

*A Special  
Report from*



## Global Health Research Investment by the United States

Concern about global health has stimulated greater investment from public and private stakeholders in recent years. As attention has increased, stakeholders in global health require a better understanding of the level of investment by various sectors. A variety of efforts to track global health resources are underway, but significant gaps in information still exist relative to research. Research!America, in partnership with The Ellison Medical Foundation, has compiled the first known estimate of the total investment in research and development (R&D) for global health by the United States.

Research!America has been tracking the U.S. investment in health-related research for approximately six years and is uniquely qualified to generate an initial estimate of investment in global health research. We continue to refine our estimate of health-related research and believe it to be the most comprehensive estimate of health R&D in the United States. Our current estimate finds that the U.S. spent \$92 billion on health research in 2002. Of this total, the federal government invested \$31 billion, the pharmaceutical and biotechnology industries invested \$50 billion, and others (universities, state governments, foundations, etc.) invested \$11 billion.<sup>i</sup> Each of these sectors devoted a portion of their investments to research on diseases and conditions that primarily affect poor populations in low- and middle-income countries. Research!America has assessed what portion of U.S. investment in health research was dedicated to global health in order to produce our estimate.

### Global Health Research and the 10/90 Gap

In this report, the term “global health” refers to diseases and conditions that disproportionately affect poor populations in low- and middle-income countries. Others may define global health differently. For example, the U.S. government distinguishes international health from global health; “international health” is defined in terms of national borders, and related funding is considered foreign assistance, while “global health” transcends national boundaries and includes shared problems and cooperative solutions.<sup>ii</sup>

Research!America recognizes that all of the research performed in the U.S. will ultimately benefit people worldwide, but the scope of this project is limited to U.S. research designed to improve health in developing nations.

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Much of the recent concern about global health has been fueled by the HIV/AIDS pandemic, but other communicable diseases, such as malaria and tuberculosis, are of growing concern as well. Preventable infectious diseases disproportionately affect developing countries and have been a primary focus of global health efforts. Meanwhile, as developing countries and multilateral agencies struggle to deal with infectious disease challenges—such as eradicating polio and providing antiretroviral treatments for millions of AIDS patients in Africa and Asia—chronic diseases are becoming an additional burden on the developing world. In 2002, more people died of cardiovascular diseases than of all infectious diseases combined worldwide.<sup>iii</sup> The prevalence of chronic diseases is growing, particularly in developing countries, and is projected to increase significantly over the next two decades.<sup>iv</sup> This will further increase the need for investment in research to improve health and quality of life.

Although investment in global health is increasing, research focusing on diseases and conditions that disproportionately burden low- and middle-income countries is woefully lacking. The expression “the 10/90 gap” is often used in reference to disparities in global health R&D—only 10 percent of global health R&D expenditures are devoted to 90 percent of the world’s health problems. The term has been in use since 1990 when the Commission on Health Research for Development performed groundbreaking work on the discrepancy in R&D funding with respect to the diseases with the highest global burden. The Global Forum for Health Research (established in 1998) currently tracks and aims to correct the 10/90 gap.<sup>v</sup> In its most recent report, the Global Forum states that the 10/90 gap does still largely exist, but as demographic and epidemiological transitions in low- and middle-income countries occur (i.e., higher prevalence of chronic diseases), these nations are likely to increasingly benefit from the research performed in high-income countries.<sup>v</sup>

Tracking the 10/90 gap and R&D investment in low- and middle-income countries is difficult because no system exists to monitor financial flows, and the limited data available are fragmented. Available international data are often not current because many countries lack the capacity to track and report R&D expenditures; thus collecting and analyzing information can take years. For example, the Global Forum’s recently published *Monitoring Financial Flows for Health Research* (November 2004) utilizes data from 2001. In addition, separating R&D expenditures from other global health expenditures is a complex task.

## **U.S. Investment in Global Health**

Governments, multilateral organizations, businesses, foundations and other investors believe that maintaining global security and economic stability is linked to health worldwide. The threat of pandemic flu is high on the agenda for public health officials, as is the potential for biological and chemical terrorism. In addition, the HIV/AIDS epidemic is jeopardizing the economies of nations like South Africa. The United States has a significant interest in improving health for people around the world by providing existing medical interventions through appropriate delivery methods as well as by researching new preventive measures and treatments that can be implemented effectively in developing nations.

