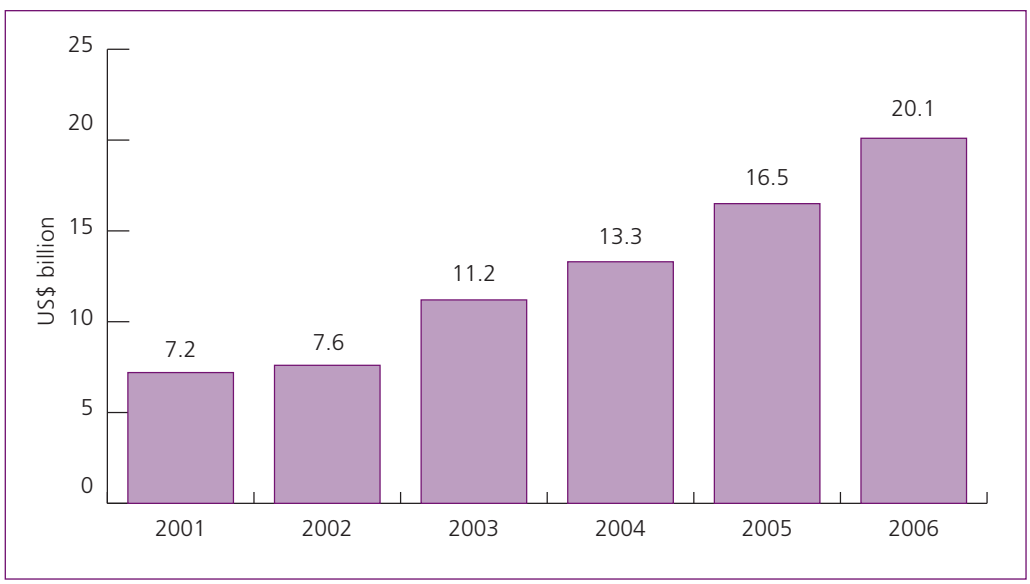
A Kaiser Family Foundation (KFF) report[27] on donor funding for health in low- and middle-income countries for the period 2001–2006 noted that ODA for "health" (including spending on health, population and water programmes) rose from US$ 7.2 billion in 2001 to US$ 16.5 billion in 2005 and US$ 20.1 billion in 2006, an overall increase of 279% in cash terms and an increase in real terms even after adjusting for inflation and currency revaluation. This large increase reflects the start-up of some new global health initiatives during this period. Of the 2006 total, US$ 13.7 billion (68%) was for health/population and US$ 6.3 billion (32%) was for water.

The contribution of the United States, the single largest donor to health, accounted for 24.9% of the funding commitments in 2006 and included commitments for PEPFAR. Collectively, European counties accounted for an even larger share (32.6%) of donor funding for health and the European Commission for a further 6.5%. Multilateral institutions contributed 25.6% of health funding.

Health progressively increased its share of total ODA from 13% in 2001 to 17% in 2006 (Figure 4.10). Funding for health grew at a much faster pace than unadjusted overall ODA (279% compared to 118% between 2001 and 2006) and, other than debt relief, was the fastest growing sector over the period.

## Figure 4.10

Total health ODA commitments, 2001–2006



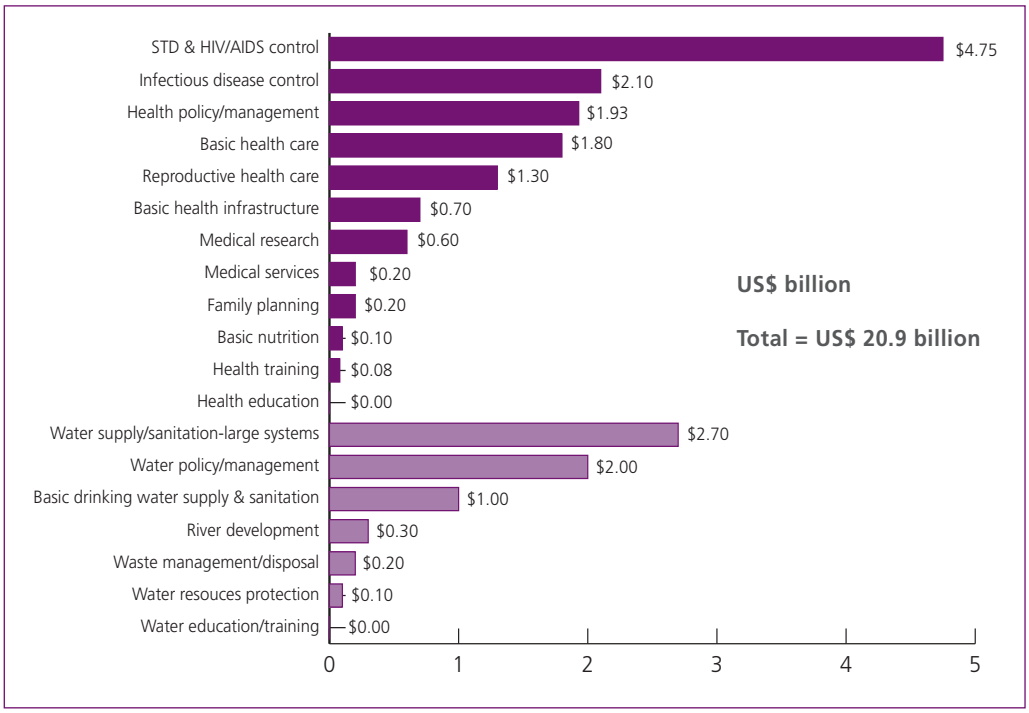

*Source:* Kates, Lief and Pearson 2008 (Ref. 7).

*Note:* Amounts in gross US$ commitments, from the OECD-DAC database and Creditor Reporting System (CRS) during the period 13–17 June 2008. "Health ODA" aggregates three CRS sectors: (1) Health, (2) Population Policies/Programmes & Reproductive Health, (3) Water Supply/Sanitation.

The KFF report[27] also noted that the amount spent on "medical research" (general medical research, excluding basic health research) within the total was US$ 0.56 billion out of US$ 20.14 billion (2.8%) in 2006 (Figure 4.11) and had grown from US$ 0.03 billion out of US$ 7.22 billion (0.42%) in 2001.

## Figure 4.11

Health ODA commitments by major subsector, 2006




*Source:* Kates, Lief and Pearson 2008[27].

*Note:* Amounts in gross US$ commitments, from the OECD-DAC database and Creditor Reporting System (CRS) during the period 13–17 June 2008. "Health ODA" aggregates three CRS sectors: (1) Health, (2) Population Policies/Programmes & Reproductive Health, (3) Water Supply/Sanitation.

The World Bank's 2008 Global Monitoring Report also notes the strong growth in overall development assistance for health between 2000 and 2008[28].

Future Report Cards will track the progress of health ODA spending, both at the aggregate level and by country, and will widen the range of research (relevant to "research for health") for which the data are collected.

**Policy implication.** To reach the target, high-income countries should continue increasing the proportion of health ODA devoted to the broad field of research for health – including, but not

limited to, health R&D and research capacity strengthening.

### 4.5.3 Report Card measures: Cluster C - low- and middle-income countries

**Tracking progress on health and health R&D by low- and middle-income countries**

This section tracks and measures progress towards meeting targets for how much of their national budgets low- and middle-income countries are investing in health and in health R&D:

C-1 Gap between actual investments in health and target to spend 15% of domestic public spending on health

C-2 Gap between actual investments in R&D for health and target to spend 2% of national health budgets on health research

In the 2001 Abuja Declaration, Member States of the Organization of African Unity, which subsequently became the African Union, pledged to set a target of allocating at least 15% of their annual budgets to the improvement of the health sector.[12] In the Report Card, we will look at how low- and middle-income countries in general match up to this target. In the past, not all low- and middle-income countries have made information readily available on their public spending on the health sector, but this is being increasingly well addressed over time through the strengthening of national health accounts[29] and should become a robust measure in the coming years.

