G-FINDER 2013
Global Funding of Innovation for Neglected Diseases

POLICYCURES

NEGLECTED DISEASE RESEARCH AND DEVELOPMENT: **THE PUBLIC DIVIDE**

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This is the sixth in a series of annual reports undertaken by Policy Cures staff in the framework of the G-FINDER project. We are very grateful to all the participants in our survey. With their commitment, we have been able to continue to provide accurate up-to-date financial information in the field of research and development (R&D) for neglected diseases. The patience and engagement of the participating government and multilateral agencies, academic and research institutions, product development partnerships, philanthropic institutions and pharmaceutical and biotechnology companies has made this project possible.

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ACRONYMS

ACTs	Artemisinin-based combination therapies
ADME	Absorption, distribution, metabolism and excretion
Aggregate industry	Aggregate pharmaceutical and biotechnology company respondents
AIDS	Acquired Immune Deficiency Syndrome
ALM	American Leprosy Missions
AMC	Advance market commitment
ARV	Antiretroviral
AusAid	Australian Government Overseas Aid Program
Australia - India SRF	Australia - India Strategic Research Fund
Australian DIICCSRTE/ARC	Australian Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCSRTE) and/or Australian Research Council (ARC)
Australian NHF	Australian National Heart Foundation
Australian NHMRC	Australian National Health and Medical Research Council
Brazilian DECIT	Brazilian Ministry of Health: Department of Science and Technology
Canadian CIDA	Canadian International Development Agency
Canadian CIHR	Canadian Institutes of Health Research
Chilean FONDECYT	Chilean National Fund for Scientific and Technological Development
Colombian Colciencias	Colombian Department for Science, Technology and Innovation
DAHW	German Leprosy and TB Relief Association
DALY	Disability adjusted life year
DCs	Developing countries
DNDi	Drugs for Neglected Diseases initiative
Dutch DGIS	Dutch Ministry of Foreign Affairs - Directorate General of Development Cooperation
EAggEC	Enteroaggregative *E. coli*
EC	European Commission: Research Directorate-General
EDCTP	European and Developing Countries Clinical Trials Partnership
EMA	European Medicines Agency
ETEC	Enterotoxigenic *E. coli*
EU	European Union
EVI	European Vaccine Initiative
FDC	Fixed-dose combination
FIND	Foundation for Innovative New Diagnostics
French ANR	French National Research Agency
French ANRS	French National Agency for Research on AIDS and Viral Hepatitis
FRF	Fondation Raoul Follereau
FTE	Full time equivalent
Gates Foundation	Bill & Melinda Gates Foundation
GAVI	Global Alliance for Vaccines and Immunizations
GBP	Global Burden of Disease Study
GDP	Gross domestic product
GERD	Gross expenditure on research & development
German BMBF	German Federal Ministry of Education and Research

ACRONYMS

German BMZ	German Federal Ministry for Economic Cooperation and Development
German DFG	German Research Foundation
G-FINDER	Global Funding of Innovation for Neglected Diseases
GHIF	Global Health Investment Fund
HAT	Human African Trypanosomiasis
HIC	High-income country
HIV	Human Immunodeficiency Virus
IAVI	International AIDS Vaccine Initiative
IDC	Innovative developing country
IDRI	Infectious Disease Research Institute
IMF	International Monetary Fund
Indian CSIR	Indian Council of Scientific and Industrial Research
Indian DBT	Indian Department of Biotechnology
Indian ICMR	Indian Council of Medical Research
Inserm	Inserm - Institute of Infectious Diseases
IPM	International Partnership for Microbicides
ITI	International Trachoma Initiative
ITM	Institute of Tropical Medicine
IVCC	Innovative Vector Control Consortium
IVI	International Vaccine Institute
LMIC	Low- and middle-income country
MDR-TB	Multidrug-resistant tuberculosis
MDT	Multidrug therapy
MESA	Malaria Eradication Scientific Alliance
MIC	Middle-income country
MMV	Medicines for Malaria Venture
MNC	Multinational pharmaceutical company
MSF	Médicines San Frontières
NIAID	National Institute of Allergy and Infectious Diseases
NLR	Netherlands Leprosy Relief
Norwegian NORAD	Royal Norwegian Ministry of Foreign Affairs and/or Norwegian Agency for Development Cooperation
NTS	Non-typhoidal *Salmonella enterica*
OAR	Office of AIDS Research
OECD	Organisation for Economic Cooperation and Development
ORT	Oral rehydration therapy
OWH	OneWorld Health
PATH	Program for Appropriate Technology in Health
PDP	Product development partnership
QIMR	Queensland Institute of Medical Research
R&D	Research and development
RCDC	US NIH's Research, Condition and Disease Categorization systems
Renaissance HSC	Renaissance Health Service Corporation
RePORTER	US NIH's Research Portfolio Online Reporting Tools
Sandler Center	Sandler Center for Basic Research in Parasitic Diseases
SME	Small pharmaceutical and biotechnology firms
SSI	Statens Serum Institute
STD	Sexually transmitted disease
Swiss SDC	Swiss Agency for Development and Cooperation
TB	Tuberculosis
TB Alliance	Global Alliance for TB Drug Development
TBVI	TuBerculosis Vaccine Initiative
TLMI	The Leprosy Mission International
UK	United Kingdom