The United States’ investment in global health comes primarily from three sectors—the federal government, industry and other private sources, such as foundations. Each sector invests in both humanitarian assistance and R&D for diseases and conditions that primarily affect low- and middle-income countries. The following sections detail how each sector is investing in research to improve global health.

## Estimated U.S. Investment in Global Health Research and Development in 2003

Source of Funding	Global Health R&D
Pharmaceutical Industry <sup>1,2</sup>	2,929
Biotechnology Industry (2001) <sup>3,4</sup>	2,600
National Institutes of Health <sup>5</sup>	2,987
Centers for Disease Control and Prevention <sup>6</sup>	24
U.S. Agency for International Development <sup>7,8</sup>	338
Department of State <sup>8,9</sup>	10
Department of Defense <sup>10,11</sup>	61
Foundations <sup>12,13</sup>	505
<b>Total</b>	<b>9,454</b>

1 Pharmaceutical Research and Manufacturers of America. PhRMA 2005 Industry Profile.

2 Russo, JB and Wertheimer, AI. Pharm Aid. Pharmaceutical Executive. April 2004.

3 A Survey of the Use of Biotechnology in U.S. Industry, Department of Commerce, October 2003

4 Daar, A.S., et.al., Top ten biotechnologies for improving health in developing countries, Volume 32, p.229-232, Nature Genetics, 2002.

5 National Institutes of Health. Estimates of Funding for Various Diseases, Conditions and Research Areas. [www.nih.gov/news/fundingresearchareas.htm](http://www.nih.gov/news/fundingresearchareas.htm).

6 CDC Financial Management Office.

7 United States Agency for International Development. [www.usaid.gov/policy/budget/cbj2005/cent\\_prog/central\\_gh.html](http://www.usaid.gov/policy/budget/cbj2005/cent_prog/central_gh.html).

8 Consolidated Appropriations Resolution, 2003. United States Agency for International Development, Child Survival and Health Program Fund.

9 U.S. Department of State. FY 2005 International Affairs Budget Request. [www.state.gov](http://www.state.gov).

10 Defense Health Program FY 2005 Budget Estimates.

11 Army RDT&E Budget Item Justification, accessed on March 31, 2005 at [www.dtic.mil](http://www.dtic.mil).

12 The Foundation Center. International Grantmaking III, October 2004. [www.fdncenter.org](http://www.fdncenter.org).

13 Bill and Melinda Gates Foundation, Annual Report, 2003. [www.gatesfoundation.org](http://www.gatesfoundation.org).

In 2003, the Department of State contributed \$94 million to the World Health Organization (WHO) and \$56 million to the Pan American Health Organization (PAHO). The WHO spends about \$60 million a year on research, about 5% of its expenditures. If the same percentage applies to U.S.-contributed funds, then \$7 million is spent on research. We assume that about 5% of PAHO's budget also is dedicated to research, which is approximately \$3 million of the United States' contribution to PAHO. The estimated total for the Department of State's investment in global health research is \$10 million. Although the State Department's funding for the Global AIDS Initiative has increased significantly since the beginning of FY 2004, only \$2 million was spent on AIDS in 2003.

The Department of Defense operates a military HIV research program to develop new vaccines and treatments. Members of the U.S. military also work with African militaries to develop prevention education programs. In 2003, the Defense Health Program spent \$16 million on these and other global health programs. The U.S. Army also invested about \$45 million in global health-related R&D projects including malaria vaccines, anti-diarrheal vaccines and vaccines against dengue fever, meningitis and hemorrhagic fevers.

The Foundation Center tracks international grantmaking by more than 1000 larger foundations. These and other foundations distributed an estimated total of \$1.014 billion in international health grants in 2002. The Foundation Center does not state how much of the \$1.014 billion is for research. However, approximately 18% of domestic and international foundation giving for health in 2002 was for medical research. If the same percentage of international health giving were for medical research, then \$183 million was invested in international health R&D by foundations in 2002. The Bill & Melinda Gates Foundation is a relative newcomer but already dominates the global health community. In 2003 alone, the Gates Foundation distributed \$322 million in grants for global health research.