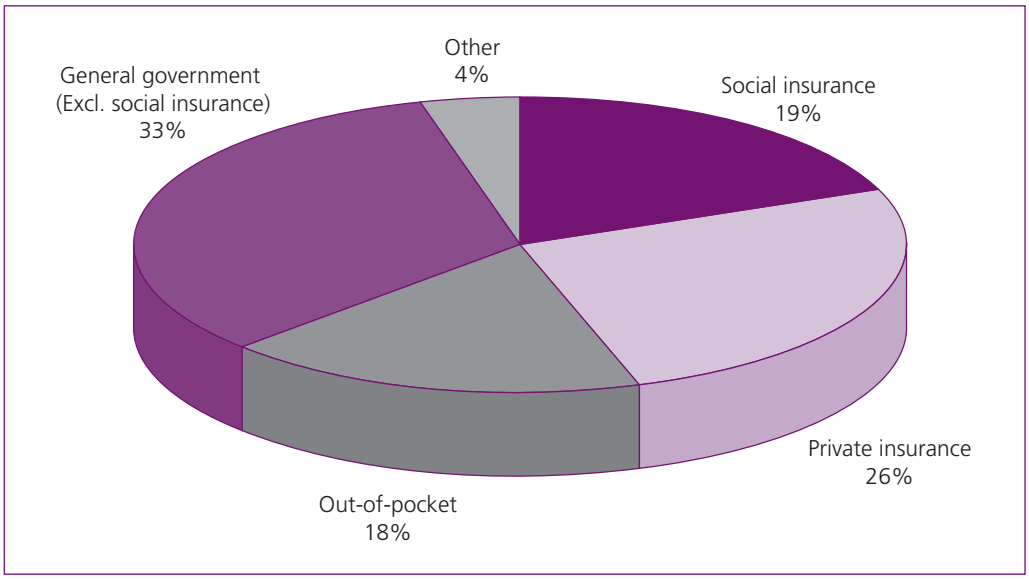
*Measure C-1* ***Gap between actual investments in health and target to spend 15% of domestic public spending on health***

*Measure C-2* ***Gap between actual investments in R&D for health and target to spend 2% of national health budgets on health research***

WHO has reported that the world spent US$ 4.4 trillion on health in 2005, with one third of this coming from general government expenditure, excluding social insurance, which accounted for a further quarter of the total (Figure 4.12)[30].

## Figure 4.12

Composition of world health expenditures, 2005




*Source:* World Health Organization 2008[9].

The latest available data from WHO on spending by countries on their health sector are provided in the 2006 *World health report*[31] and cover the years 1999–2003 (Table 4.3). Among low- and middle-income countries, Andorra, Colombia, Costa Rica, Guatemala, Haiti, Honduras, Liberia, Palau, Panama, Samoa and Tonga had surpassed 15% of government spending on the health sector by 2003 (see last column of Table 4.3) and a number were in the 10–15% range.

## Table 4.3

Health expenditures, 1999–2003

| Member State | Total expenditure on health as % of GDP | | | | | General government expenditure on health as % of total government expenditure | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 1999 | 2000 | 2001 | 2002 | 2003 |
| Afghanistan | 3.2 | 2.8 | 3.2 | 6.7 | 6.5 | 1.6 | 1.6 | 1.6 | 7.4 | 7.3 |
| Albania | 6.9 | 6.5 | 6.6 | 6.8 | 6.5 | 8.9 | 8.6 | 8.8 | 9.0 | 9.2 |
| Algeria | 3.7 | 3.5 | 3.8 | 4.2 | 4.1 | 9.0 | 9.0 | 9.5 | 9.6 | 10.0 |
| Andorra | 7.3 | 7.5 | 7.0 | 7.2 | 7.1 | 31.8 | 30.6 | 28.9 | 30.6 | 33.7 |
| Angola | 3.2 | 2.5 | 3.3 | 2.4 | 2.8 | 2.4 | 3.4 | 5.5 | 4.1 | 5.3 |
| Antigua and Barbuda | 4.5 | 4.5 | 4.6 | 4.7 | 4.6 | 11.8 | 12.1 | 10.8 | 10.0 | 10.4 |
| Argentina | 9.1 | 8.9 | 9.5 | 8.6 | 8.9 | 15.0 | 14.7 | 14.3 | 15.2 | 14.7 |
| Armenia | 6.0 | 6.3 | 6.5 | 5.8 | 6.0 | 5.1 | 3.9 | 5.7 | 5.3 | 5.4 |
| Australia | 8.7 | 9.0 | 9.2 | 9.3 | 9.5 | 16.9 | 16.8 | 16.9 | 17.7 | 17.7 |
| Austria | 7.6 | 7.5 | 7.4 | 7.5 | 7.5 | 9.7 | 10.0 | 9.8 | 10.0 | 10.0 |
| Azerbaijan | 4.7 | 4.1 | 3.9 | 3.7 | 3.6 | 4.2 | 4.2 | 4.3 | 2.9 | 2.8 |
| Bahamas | 6.6 | 6.5 | 6.5 | 6.5 | 6.4 | 14.4 | 14.3 | 13.6 | 14.6 | 13.9 |
| Bahrain | 4.7 | 3.9 | 4.2 | 4.2 | 4.1 | 11.2 | 10.0 | 10.1 | 8.7 | 8.8 |
| Bangladesh | 3.2 | 3.2 | 3.2 | 3.3 | 3.4 | 4.7 | 4.3 | 4.7 | 5.4 | 5.8 |
| Barbados | 6.1 | 6.2 | 6.7 | 6.9 | 6.9 | 12.0 | 12.0 | 12.2 | 12.3 | 11.1 |
| Belarus | 6.1 | 6.1 | 6.6 | 6.4 | 5.5 | 10.4 | 10.7 | 10.7 | 10.1 | 8.3 |
| Belgium | 8.5 | 8.5 | 8.7 | 8.9 | 9.4 | 11.8 | 12.1 | 12.5 | 12.5 | 12.4 |
| Belize | 4.8 | 4.5 | 4.8 | 4.6 | 4.5 | 5.5 | 5.3 | 5.0 | 5.3 | 5.0 |
| Benin | 4.8 | 4.7 | 5.0 | 4.7 | 4.4 | 11.1 | 10.0 | 9.8 | 8.0 | 9.8 |
| Bhutan | 4.5 | 4.2 | 5.2 | 3.6 | 3.1 | 8.7 | 7.2 | 11.2 | 8.3 | 7.6 |
| Bolivia | 6.2 | 6.1 | 6.4 | 6.6 | 6.7 | 10.5 | 9.9 | 10.4 | 11.6 | 11.9 |
| Bosnia and Herzegovina | 10.7 | 9.7 | 9.1 | 9.0 | 9.5 | 8.9 | 7.8 | 7.9 | 8.6 | 11.4 |
| Botswana | 5.2 | 5.4 | 4.8 | 5.1 | 5.6 | 6.7 | 7.4 | 6.0 | 6.4 | 7.5 |
| Brazil | 7.8 | 7.6 | 7.8 | 7.7 | 7.6 | 9.3 | 8.5 | 9.2 | 9.7 | 10.3 |
| Brunei Darussalam | 3.7 | 3.4 | 3.5 | 3.5 | 3.5 | 4.7 | 5.1 | 4.5 | 4.7 | 5.2 |
| Bulgaria | 6.0 | 6.2 | 7.2 | 7.9 | 7.5 | 9.8 | 8.6 | 9.6 | 11.3 | 10.1 |
| Burkina Faso | 5.4 | 5.2 | 5.0 | 5.4 | 5.6 | 10.0 | 9.4 | 10.5 | 12.8 | 12.7 |
| Burundi | 3.0 | 3.1 | 3.1 | 3.1 | 3.1 | 2.8 | 2.0 | 2.2 | 2.0 | 2.0 |
| Cambodia | 10.8 | 11.0 | 10.8 | 10.9 | 10.9 | 7.5 | 10.4 | 9.3 | 9.9 | 11.8 |
| Cameroon | 4.9 | 4.4 | 4.5 | 4.6 | 4.2 | 7.2 | 9.6 | 8.0 | 8.4 | 8.0 |
| Canada | 9.0 | 8.9 | 9.4 | 9.6 | 9.9 | 14.6 | 15.1 | 15.5 | 16.1 | 16.7 |
| Cape Verde | 4.5 | 4.6 | 5.0 | 5.0 | 4.6 | 9.0 | 9.6 | 12.4 | 11.1 | 11.1 |
| Central African Republic | 3.6 | 4.0 | 3.9 | 4.0 | 4.0 | 6.7 | 10.0 | 11.5 | 11.2 | 12.4 |
| Chad | 6.1 | 6.7 | 6.8 | 6.3 | 6.5 | 11.9 | 13.1 | 13.8 | 9.4 | 10.5 |
| Chile | 7.1 | 6.1 | 6.2 | 6.2 | 6.1 | 10.0 | 10.7 | 11.6 | 11.8 | 12.7 |