## Method and Rationale

Members of the Pharmaceutical Research and Manufacturers of America (PhRMA) spent \$34.5 billion on research and development worldwide in 2003, \$420 million of which was spent in developing countries. Markets in low- and middle-income countries accounted for 8.5% of the total \$219 billion in sales by PhRMA member companies in 2003. If the same percent were invested in research, we estimate that the pharmaceutical industry invested \$2.9 billion in global health research. Also important but not included in the R&D estimate is the pharmaceutical industry's donation of more than \$1.4 billion in medical products to the developing world in 2003. This estimate was made by the Partnership for Quality Medical Donations and the Center for Pharmaceutical Health Services Research at the Temple University School of Pharmacy and accounts for only the wholesale value of medicines and not the many donated hours of health care provided by doctors, nurses and other volunteers.

A survey of 3000 U.S. companies engaged in biotechnology-related activities estimates R&D expenditures for 2001 at \$41.6 billion. Of that amount, 40% of those research activities (\$16.4 billion) were dedicated specifically to biotechnology-related activities. International markets accounted for at least 16% of firms' biotechnology-related net sales or \$8 billion in revenues in 2001. Applying the same percentage for research, we estimate that in 2001 the biotechnology sector invested \$2.6 billion in research designed to improve global health.

The National Institutes of Health (NIH) funds research on a number of topics that primarily apply to low- and middle-income countries. The largest portion of global health expenditures at the NIH is nearly \$1.4 billion for emerging infectious diseases. In FY 2003, the NIH invested \$279 million for HIV/AIDS research at international sites and \$405 million for HIV/AIDS vaccine research. Other global health research areas at NIH include tuberculosis, vector-borne diseases and infant mortality and low birth-weight.

The Centers for Disease Control and Prevention (CDC) spent \$341 million on global health in 2003. Of this, \$24.2 million was spent on global health research.

The United States Agency for International Development (USAID) committed \$338 million to global health research for the development of microbicides; the U.S. contribution to the Global Fund to Fight AIDS, TB and Malaria; the International AIDS Vaccine Initiative; and the U.S. contribution to The Vaccine Fund.

*Important, but not captured in the R&D estimate, are the pharmaceutical industry's donations for global health.*

## **Industry**

The pharmaceutical, biotechnology and medical device industries together are the largest investors in health research in the U.S. In addition to investing in R&D on diseases in developing countries, the pharmaceutical industry also provides financial aid, medicine, and medical expertise to low- and middle-income countries. However, determining precisely how much U.S. industry invests in global health R&D has a number of complications and limitations.

### **Pharmaceutical Industry**

According to the Pharmaceutical Research and Manufacturers of America (PhRMA) annual member survey, its members spent \$34.5 billion on R&D in 2003.<sup>vi</sup> We estimate the portion of this amount dedicated to global health R&D investment is \$2.9 billion. Sales for low- and middle-income countries account for 8.5% of all sales by PhRMA member companies (\$18.6 billion out of a total \$218.8 billion in sales in 2003). If the same proportion were invested in R&D for these markets, then the pharmaceutical industry spent \$2.9 billion on global health R&D. Of the \$2.9 billion, \$420 million was spent on R&D performed in low- and middle-income countries.

Important, but not captured in the R&D estimate, are the pharmaceutical industry's donations for global health. The Partnership for Quality Medical Donations (PQMD) and the Center for Pharmaceutical Health Services Research at the Temple University School of Pharmacy estimate the wholesale value of medicines donated to the developing world by the pharmaceutical industry was more than \$1.4 billion in 2003. The industry also donates extensive hours of health care provided by doctors, nurses, and other volunteers.<sup>vii</sup> The PQMD estimate includes the value of drug donations by only 21 pharmaceutical and humanitarian agency members. Pharmaceutical companies also provide funds for establishing and maintaining laboratories in developing countries that perform research on diseases that occur locally, and this component is not included in the \$1.4 billion estimate.

### **Biotechnology Industry**

The biotechnology industry is also investing in global health, but companies face challenges, such as securing venture capital. Based on a survey of 3000 U.S. companies engaged in biotechnology-related activities, we estimate that \$2.6 billion is spent by biotechnology firms on global health research. According to the Department of Commerce survey report, total R&D expenditures of the companies surveyed were \$41.6 billion.<sup>viii</sup> Forty percent of those research activities (\$16.4 billion) were dedicated specifically to biotechnology-related activities. International markets accounted for at least 16% of firms' biotechnology-related net sales or \$8 billion in revenues in 2001.<sup>ix</sup> Applying the same percentage for research, we estimate that in 2001 the biotechnology sector invested \$2.6 billion in research designed to improve global health.

## Government

International assistance and health research funding for HIV/AIDS and other global health problems is allocated to a number of government agencies—the United States Agency for International Development, the Department of State, the Department of Defense, the National Institutes of Health, and the Centers for Disease Control and Prevention.

### *United States Agency for International Development*

USAID invested \$2 billion in global health in FY 2003.<sup>x</sup> The majority of USAID's global health spending is allocated to humanitarian assistance, but the agency also invests in some research. USAID's portfolio includes research on preventing mother-to-child HIV/AIDS transmission, prevention of HIV transmission in health care settings, development of microbicides, new treatment regimens for tuberculosis, and development of a malaria vaccine. In FY 2003, we estimate that USAID dedicated \$338 million to HIV, malaria and tuberculosis vaccine development and microbicide research.<sup>xi</sup>

### *Department of State*

The Department of State makes contributions to multilateral health organizations, such as the World Health Organization (WHO) and the Pan American Health Organization (PAHO). In 2003, the Department of State contributed \$94 million to WHO and \$56 million to PAHO.<sup>xii</sup> The WHO spends about \$60 million a year on research, about 5% of its expenditures.<sup>xiii</sup> If the same percentage applies to the portion contributed by the United States, then approximately \$7 million of the Department of State's investment in WHO is spent on research. We assume that about 5% of PAHO's budget also is dedicated to research, which is approximately \$3 million of the United State's contribution to PAHO. The estimated total for the Department of State's investment in global health research is \$10 million.

Another important component of the United States' investment in global health is the President's Emergency Plan for AIDS Relief (PEPFAR), which has significantly increased the U.S. government's investment in the health of low- and middle-income countries. The Global AIDS Coordinator, Randall L. Tobias, is based at the Department of State and oversees all of the government's resources and international activities to combat the HIV/AIDS pandemic. In 2003, President Bush announced PEPFAR would provide \$15 billion over five years, and funding began in fiscal year 2004. PEPFAR funds are distributed among the agencies that address global health concerns (listed above). For 2005, the administration has requested \$1.45 billion for global HIV/AIDS programs to be managed by the Department of State.<sup>xii</sup>

### *Department of Defense*

The Department of Defense also plays a role in global health efforts, investing \$61 million in global health-related research in 2003. The military focuses on infectious diseases that soldiers might encounter when deployed in a developing nation or during a terrorist attack. The U.S. Army invested about \$45 million in global health-related research and development projects including vaccines against malaria, dengue fever, meningitis and hemorrhagic fevers.<sup>xiv</sup> The DoD also operates a military HIV research program to develop new vaccines and treatments. Members of the U.S. military work also with African militaries to develop HIV/AIDS prevention education programs. In 2003, the Defense Health Program spent \$16 million on these and other global health programs.<sup>xv</sup>

### ***Centers for Disease Control and Prevention***

The Centers for Disease Control and Prevention is the agency responsible for protecting the health of Americans at home and abroad by monitoring health, detecting and investigating health problems, conducting research to enhance prevention, developing and advocating sound public health policies, implementing prevention strategies, promoting healthy behaviors, fostering safe and healthful environments, and providing leadership and training.<sup>xvi</sup> The CDC and the Agency for Toxic Substances and Disease Registry have developed a Global Health Strategy (published in 2000) to address the needs of low- and middle-income countries. Some of the priority program areas are: emergency response; emerging infectious diseases; vaccine-preventable diseases; HIV/AIDS, STDs and TB; non-vaccine eradication and elimination programs; reproductive health; health promotion and chronic disease prevention; tobacco-use prevention and control; micronutrient malnutrition; childhood lead poisoning; toxic substances and hazardous wastes; occupational safety and health and injury.<sup>xvii</sup>