| Member State | Total expenditure on health as % of GDP | | | | | General government expenditure on health as % of total government expenditure | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 1999 | 2000 | 2001 | 2002 | 2003 |
| China | 4.9 | 5.1 | 5.2 | 5.5 | 5.6 | 12.5 | 11.1 | 9.5 | 9.4 | 9.7 |
| Colombia | 9.3 | 7.7 | 7.7 | 7.5 | 7.6 | 23.2 | 21.4 | 18.6 | 19.0 | 20.5 |
| Comoros | 3.2 | 2.7 | 2.3 | 2.9 | 2.7 | 10.5 | 9.5 | 5.0 | 6.4 | 6.4 |
| Congo | 2.4 | 1.8 | 2.0 | 1.9 | 2.0 | 4.9 | 4.8 | 4.2 | 3.7 | 4.3 |
| Cook Islands | 3.6 | 4.0 | 3.8 | 3.6 | 3.8 | 7.7 | 8.2 | 8.6 | 8.6 | 9.6 |
| Costa Rica | 6.0 | 6.3 | 6.8 | 7.2 | 7.3 | 21.0 | 21.7 | 21.4 | 22.2 | 22.8 |
| Côte d'Ivoire | 5.1 | 4.7 | 3.9 | 3.8 | 3.6 | 4.5 | 5.2 | 4.3 | 6.2 | 5.0 |
| Croatia | 8.7 | 9.3 | 8.4 | 7.8 | 7.8 | 13.7 | 14.9 | 14.2 | 13.2 | 13.8 |
| Cuba | 6.9 | 7.0 | 7.1 | 7.2 | 7.3 | 11.1 | 10.8 | 11.4 | 11.2 | 11.2 |
| Cyprus | 5.7 | 5.8 | 5.9 | 6.1 | 6.4 | 6.5 | 6.4 | 6.4 | 6.8 | 7.0 |
| Czech Republic | 6.6 | 6.6 | 6.9 | 7.2 | 7.5 | 14.1 | 14.3 | 13.9 | 13.9 | 12.7 |
| Democratic People's Republic of Korea | 4.8 | 5.9 | 5.8 | 5.8 | 5.8 | 6.8 | 8.1 | 7.8 | 7.5 | 7.3 |
| Democratic Republic of Congo | 3.2 | 3.7 | 3.1 | 3.3 | 4.0 | 2.6 | 2.6 | 4.7 | 4.2 | 5.4 |
| Denmark | 8.5 | 8.4 | 8.6 | 8.8 | 9.0 | 12.5 | 12.6 | 13.0 | 13.2 | 13.5 |
| Djibouti | 5.1 | 5.4 | 5.3 | 5.5 | 5.7 | 10.2 | 10.7 | 11.6 | 10.8 | 10.5 |
| Dominica | 6.2 | 6.2 | 5.9 | 6.3 | 6.3 | 12.8 | 9.5 | 11.3 | 11.9 | 11.6 |
| Dominican Republic | 6.0 | 6.8 | 6.9 | 7.3 | 7.0 | 10.5 | 13.1 | 12.0 | 12.4 | 12.8 |
| Ecuador | 4.7 | 4.1 | 4.8 | 5.0 | 5.1 | 9.8 | 6.4 | 8.5 | 9.7 | 8.7 |
| Egypt | 5.0 | 5.2 | 5.4 | 5.9 | 5.8 | 5.6 | 6.3 | 7.1 | 8.4 | 8.2 |
| El Salvador | 8.0 | 8.0 | 7.7 | 8.0 | 8.1 | 25.1 | 25.0 | 21.2 | 22.8 | 22.0 |
| Equatorial Guinea | 2.8 | 2.0 | 1.7 | 1.8 | 1.5 | 9.9 | 11.0 | 10.1 | 8.8 | 7.0 |
| Eritrea | 3.8 | 4.5 | 4.6 | 4.5 | 4.4 | 2.9 | 4.4 | 4.6 | 3.9 | 4.0 |
| Estonia | 6.0 | 5.5 | 5.1 | 5.0 | 5.3 | 11.4 | 11.1 | 10.7 | 10.6 | 11.2 |
| Ethiopia | 5.4 | 5.7 | 5.8 | 6.0 | 5.9 | 8.9 | 9.3 | 10.5 | 9.9 | 9.6 |
| Fiji | 3.7 | 3.9 | 3.8 | 4.1 | 3.7 | 7.3 | 8.1 | 7.9 | 8.3 | 7.8 |
| Finland | 6.9 | 6.6 | 6.9 | 7.2 | 7.4 | 10.0 | 10.2 | 10.7 | 11.0 | 11.2 |
| France | 9.3 | 9.3 | 9.4 | 9.7 | 10.1 | 13.3 | 13.5 | 13.7 | 13.8 | 14.2 |
| Gabon | 4.5 | 4.2 | 4.2 | 4.4 | 4.4 | 10.9 | 13.9 | 9.9 | 10.7 | 12.8 |
| Gambia | 7.0 | 7.9 | 7.8 | 7.5 | 8.1 | 10.0 | 14.4 | 9.4 | 12.0 | 13.9 |
| Georgia | 2.9 | 4.3 | 4.4 | 4.5 | 4.0 | 4.8 | 6.4 | 6.6 | 6.6 | 4.7 |
| Germany | 10.6 | 10.6 | 10.8 | 10.9 | 11.1 | 17.1 | 18.2 | 17.4 | 17.6 | 17.6 |
| Ghana | 5.5 | 5.4 | 4.8 | 4.7 | 4.5 | 7.8 | 6.8 | 4.2 | 5.4 | 5.0 |
| Greece | 9.6 | 9.9 | 10.2 | 9.8 | 9.9 | 10.4 | 10.0 | 10.9 | 10.1 | 10.1 |
| Grenada | 5.5 | 7.2 | 7.6 | 7.1 | 6.7 | 14.7 | 13.2 | 15.1 | 10.7 | 12.4 |
| Guatemala | 4.7 | 5.5 | 5.4 | 5.2 | 5.4 | 17.0 | 16.2 | 15.4 | 14.1 | 15.3 |

| Member State | Total expenditure on health as % of GDP | | | | | General government expenditure on health as % of total government expenditure | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 1999 | 2000 | 2001 | 2002 | 2003 |
| Guinea | 4.7 | 4.8 | 4.8 | 5.2 | 5.4 | 3.9 | 3.9 | 4.7 | 4.2 | 4.9 |
| Guinea-Bissau | 4.8 | 4.1 | 4.3 | 6.2 | 5.6 | 4.6 | 2.2 | 2.1 | 6.6 | 6.9 |
| Guyana | 4.3 | 5.5 | 5.3 | 5.0 | 4.8 | 8.0 | 10.8 | 12.3 | 12.2 | 11.6 |
| Haiti | 6.8 | 6.8 | 7.1 | 7.5 | 7.5 | 18.5 | 20.7 | 23.8 | 23.8 | 23.8 |
| Honduras | 5.7 | 6.4 | 6.5 | 6.9 | 7.1 | 12.2 | 15.1 | 14.1 | 15.6 | 16.8 |
| Hungary | 7.4 | 7.1 | 7.4 | 7.8 | 8.4 | 10.7 | 10.6 | 10.5 | 10.4 | 12.1 |
| Iceland | 9.4 | 9.3 | 9.3 | 10.0 | 10.5 | 18.1 | 17.8 | 17.5 | 18.2 | 18.3 |
| India | 5.1 | 5.0 | 5.0 | 4.9 | 4.8 | 4.5 | 4.3 | 4.2 | 3.9 | 3.9 |
| Indonesia | 2.6 | 2.5 | 3.1 | 3.2 | 3.1 | 3.8 | 3.5 | 4.7 | 5.1 | 5.1 |
| Iran, Islamic Republic of | 6.2 | 5.8 | 6.3 | 5.8 | 6.5 | 10.9 | 11.7 | 11.5 | 8.0 | 10.3 |
| Iraq | 1.9 | 1.7 | 1.6 | 1.6 | 2.7 | 1.2 | 1.3 | 1.2 | 0.7 | 4.2 |
| Ireland | 6.2 | 6.2 | 6.8 | 7.0 | 7.3 | 13.4 | 14.6 | 15.4 | 16.3 | 17.2 |
| Israel | 8.6 | 8.6 | 9.2 | 9.3 | 8.9 | 11.3 | 11.5 | 11.6 | 11.4 | 11.4 |
| Italy | 7.7 | 8.1 | 8.2 | 8.4 | 8.4 | 11.4 | 12.6 | 12.7 | 13.1 | 12.8 |
| Jamaica | 5.4 | 6.2 | 5.4 | 4.9 | 5.3 | 5.6 | 6.6 | 4.3 | 4.5 | 4.5 |
| Japan | 7.4 | 7.6 | 7.8 | 7.9 | 7.9 | 15.9 | 16.1 | 16.9 | 16.8 | 16.8 |
| Jordan | 8.8 | 9.2 | 9.4 | 9.3 | 9.4 | 10.1 | 9.8 | 9.8 | 9.9 | 8.9 |
| Kazakhstan | 4.3 | 4.1 | 3.4 | 3.5 | 3.5 | 8.8 | 9.3 | 8.4 | 9.0 | 9.0 |
| Kenya | 4.6 | 4.3 | 4.2 | 4.5 | 4.3 | 4.1 | 11.1 | 8.0 | 9.2 | 7.2 |
| Kiribati | 7.6 | 10.7 | 11.5 | 11.3 | 13.1 | 6.8 | 9.8 | 10.5 | 10.4 | 7.8 |
| Kuwait | 3.6 | 3.1 | 3.6 | 3.9 | 3.5 | 6.4 | 8.8 | 6.2 | 6.6 | 6.1 |
| Kyrgyzstan | 4.9 | 4.4 | 4.5 | 5.1 | 5.3 | 7.8 | 8.2 | 8.7 | 8.7 | 9.0 |
| Lao People's Democratic Republic | 2.4 | 2.5 | 2.7 | 2.9 | 3.2 | 6.0 | 4.8 | 5.4 | 7.6 | 6.2 |
| Latvia | 6.4 | 6.0 | 6.2 | 6.3 | 6.4 | 9.1 | 8.9 | 9.1 | 9.3 | 9.4 |
| Lebanon | 11.3 | 11.7 | 11.7 | 10.6 | 10.2 | 9.5 | 7.9 | 10.2 | 8.8 | 8.4 |
| Lesotho | 5.4 | 5.8 | 5.6 | 6.5 | 5.2 | 9.1 | 9.7 | 10.1 | 10.9 | 9.5 |
| Liberia | 6.3 | 4.8 | 4.1 | 3.9 | 4.7 | 18.1 | 13 | 12.4 | 10.5 | 17.6 |
| Libyan Arab Jamahiriya | 3.6 | 3.2 | 5.5 | 5.0 | 4.1 | 5.5 | 6.0 | 9.2 | 7.9 | 5.9 |
| Lithuania | 6.3 | 6.5 | 6.3 | 6.5 | 6.6 | 12.2 | 14.6 | 15.2 | 14.2 | 14.7 |
| Luxembourg | 6.2 | 6.0 | 6.3 | 7.1 | 6.8 | 13.4 | 14.0 | 14.7 | 14.8 | 13.7 |
| Madagascar | 2.2 | 2.1 | 1.9 | 2.8 | 2.7 | 6.9 | 6.5 | 7.0 | 11.4 | 9.3 |
| Malawi | 9.8 | 8.6 | 10.5 | 9.4 | 9.3 | 12.2 | 7.5 | 11.7 | 9.1 | 9.1 |
| Malaysia | 3.2 | 3.3 | 3.7 | 3.7 | 3.8 | 6.5 | 6.5 | 6.4 | 6.6 | 6.9 |
| Maldives | 5.6 | 5.9 | 6.0 | 5.8 | 6.2 | 13.2 | 13.7 | 13.8 | 13.3 | 13.8 |
| Mali | 4.0 | 4.7 | 4.3 | 4.5 | 4.8 | 6.6 | 8.5 | 8.2 | 9.0 | 9.2 |
| Malta | 7.0 | 8.0 | 8.0 | 9.1 | 9.3 | 11.9 | 14.2 | 13.8 | 15.3 | 15.5 |
| Marshall Islands | 15.9 | 14.7 | 12.4 | 12.0 | 13.1 | 17.9 | 13.7 | 12.1 | 11.5 | 14.4 |
| Mauritania | 2.7 | 2.5 | 2.9 | 3.9 | 4.2 | 8.6 | 6.5 | 6.8 | 9.2 | 14.3 |
| Mauritius | 3.1 | 3.3 | 3.5 | 3.6 | 3.7 | 7.2 | 6.6 | 9.0 | 9.4 | 9.2 |
| Mexico | 5.6 | 5.6 | 6.0 | 6.0 | 6.2 | 12.2 | 11.4 | 11.9 | 11.6 | 11.7 |