One of the anticipated outcomes of the Global Health Strategy is expanded research capacity and greater knowledge of critical public health problems. In FY 2003, the CDC spent a total of \$381 million on global health. According to the CDC's Financial Management Office, \$24 million of global health expenditures is considered research.<sup>xviii</sup>

### ***National Institutes of Health***

The National Institutes of Health funds research on a number of topics that affect low- and middle-income countries. In FY 2003, the NIH invested \$2.7 billion in domestic and international HIV/AIDS research.<sup>xix</sup> In consultation with the NIH Budget Office, we determined that the portions of the HIV/AIDS investment most applicable to our definition of global health are \$279 million for research at international sites and \$405 million for HIV/AIDS vaccine research.<sup>xx</sup>

Emerging infectious diseases is another research area that has an impact on developing countries. The U.S. and the world have experienced a number of emerging infectious disease outbreaks recently, including SARS in 2003 and West Nile Virus in 1999. Often because of inadequate health care systems and poverty, infectious diseases disproportionately affect low- and middle-income countries.

About one-third of the world's population is infected with tuberculosis (TB), and 98 percent

of new cases occur in the developing world.<sup>xxi</sup> In 2003, the NIH spent \$122 million on research to better treat and prevent TB. Vector-borne diseases, such as malaria, also primarily affect low- and middle-income countries. Malaria killed more than one million people in 2002. Other vector-borne diseases include plague, dengue, and Lyme disease. Low- and middle-income countries also bear a high burden of infant mortality. The table at left outlines the NIH's investment in health research on conditions that primarily affect developing countries.

#### **NIH Global Health Research Expenditures in FY 2003**

(in millions)<sup>xix</sup>

Emerging Infectious Diseases	\$1,362
HIV/AIDS Vaccine	\$405
International HIV/AIDS Research	\$279
Infant Mortality/Low Birthweight	\$523
Tuberculosis	\$122
Vector-borne Diseases	\$296
<b>Total</b>	<b>\$2,987</b>

The portion of NIH research that is performed abroad is very small in comparison to the total NIH budget and includes grants to institutions in developed and developing countries. International health spending by the NIH—that is actually performed abroad—is about one percent of its budget. The table on page 6 captures the areas of research from which low- and middle-income countries would benefit most and includes research that is performed both in the U.S. and abroad. There is overlap in these categories and we acknowledge that our estimate is possibly high.

## Foundations

Foundations have made significant contributions to improving the health of low- and middle-income nations. Some of the foundations focused on global health are the Bill & Melinda Gates Foundation, the Ford Foundation, the Rockefeller Foundation, the John D. and Catherine T. MacArthur Foundation, the William and Flora Hewlett Foundation, the W.K. Kellogg Foundation and the Packard Foundation.

Most foundations publish their total grant expenditures annually, but only a few list grants paid by subject area, such as global health. However, the Foundation Center tracks international grant-making by more than 1000 larger foundations. These and other foundations distributed an estimated total of \$1.014 billion in international health grants in 2002.<sup>xxii</sup> The Foundation Center does not state how much of the \$1.014 billion is for research, but approximately 18% of *domestic and international* foundation giving for health in 2002 was for medical research.<sup>xxiii</sup> If the same percentage of international health giving were for medical research, then \$183 million was invested in international health R&D by foundations in 2002.

The Bill & Melinda Gates Foundation is a relative new-comer, but already dominates the global health community. The Gates Foundation plays a substantial role in stimulating investment to improve global health inequities, and its programming is designed in part to promote research and development of health technologies that will accelerate prevention, elimination or eradication of diseases, as well as increase their affordability in low-resource settings. As a result, the Foundation concentrates investment on preventing and controlling infectious diseases, addressing the pandemics of HIV/AIDS and TB, and strengthening reproductive and child health in developing nations. The Gates Foundation has spent \$4.2 billion on its global health programs since its inception.<sup>xxiv</sup> In 2003 alone, it distributed \$577 million in grants for global health. Of this total, \$322 million was invested in global health research.<sup>xxv</sup> In particular, the Gates Foundation granted \$200 million to the Foundation of the National Institutes of Health in 2003 to establish the Grand Challenges in Global Health initiative.