| Member State | Total expenditure on health as % of GDP | | | | | General government expenditure on health as % of total government expenditure | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 1999 | 2000 | 2001 | 2002 | 2003 |
| Micronesia, Federated States of | 6.8 | 6.5 | 6.5 | 6.4 | 6.4 | 7.9 | 8.0 | 8.9 | 8.8 | 8.8 |
| Monaco | 9.3 | 9.4 | 9.4 | 9.2 | 9.7 | 11.6 | 14.0 | 13.6 | 14.3 | 17.5 |
| Mongolia | 5.4 | 7.0 | 7.3 | 6.7 | 6.7 | 10.9 | 10.6 | 10.6 | 11.5 | 10.3 |
| Morocco | 4.6 | 4.7 | 4.9 | 5.0 | 5.1 | 4.4 | 4.2 | 4.5 | 5.3 | 6.0 |
| Mozambique | 4.7 | 5.5 | 4.8 | 5.1 | 4.7 | 12.1 | 12.9 | 10.7 | 11.5 | 10.9 |
| Myanmar | 1.8 | 2.2 | 2.1 | 2.8 | 2.8 | 0.8 | 1.2 | 1.3 | 2.3 | 2.5 |
| Namibia | 7.0 | 7.0 | 6.4 | 5.9 | 6.4 | 13.1 | 12.3 | 11.1 | 11.0 | 12.4 |
| Nauru | 16.0 | 13.8 | 12.2 | 12.9 | 12.3 | 9.2 | 9.2 | 9.1 | 9.2 | 8.8 |
| Nepal | 5.1 | 4.9 | 5.4 | 5.6 | 5.3 | 7.4 | 7.0 | 8.7 | 9.5 | 7.9 |
| Netherlands | 8.4 | 8.3 | 8.7 | 9.3 | 9.8 | 11.2 | 11.5 | 11.5 | 12.0 | 12.4 |
| New Zealand | 7.7 | 7.8 | 7.9 | 8.2 | 8.1 | 14.9 | 15.6 | 16.1 | 17.3 | 17.2 |
| Nicaragua | 5.8 | 7.1 | 7.7 | 7.9 | 7.7 | 11.2 | 13.1 | 12.9 | 15.2 | 11.7 |
| Niger | 4.5 | 4.4 | 4.3 | 4.3 | 4.7 | 12.5 | 12.3 | 12.0 | 11.5 | 12.4 |
| Nigeria | 5.4 | 4.3 | 5.3 | 5.0 | 5.0 | 5.4 | 4.2 | 3.2 | 3.1 | 3.2 |
| Niue | 8.0 | 7.7 | 38.2 | 10.3 | 9.7 | 6.7 | 6.1 | 30.6 | 8.9 | 9.3 |
| Norway | 9.4 | 8.5 | 8.9 | 9.9 | 10.3 | 16.1 | 16.4 | 16.7 | 17.4 | 17.6 |
| Oman | 3.6 | 3.1 | 3.1 | 3.3 | 3.2 | 7.9 | 7.3 | 6.8 | 7.2 | 7.0 |
| Pakistan | 3.7 | 2.8 | 2.6 | 2.6 | 2.4 | 4.0 | 3.4 | 3.4 | 3.1 | 2.6 |
| Palau | 9.5 | 9.9 | 9.7 | 9.4 | 9.7 | 13.9 | 14.8 | 13.3 | 11.8 | 15.2 |
| Panama | 6.9 | 7.8 | 7.7 | 8.0 | 7.6 | 18.9 | 21.3 | 19.8 | 20.2 | 16.2 |
| Papua New Guinea | 3.5 | 3.6 | 3.7 | 3.5 | 3.4 | 10.3 | 10.5 | 11.0 | 11.4 | 10.9 |
| Paraguay | 7.2 | 8.4 | 8.4 | 8.3 | 7.3 | 16.7 | 17.5 | 15.9 | 15.0 | 14.2 |
| Peru | 4.9 | 4.7 | 4.6 | 4.4 | 4.4 | 12.3 | 12.1 | 12.1 | 12.1 | 10.7 |
| Philippines | 3.5 | 3.4 | 3.2 | 3.0 | 3.2 | 6.5 | 7.1 | 5.9 | 4.9 | 5.9 |
| Poland | 5.9 | 5.7 | 6.0 | 6.6 | 6.5 | 8.7 | 8.9 | 9.7 | 10.2 | 9.8 |
| Portugal | 8.7 | 9.2 | 9.4 | 9.3 | 9.6 | 13.0 | 14.1 | 14.3 | 14.3 | 14.1 |
| Qatar | 3.6 | 2.8 | 2.9 | 3.3 | 2.7 | 6.9 | 6.7 | 6.8 | 6.8 | 6.7 |
| Republic of Korea | 4.8 | 4.7 | 5.4 | 5.3 | 5.6 | 9.0 | 9.1 | 11.2 | 10.7 | 8.9 |
| Republic of Moldova | 6.8 | 6.5 | 6.4 | 7.1 | 7.2 | 8.5 | 9.8 | 11.2 | 12.9 | 11.8 |
| Romania | 5.4 | 5.4 | 5.5 | 5.9 | 6.1 | 9.6 | 9.9 | 10.3 | 10.5 | 10.9 |
| Russian Federation | 5.6 | 5.8 | 5.7 | 5.9 | 5.6 | 8.8 | 9.4 | 9.6 | 9.6 | 9.3 |
| Rwanda | 4.6 | 4.3 | 4.1 | 4.2 | 3.7 | 9.9 | 8.0 | 7.7 | 10.2 | 7.2 |
| Saint Kitts and Nevis | 5.5 | 5.6 | 5.4 | 5.4 | 5.3 | 10.4 | 10.4 | 10.9 | 9.7 | 11.4 |
| Saint Lucia | 4.6 | 4.8 | 5.1 | 5.0 | 5.0 | 10.2 | 10.7 | 11.8 | 10.6 | 10.3 |
| Saint Vincent and the Grenadines | 5.7 | 5.7 | 5.7 | 6.2 | 6.1 | 8.5 | 10.8 | 10.1 | 10.7 | 11.0 |

| Member State | Total expenditure on health as % of GDP | | | | | General government expenditure on health as % of total government expenditure | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 1999 | 2000 | 2001 | 2002 | 2003 |
| Samoa | 6.3 | 6.2 | 5.7 | 5.8 | 5.4 | 20.3 | 21.3 | 22.0 | 24.5 | 20.1 |
| San Marino | 7.3 | 7.4 | 7.7 | 7.7 | 7.5 | 18.2 | 18.0 | 15.2 | 20.4 | 21.0 |
| Sao Tome and Principe | 10.0 | 8.6 | 10.5 | 9.0 | 8.6 | 12.5 | 11.2 | 10.9 | 11.3 | 11.1 |
| Saudi Arabia | 4.3 | 4.2 | 4.7 | 4.5 | 4.0 | 10.7 | 9.8 | 9.9 | 10.6 | 9.4 |
| Senegal | 4.5 | 4.4 | 4.7 | 5.0 | 5.1 | 7.8 | 8.1 | 8.0 | 9.5 | 9.3 |
| Serbia-Montenegro | 9.6 | 7.7 | 7.3 | 7.9 | 9.6 | 12.4 | 13.5 | 12.4 | 12.2 | 16.0 |
| Seychelles | 5.3 | 5.2 | 5.1 | 5.1 | 5.9 | 6.9 | 6.8 | 8.1 | 7.0 | 10.2 |
| Sierra Leone | 3.1 | 3.8 | 3.4 | 3.5 | 3.5 | 6.9 | 7.6 | 6.4 | 7.9 | 7.9 |
| Singapore | 4.1 | 3.6 | 4.3 | 4.3 | 4.5 | 8.2 | 6.7 | 7.0 | 6.6 | 7.7 |
| Slovakia | 5.8 | 5.5 | 5.6 | 5.7 | 5.9 | 10.9 | 9.7 | 11.4 | 11.5 | 13.2 |
| Slovenia | 7.7 | 8.6 | 9.0 | 8.9 | 8.8 | 14.0 | 13.7 | 14.2 | 14.0 | 13.8 |
| Solomon Islands | 4.7 | 5.1 | 5.1 | 4.9 | 4.8 | 11.1 | 11.4 | 11.5 | 13.2 | 9.4 |
| Somalia | 2.7 | 2.6 | 2.6 | n/a | n/a | 4.2 | 4.2 | 4.2 | n/a | n/a |
| South Africa | 8.7 | 8.1 | 8.4 | 8.4 | 8.4 | 10.7 | 10.9 | 11.2 | 11.6 | 10.2 |
| Spain | 7.5 | 7.4 | 7.5 | 7.6 | 7.7 | 13.4 | 13.3 | 13.4 | 13.4 | 13.7 |
| Sri Lanka | 3.5 | 3.6 | 3.6 | 3.6 | 3.5 | 6.8 | 6.5 | 6.1 | 6.4 | 6.5 |
| Sudan | 4.3 | 3.8 | 4.0 | 4.0 | 4.3 | 9.0 | 8.6 | 9.5 | 8.8 | 9.1 |
| Suriname | 7.6 | 8.0 | 7.9 | 8.1 | 7.9 | 10.7 | 9.7 | 10.8 | 10.4 | 10.4 |
| Swaziland | 6.4 | 6.1 | 6.0 | 5.9 | 5.8 | 11.8 | 11.6 | 11.3 | 10.9 | 10.9 |
| Sweden | 8.4 | 8.4 | 8.8 | 9.2 | 9.4 | 12.0 | 12.5 | 13.1 | 13.4 | 13.6 |
| Switzerland | 10.5 | 10.4 | 10.9 | 11.1 | 11.5 | 16.7 | 17.1 | 17.9 | 18.2 | 19.4 |
| Syrian Arab Republic | 5.5 | 5.1 | 5.0 | 5.0 | 5.1 | 7.2 | 7.3 | 6.7 | 6.5 | 6.3 |
| Tajikistan | 3.8 | 3.3 | 3.3 | 3.3 | 4.4 | 6.3 | 4.9 | 5.3 | 4.8 | 4.8 |
| Thailand | 3.5 | 3.4 | 3.3 | 3.4 | 3.3 | 10.5 | 10.8 | 10.3 | 11.8 | 13.6 |
| The former Yugoslav Republic of Macedonia | 6.3 | 6.0 | 6.1 | 6.8 | 7.1 | 15.1 | 15.0 | 12.3 | 14.0 | 17.1 |
| Timor-Leste | 10.0 | 8.4 | 7.9 | 7.7 | 9.6 | 8.7 | 8.1 | 8.5 | 8.6 | 7.7 |
| Togo | 5.4 | 4.6 | 5.4 | 4.9 | 5.6 | 12.4 | 7.5 | 8.6 | 6.9 | 9.3 |
| Tonga | 6.8 | 6.8 | 7.3 | 6.5 | 6.5 | 14.6 | 13.2 | 11.9 | 17.1 | 21.2 |
| Trinidad and Tobago | 3.8 | 3.7 | 3.6 | 3.9 | 3.9 | 6.4 | 6.3 | 5.8 | 5.7 | 5.9 |
| Tunisia | 5.5 | 5.6 | 5.7 | 5.6 | 5.4 | 7.2 | 6.9 | 7.6 | 6.9 | 7.2 |
| Turkey | 6.4 | 6.6 | 7.5 | 7.2 | 7.6 | 10.3 | 9.8 | 10.3 | 12.1 | 13.9 |
| Turkmenistan | 3.5 | 4.5 | 4.0 | 3.6 | 3.9 | 12.7 | 12.7 | 12.7 | 12.7 | 12.7 |
| Tuvalu | 9.3 | 11.5 | 7.5 | 31.6 | 6.1 | 5.9 | 5.0 | 4.2 | 33.5 | 6.0 |
| Uganda | 6.3 | 6.6 | 7.3 | 7.6 | 7.3 | 9.4 | 9.0 | 9.6 | 10.8 | 10.7 |
| Ukraine | 5.5 | 5.0 | 5.0 | 5.4 | 5.7 | 8.6 | 8.4 | 8.9 | 9.4 | 10.2 |

| Member State | Total expenditure on health as % of GDP | | | | | General government expenditure on health as % of total government expenditure | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 1999 | 2000 | 2001 | 2002 | 2003 |
| United Arab Emirates | 3.8 | 3.2 | 3.7 | 3.4 | 3.3 | 7.9 | 7.6 | 7.7 | 7.8 | 8.0 |
| United Kingdom | 7.2 | 7.3 | 7.5 | 7.7 | 8.0 | 14.5 | 14.8 | 15.3 | 15.4 | 15.8 |
| United Republic of Tanzania | 4.3 | 4.4 | 4.5 | 4.5 | 4.3 | 12.4 | 12.6 | 12.8 | 12.8 | 12.7 |
| United States of America | 13.1 | 13.3 | 14.0 | 14.7 | 15.2 | 16.7 | 17.1 | 17.7 | 18.2 | 18.5 |
| Uruguay | 10.6 | 10.5 | 10.8 | 10.3 | 9.8 | 10.6 | 10.3 | 9.4 | 8.0 | 6.3 |
| Uzbekistan | 6.0 | 5.7 | 5.7 | 5.6 | 5.5 | 7.0 | 6.6 | 7.1 | 6.8 | 7.6 |
| Vanuatu | 4.2 | 3.9 | 3.8 | 4.1 | 3.9 | 11.5 | 10.1 | 11.1 | 12.0 | 12.9 |
| Venezuela, Bolivarian Republic of | 6.2 | 6.2 | 5.2 | 5.0 | 4.5 | 13.1 | 11.5 | 7.2 | 7.8 | 6.4 |
| Viet Nam | 4.9 | 5.3 | 5.5 | 5.1 | 5.4 | 6.7 | 6.0 | 6.7 | 5.1 | 5.6 |
| Yemen | 4.2 | 4.6 | 5.0 | 4.9 | 5.5 | 5.9 | 6.4 | 6.5 | 5.6 | 6.0 |
| Zambia | 5.7 | 5.5 | 5.8 | 6.0 | 5.4 | 9.5 | 9.1 | 10.2 | 10.6 | 11.8 |
| Zimbabwe | 8.1 | 7.8 | 9.1 | 8.4 | 7.9 | 10.0 | 7.4 | 9.3 | 9.8 | 9.2 |

*Source:* WHO 2006[31].