## Universities and Independent Research Institutes

Universities also play a role in funding global health R&D by supporting faculty members who study related topics. Most university funds allocated to global health research originate from other sectors that are captured in this estimate. Therefore, to avoid double counting, we do not list universities in our one-page summary (page 3) of the U.S. investment in global health research.

Independent research institutes, such as the Howard Hughes Medical Institute (HHMI) and the Seattle Biomedical Research Institute (SBRI) also invest in global health research. HHMI supports researchers in foreign countries through grants worth about \$543,600 a year.<sup>xvii</sup> These grants are either awarded to researchers in low- and middle-income countries or are focused on diseases and conditions that primarily affect populations in developing countries.

With the exception of HHMI, research institutes like SBRI receive funding from many sources including the NIH, universities and the Bill & Melinda Gates Foundation. In our efforts to gather this information, we concluded that the funding used at universities and independent research institutes to perform global health research comes primarily from external sources that are captured in the other categories of funding.

- i Research!America 2002 Investment in U.S. Health Research, April 2004.
- ii U.S. Department of Health and Human Services, Office of Global Health. [www.globalhealth.gov](http://www.globalhealth.gov).
- iii World Health Organization. The World Health Report 2004—Changing History. Geneva, Switzerland: World Health Organization; 2004.
- iv Yach, D., et al. The Global Burden of Chronic Diseases: Overcoming Impediments to Prevention and Control. *JAMA*. 2004; 291(21): 2616-2622.
- v Global Forum for Health Research Report 2003-04, May 2004.
- vi Pharmaceutical Research and Manufacturers of America. PhRMA 2005 Industry Profile.
- vii Russo, JB and Wertheimer, AI. *Pharm Aid*. *Pharmaceutical Executive*. April 2004.
- viii A Survey of the Use of Biotechnology in U.S. Industry, Department of Commerce, October 2003.
- ix Daar, A.S., et al., Top ten biotechnologies for improving health in developing countries, Volume 32, p.229-232, *Nature Genetics*, 2002.
- x USAID: Bureau for Global Health Congressional Budget Justification FY 2005.
- xi Consolidated Appropriations Resolution, 2003. United States Agency for International Development, Child Survival and Health Program Fund.
- xii Department of State FY 2005 International Affairs Budget Request.
- xiii Personal Correspondence with Dr. Tikki Pang, Director, Research Policy & Cooperation, WHO.
- xiv Army RDT&E Budget Item Justification, accessed on March 31, 2005 at [www.dtic.mil](http://www.dtic.mil).
- xv U.S. Department of Defense Military Health System. Defense Health Program FY 2005 Budget Estimates, RDT&E Budget Item Justification – R-2. [www.ha.osd.mil](http://www.ha.osd.mil).
- xvi Centers for Disease Control and Prevention. [www.cdc.gov/aboutcdc.htm](http://www.cdc.gov/aboutcdc.htm).
- xvii Centers for Disease Control and Prevention. Working with Partners to Improve Global Health: A Strategy for CDC and ATSDR, 2000.
- xviii Personal correspondence with CDC Financial Management Office.
- xix National Institutes of Health. Estimates of Funding for Various Diseases, Conditions and Research Areas. [www.nih.gov/news/fundingresearchareas.htm](http://www.nih.gov/news/fundingresearchareas.htm).
- xx Personal correspondence with Richard Turman, NIH Associate Director for Budget.
- xxi U.S. Department of State. Tuberculosis: Global Impact and U.S. Response. [www.state.gov/g/oes/rls/fs/2003/18798.htm](http://www.state.gov/g/oes/rls/fs/2003/18798.htm).
- xxii The Foundation Center. International Grantmaking III, 2004.
- xxiii The Foundation Center. Distribution of Foundation Grants by Subject Categories, circa 2002.
- xxiv The Bill & Melinda Gates Foundation. [www.gatesfoundation.org/GlobalHealth/Grants](http://www.gatesfoundation.org/GlobalHealth/Grants).
- xxv The Bill & Melinda Gates Foundation. 2003 Annual Report.
- xxvi Howard Hughes Medical Institute, Awards Database. [www.hhmi.org/grants/reports/awards/main](http://www.hhmi.org/grants/reports/awards/main).



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