As well as the substantial financial resources invested in health R&D in high-income countries, health research is also being funded by many other governments, notably many Central and Eastern European countries, some of which report to the OECD; also countries in Central and South America, including Argentina, Brazil, Costa Rica, Cuba, Ecuador, El Salvador, Mexico and Trinidad and Tobago, which report to RICYT; and countries in Asia, including the most populous ones, China and India, for which there are no regional reporting channels.

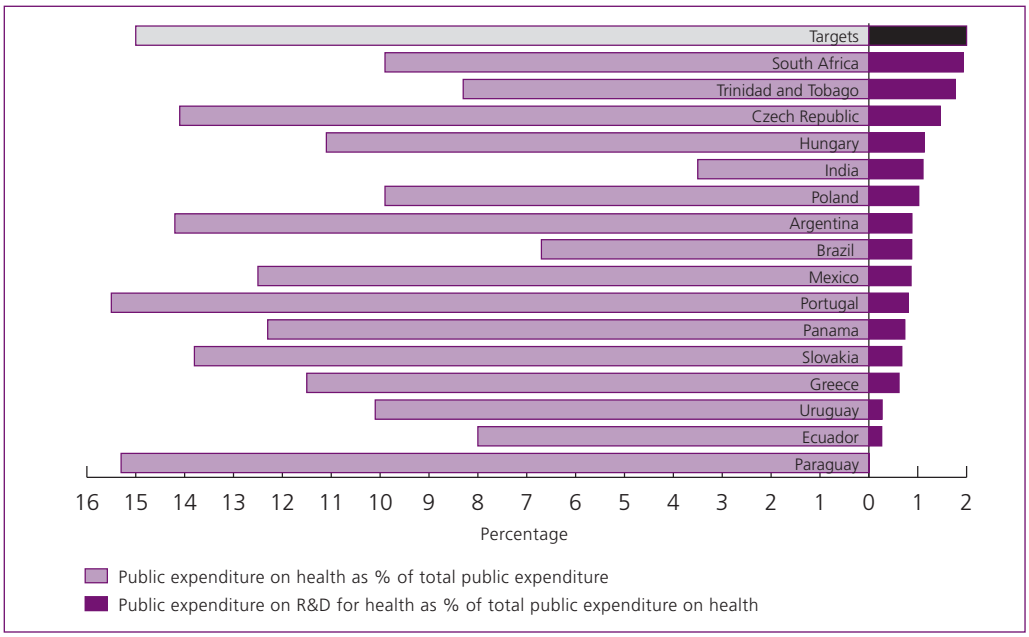
Few low- and middle-income countries collect and report data on investment in health research. The 2005 study shows that governments in low- and middle-income countries for which data are available spent at least US$ 3.0 billion on health R&D for in 2005, up from US$ 2.4 billion in 2003 and US$ 2.5 billion in 2001. As more countries report on investments in R&D for health and the quality of reporting improves, adjustments to these data will be in order. At present, compared with the high-income countries, efforts in financing R&D for health by governments in low- and middle-income countries are still relatively modest.

According to the Global Forum's estimates for 2005, no low- and middle-income countries met the target set by the 1990 Commission on Health Research for Development for investments in R&D for health totalling at least 2% of national health investments. Also, only two, Paraguay and Portugal, have met the target of investing 15% of public investment in health (see Figure 4.13).

According to these data, South Africa came closest to meeting the 2% target in 2005, although it was far from meeting its 15% target. The Czech Republic was closest to meeting both targets. India was far from investing 15% of public spending in health; and, despite heavy investments in R&D, was not close yet to reaching 2% of the health budget for health R&D. Unfortunately, few of the data needed for these measures are routinely available for Africa, as yet.

## Figure 4.13

Public investments in health as a percentage of GDP; and public investments in R&D for health as a percentage of public investments in health, 2005

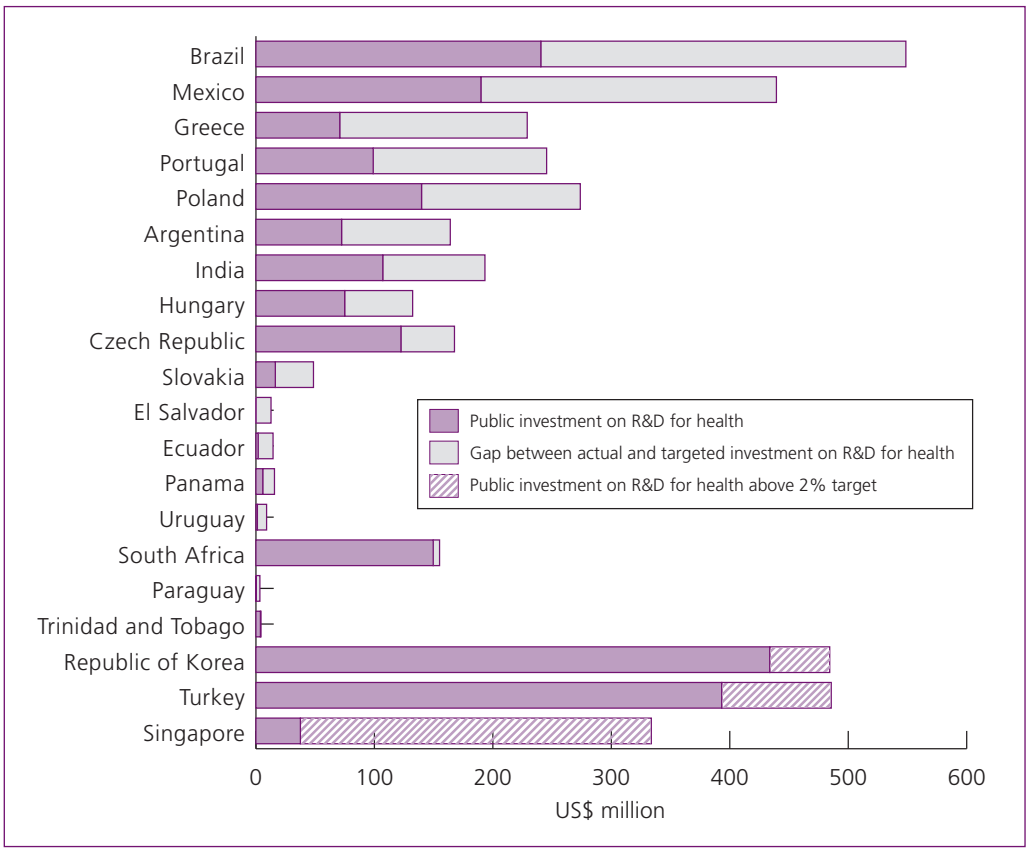



Based on the 2005 estimates, Figure 4.14 illustrates the size of the gap, in cash terms and relative to current health R&D spending, that a number of countries need to close in order to reach the 2% target for public investments in health research in low- and middle-income countries. Of course, as they also work to improve their spending on the health sector, they will need to maintain or further increase the proportion that is earmarked for research if they are to continue to progress towards reaching both targets.

**Policy implication.** To reach the targets, most low- and middle-income countries need to increase government financing for the health sector and, at the same time, accelerate increases in their financing of R&D for health.

## Figure 4.14

Gap between actual and 2% target for public investments in research for health in low- and middle-income countries, 2005 estimates




*Sources:* Global Forum for Health Research estimates of investments in R&D for health based on OECD, RICYT, and national surveys for countries reporting public investments in R&D for health in 2005; public investment in health estimates from WHO.

### 4.5.4 Report Card measures: Cluster D - global health initiatives and development agencies

**Tracking progress towards allocation of 5% of health funds to health R&D**

This section tracks and measures progress towards the target for supporting health R&D in the work undertaken by global health initiatives and development agencies that invest in health.

*Measure D-1* *Gap between actual investments and commitment to invest 5% of overall health investment portfolios of global health initiatives and development agencies to support research capacity of countries, dissemination of research findings, and management of knowledge*

The target in this domain is one of the most recent, having been proposed[18] by the ministers of health and heads of delegation of 14 African countries that attended the High Level Ministerial Meeting on Health Research for Disease Control and Development which took place in Accra on 17 June 2006. It has not been formally adopted by any of the global health initiatives or development agencies to whom it is addressed and retains the relatively weak status of an aspiration by one group for the performance of another.

Nevertheless, we include this 5% target in the Report Card, because (1) it is, in any case, a subcomponent of the broader target set much earlier by the Commission on Health Research for Development that development assistance agencies – which would include all bilateral and multilateral actors – should meet the 5% target; and (2) since the 1990 report[5] of the Commission on Health Research for Development, the size of this subcomponent of the development assistance domain has grown hugely and now accounts for many billions of dollars of funding to the health sector in low- and middle-income countries, making it worthy of separate attention.

The target, as expressed in the Accra Communiqué, contains a definitional challenge. It does not refer straightforwardly to health research or health R&D, but to "research capacity of countries, dissemination of research findings, and management of knowledge". To a large degree, these can be considered as elements within the domain of research for health (although the extent to which knowledge management is counted within research is least clear) and are certainly understood to be elements of the "health research system".[32] Furthermore, few if any of the global health initiatives and development agencies ever report resource allocations that are disaggregated into any of these categories. We therefore make the assumption that all of these activities can be classed as components of research for health and that, in keeping with the spirit of the Accra Communiqué, it is reasonable to ask how much of their resources in the health field the global health initiatives and development agencies are allocating to research in general.

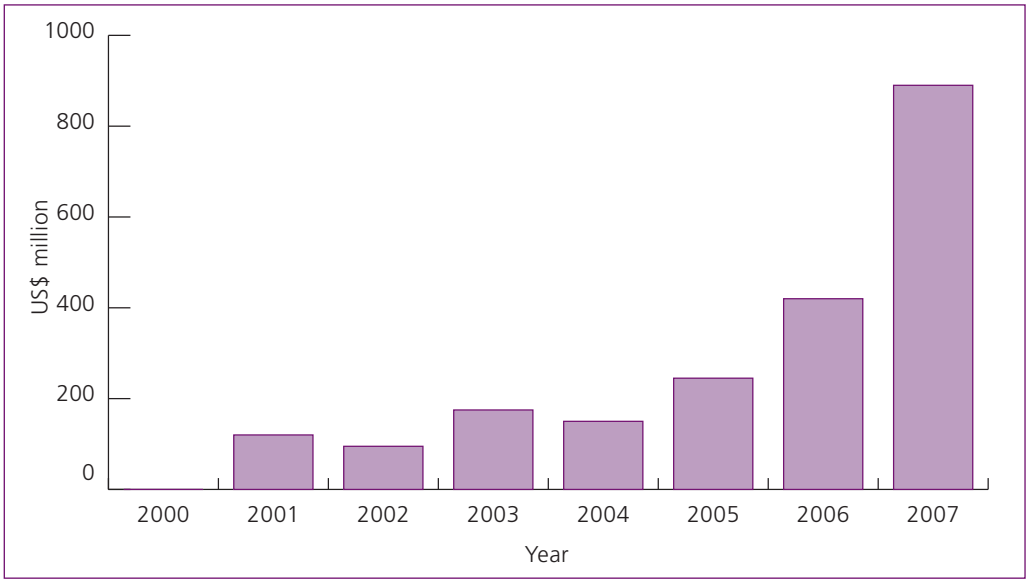
The two largest global health initiatives are the Global Fund to Fight AIDS, Tuberculosis and Malaria and the Global Alliance for Vaccines and Immunization:

**Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM).** Since its creation in January 2002, GFATM has approved a total of US$ 10.8 billion to more than 550 grants in 136 countries, dispersed through seven rounds of grant making, and in 2008 is preparing to allocate further grants in round 8 to a projected total of US$ 3.9 billion over a biennium.[33] Writing in 2004, the Executive Director of GFATM noted that it was not the remit of the organization to fund research into new drugs, vaccines or diagnostics – although the existence of such a large fund for drug purchase should act as a spur to others to invest in this kind of R&D. On the other hand, he observed that funding of operational research was important and would be provided when it was included by applicants in their request for country support.[34] Three years later, a review[35] of operational research in GFATM grants reported that the Global Fund encouraged recipient programmes to spend 5–10% of grant budget on monitoring and evaluation, including operational research. Of 363 proposals in rounds 1–5, 70 (19%) included operational research. For all three diseases targeted by GFATM, the proportion of proposals including operational research and the proportional budgets for operational research increased from rounds 1–5 to round 6. Over the total Global Fund portfolio, the budget allocated to operational research increased from 0.4% to 3%.

**Global Alliance for Vaccines and Immunization (GAVI).** With the availability of new funding streams, programme disbursements by GAVI have been rising steeply in the last few years (Figure 4.15), reaching over US$ 900 million in 2007.[36] Like GFATM, GAVI has also argued that the existence of large purchasing funds and the recent supplementation of these by advance market commitments will act as a stimulus for investments in R&D for new products.[37] A new "Window 3" mechanism was introduced by GAVI in 2002, permitting the use of GAVI funds for a range of activities including R&D, but with an overall total cap on Window 3 of US$ 30 million per year for the first three years.[38] However, with the recent strengthening of GAVI's activities in supporting health systems development, revised guidelines for this area in 2007 stressed the opportunity for countries to use some of their GAVI funds for health systems operational research that better informs decisions and processes for overcoming health systems barriers to deliver immunization. The research areas must be directly linked to the health system bottleneck areas identified within the GAVI health systems strengthening (HSS) proposal and funded with GAVI HSS funds. The operational research programmes should be implemented through a close collaboration between policy- and decision-makers, researchers, academics and nongovernmental organizations where appropriate.[39]

## Figure 4.15

Programme disbursements by GAVI, 2000–2007




*Source:* GAVI.

Among the internal development agencies, the World Bank and WHO have the two largest health portfolios.

- The World Bank is not a donor but, almost exclusively, a lender to the economies of low- and middle-income countries, including the health sector. There is no formal policy commitment to include a specific research allocation in its lending. However, the World Bank encourages countries to allocate up to an initial 1% of the total operations budget in loans to analytical work in support of the programmes funded.
- With total biennial budgets that rose to about US$ 3 billion in recent years, WHO provides some funding to health projects and programmes in low- and middle-income countries as well as for its headquarters and global operations.[40] It has been working to ensure that an increased proportion of its overall budget is spent at the country level. WHO has no commitment to include a specific research allocation, either in its overall biennial budget or in its specific contributions to country-level activities.

Future work on this Report Card measure will look in detail at the evolving nature of research spending in the work of the global health initiatives and development agencies.

**Policy implication.** To reach the target, global health initiatives need to encourage uptake by countries of the provisions they are willing to make for research within their funding windows. International agencies funding health in low- and middle-income countries need to make allocations and set targets for research funding and encourage their uptake by countries.

## 4.6 Conclusions and the way forward

The construction of a Report Card on R&D for health is a challenging venture, given serious gaps in the availability of data and problems with definitions and standards and with the very nature of the targets that have been proposed in different international arenas. Nevertheless, it represents a worthwhile effort, because a Report Card provides a mechanism by which progress can be assessed and the commitments or aspirations of different actors compared with their actual performance.

The Global Forum will develop the Report Card systematically in the coming years, collecting, analysing and reporting the data that are available and working through advocacy, partnerships and catalytic roles to secure the development of information systems for producing such data where they do not yet exist. As the quality and range of data that can be accessed improve, the initial measures may be refined or new ones added. The regular issuing of the Report Card will provide an increasingly detailed evidence base that can be used for advocacy. The Global Forum itself will not only publish the results but will also take the arguments to policy-makers and those who make the decisions about resources, to encourage them where targets have been set, to hold them to account where commitments have been made, and to make the case where needed for improved performance in the future.

The final objective is not more money for researchers – it is that, through these increases in research resources, there will be more knowledge, processes, tools and products created and utilized, with the result that health and health equity will improve globally and, most especially, for the poorest and least advantaged people in the world.

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# Chapter 5

# Monitoring financial flows for research for health: challenges and opportunities

# Monitoring financial flows for research for health: challenges and opportunities

## 5.1 Signposts and milestones

During the last two decades, clear links have been established between development, health and research, highlighted in a series of world conferences during the 1990s dealing with development issues such as gender, education and population; by the United Nations Millennium Summit and its resulting Millennium Development Goals[1] and the subsequent commitments made at the 2002 Monterrey Conference on Financing for Development;[2] and by the reports of the Commission on Health Research for Development[3] in 1990, the Commission on Macroeconomics and Health[4] in 2001 and the Commission on Social Determinants of Health[5] in 2008.

Taken together, these milestones provide the visible markers of a global pathway towards reducing inequities, including those in health, between different population groups based on long-standing imbalances in resources and power relationships. They also affirm the importance of increasing knowledge and gathering and using evidence to help determine the best directions for the future and to accelerate progress towards the goals.

In the 10 years since the Global Forum for Health Research was established in 1998, the imbalance symbolized by the expression "10/90 gap" – an imbalance in the global application of research resources to address the health needs of poor and disadvantaged populations – has become widely recognized. And, the regular tracking of research resources has become widely appreciated as a tool to help promote the closure of this gap (see Chapter 1).

This period has also seen unprecedented effort by the global community to set development, health and research goals and targets and to make commitments to achieve them. With the 2008 edition of *Monitoring Financial Flows for Health Research*, the Global Forum launches a regular Report Card (Chapter 4) that will measure progress and highlight success and failures to meet commitments and progress towards the targets.

## 5.2 Challenges and opportunities

Global investments in health R&D have continued to rise strongly during the first half of the current decade, according to the Global Forum's estimates (Chapter 2), reaching at least US$ 160 billion by 2005. The global total has been rising at a rate of at least US$ 10 billion per year during this period. The Global Forum's focus is on determining how much of this is relevant to the health of the poor and in which areas the gaps are greatest and the needs most pressing if health and health equity are to be improved. In addressing these questions, *we recognize the need for continuing to improve the precision and depth of analysis on two broad fronts*:

- In terms of inputs, the resources for R&D relevant to the health of the poor can be seen as two-dimensional: along one dimension, they are derived from the public sector and the private for-profit and not-for-profit sectors, as detailed in Chapter 2 of this report; along the second dimension, the public sector resources are derived from a combination of direct investments in R&D as part of the overall research investments made by countries, government investment in research that is included as a component of spending on the health sector in each country, and foreign resources that are part of ODA provided by high-income countries to low- and middle-income countries.
- In terms of outputs, the resources for R&D are applied to a range of health problems and needs. Traditionally, the main focus has been on biomedical research and development that leads to a better understanding of the nature and origins and diseases and the creation of tools, processes and products for their treatment – an area in which R&D costs have increased dramatically in recent years and which accounts for the vast majority of global R&D spending related to health. But, there has been an increasing recognition of the importance of research in other areas and the "health R&D" spectrum has been acknowledged to include areas such as health policy and systems research, behavioural and social sciences, and operational research. Most recently, a paradigm shift has led to a more comprehensive "research for health" approach, as documented in Chapter 1, which encompasses research into the whole spectrum of biological, economic, environmental, political, social and other determinants of health.

In moving forward, it will be necessary to tackle a number of substantial challenges. While these are obstacles standing in the way of progress, overcoming the hurdles also presents opportunities to clarify understanding, stimulate cooperation and catalyse greater efforts towards achieving the goals.

### 5.2.1 Tracking resources for R&D for health

As we continue to track R&D financial flows, we will be engaging with five particular challenges:

- building international consensus on a classification system for investments in R&D for health (for a tentative typology, see Box 5.1);
- widening the range of data collected, to give a better reflection of the whole range of work implied by "R&D for health" rather than only "health R&D" (see Chapter 1 for discussion);
- working with the private sector to obtain more complete, detailed and disaggregated data relating to R&D that is relevant to health in low- and middle-income countries;
- encouraging, through a range of partnerships, the development of country capacities in low- and middle-income countries for the regular and systematic gathering, analysis and reporting of data relating to R&D for health;

- developing a scale of purchasing power parities that is relevant to R&D for health and takes account of the different costs associated with different components of R&D processes in a variety of settings – in the public and private sectors and in countries at different stages of economic development.

## Box 5.1

Tentative typology of "research for health"

**1. Research on "disease-related" prevention and treatment**

- Basic research funded by public and private for-profit and not-for-profit sectors
- Other research carried out by pharmaceutical companies for development of products, etc.

**2. Research on other "disease-related" prevention, treatment and care**

- Health-care policies, programmes, systems and services
- Training of health-care workers
- Health-care human resources
- Scale-up of interventions
- Disease monitoring and surveillance
- Disease prevention and treatment:
  - Exposures, risk factors for and determinants of ill-health and disease
  - Specific diseases or conditions (biomedical and clinical research on type I, II & III diseases)
- Disease outcomes and impacts

**3. Research on "health"**

- Health planning
- Public health
- Safety, quality, availability, affordability, accessibility, inclusion of:
  - Water, food, housing, sanitation
  - Natural environments
  - Built environments
  - Social environments
- Health promotion
- Health education:
  - Health knowledge, attitudes and practices

- Health research systems
- Health classifications systems, measures and indicators
- Health status: physical, mental, social, and spiritual well-being
- Health equity and social equality
- Social determinants of "health" including human rights, inclusion, participation and equality
- Safety, quality, accessibility, affordability, inclusiveness, efficiency, effectiveness, impact on health of:
  - Public policies, programmes, systems and services *outside the health sector*
  - *Health* policies, programmes, systems and services

### 5.2.2 Filling the Report Card for development, health and research

The Report Card recognizes the linkages and interdependencies of three pillars on which global progress towards improving health and health equity rest: development, health and research. The Report Card is designed to assess the separate and collective efforts of different global actors towards supporting these three pillars, meeting specific commitments they have made and reaching the targets that have been set. Filling the Report Card presents a number of challenges:

- obtaining comprehensive and disaggregated development data relevant to the ODA commitments of the United Nations and the G8 Gleneagles Summit, including specific information on resource flows for least developed countries and for the country-specific health component of ODA;
- obtaining comprehensive, accurate and up-to-date data relevant to the spending of low- and middle-income countries on the health sector;
- obtaining comprehensive, accurate and up-to-date data relevant to spending of low- and middle-income countries on research in general, disaggregated in all the sectors and domains relevant to R&D for health.

### 5.2.3 Developing a focus on research for health equity

Increasing resources for general health R&D will not guarantee that the health needs of the poor will be addressed or that health inequalities between more and less advantaged populations and groups will be narrowed. An important challenge is therefore to ensure that, whether R&D is focused on creating new drugs, vaccines and diagnostics, on the functioning of health systems or on the wider determinants of health, the specific circumstances of the poorer and less advantaged are taken into account and that issues of accessibility and affordability, and of economic, cultural,

social and other local contexts, are factored into the analysis and into the design, conduct, interpretation and use of the research.

This last challenge will requires the use of a specific set of indicators relevant to research for health equity. Tugwell et al.[6] have considered the health research profile that is needed to assess the capacities of low- and middle-income countries to undertake equity-oriented research. Using a mini-Delphi technique a questionnaire was developed and applied in 12 countries (three each from Asia, Latin America, Africa and Central and Eastern Europe), with indicators representing five categories of the health research profile:

1. research priorities
2. resources spent on research
3. production of knowledge
4. packaging of knowledge
5. evidence of research impact on policy and equity.

The results showed that, overall, there was a gradient where countries scoring lower on the human development index had a lower capacity to conduct research to meet local health needs, and only one of the 12 countries indicated that there was research on all fronts of the equity debate. The study concluded with a recommendation that all countries (and external agencies) should invest more in building a certain minimum level of national capacity for equity-oriented research.

Building on this work, there is a need to expand the health research profile that is relevant to all aspects of research for health equity (c.f. Box 5.1) and develop the data collection, analysis and reporting systems that are required to be able to make regular use of this information.

## 5.3 Moving from evidence to impact

From ethical, human rights and equity perspectives, a more equitable balance in global expenditures on R&D for health is imperative. Addressing the conditions that create and sustain health would help to avoid the human misery and suffering that result from disease. Investing in upstream health and research for health would address the root of the epidemic of hunger and poverty-related diseases and maternal and child health conditions that define the health status of the majority of the world's population. As the HIV epidemic in Africa has shown, the after-the-fact costs – human costs and care and treatment costs – are prohibitive.

One encouraging aspect of the study by Tugwell et al.[6] discussed above was that seven out of 12 countries demonstrated impact of health research on policies and engagement of stakeholders in this process. This combination of inclusiveness and impact is vital if research is to achieve its full potential.

Why do Africa and South Asia continue to shoulder a disproportionate share of global mortality and morbidity? It is time to ask challenging questions that will lead to shifts in focus of investments for the interlinked pillars of development, health and research. The regular tracking of resource flows for R&D for health and the complementary filling of the Report

Card on resources for development, health and research are designed to provide the evidence base from which clear arguments will emerge. This is the starting point for the most important aspect of the work in which we are engaged: to take the arguments and evidence to policy-makers – those who control decisions about priorities and resources across a wide range of relevant sectors, disciplines and fields – and to persuade them to make the necessary investments. Only then will research fulfil its potential and the pace of change be accelerated towards achieving the goals of better health and health equity for all.

## Endnotes and references


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Data on investments in research and development (R&D) for health are indicators of current research priorities, trends, overlaps and gaps. As efforts to address the health needs of poor populations are evolving, it is vital to regularly track these investments to make sure they are used better: in more efficient, effective and equitable ways.

The Global Forum for Health Research is the only organization that regularly tracks and reports on the world's R&D investments for health. In this 2008 edition, it provides new estimates of the investments in R&D for health globally and by sectors of performance and sources of funds.

Over the course of several decades the world has accumulated a substantial array of targets, commitments and aspirations relating to resources for development, health, research and health research. The Global Forum begins a regular review of these measures and global progress towards their implementation – a "Report Card" on global efforts relevant to R&D for health.

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