ACRONYMS

UK DFID	UK Department for International Development
UK MRC	UK Medical Research Council
US	United States
US CDC	US Centers for Disease Control
US DOD	US Department of Defense (DOD) including DOD Defense Advanced Research Projects Agency
US FDA	US Food and Drug Administration
US NIH	US National Institutes of Health
USAID	US Agency for International Development
WHO	World Health Organization
WHO/TDR	World Health Organization Special Programme for Research and Training in Tropical Diseases
WHOPES	World Health Organization Pesticide Evaluation Scheme
XDR-TB	Extensively drug-resistant tuberculosis
YOY	Year-on-year

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EXECUTIVE SUMMARY

The survey

The sixth G-FINDER survey reports on 2012 global investment into research and development (R&D) of new products for neglected diseases, and identifies trends and patterns across the six years of global G-FINDER data. It covers:

- 31 neglected diseases
- 134 product areas for these diseases, including drugs, vaccines, diagnostics, microbicides and vector control products
- Platform technologies (e.g. adjuvants, delivery technologies, diagnostic platforms)
- All types of product-related R&D, including basic research, discovery and preclinical, clinical development, Phase IV and pharmacovigilance studies, and baseline epidemiological studies.

In all, 201 organisations completed the survey in 2012.

Findings

In 2012, reported funding for neglected disease R&D was $3,165m (*$3,475m in unadjusted 2012 US$*). Funding increased slightly compared to 2011, with repeat survey participants – year-on-year (YOY) funders – increasing their investment by $92.1m (up 3.2%). An additional $183.9m was reported by organisations that have participated in some, but not all, years of the survey (irregular participants).

This is a positive change compared to recent years, as global investment in neglected disease R&D had been declining since 2009. All key funding sectors contributed to this YOY increase, with philanthropic funding rising by $51.9m (up 9.4%), public funding by $27.8m (up 1.5%) and industry investment by $12.4m (up 2.5%).

DISEASE FINDINGS

As in previous years, the three 'top tier' diseases – HIV/AIDS, malaria and tuberculosis (TB) – received the vast majority of global neglected disease R&D funding. However, investment in the top tier diseases overall continued to drop, while funding for the second and third tier diseases increased, resulting in further rebalancing between the three groups.

Indeed, YOY funding for TB continued to drop at a similar rate as last year (down $32.5m, -6.5%) while malaria joined this downward trend after seeing a modest increase in 2011 (down $22.3m, -4.2%). HIV/AIDS was the only top tier disease that saw an increase in YOY funding (up $37.8m, 3.8%), which was also the first time the disease saw a rise in investment since 2008. Increased investment in 'second tier' diseases – dengue, diarrhoeal diseases, kinetoplastids, bacterial pneumonia & meningitis, helminth infections and salmonella infections – mainly came from a YOY rise in dengue funding (up $17.7m, 7.9%). Investments in the remaining second tier diseases were mixed, with small increases seen for salmonella infections (up $6.7m, 16.5%) and helminth infections (up $5.1m, 7.4%), and a cut for bacterial pneumonia & meningitis (down $2.2m, -2.4%). Funding for diarrhoeal diseases (up $1.0m, 0.7%) and kinetoplastids (down $1.0m, -0.9%) was essentially steady. As in previous years, the 'third tier' diseases – leprosy, trachoma, Buruli ulcer and rheumatic fever – each received less than 0.5% of global R&D funding.

Funding for platform technologies – adjuvants and immunomodulators, general diagnostic platforms, and delivery technologies and devices – increased notably in 2012, in particular for adjuvants and immunomodulators (up $19.1m, 371%). Core funding – investments that are not earmarked and are given to organisations working on multiple neglected diseases – also rose (up $20.6m, 26.5%), predominantly due to an increase in funding to the University of Oxford for its overseas research partnerships.

FUNDERS

"Funding from most HIC governments was flat or down"

The public sector continued to play a key role in neglected disease R&D, providing almost two-thirds of global funding ($2.0bn, 63.2%), predominantly from high-income country (HIC) governments ($1.9bn, or 95.9% of public sector funding). The philanthropic sector contributed $631.0m (19.9%) while industry invested $527.2m (16.7%).

In line with previous years, the top 3 public funders were the US, the UK and the European Commission (EC). Of these, the US was the only public funder to increase investment in neglected disease R&D (up $86.3m, 6.4%), reversing the 2010 and 2011 trend of funding cuts. UK public funding continued to drop (down $36.3m, -28.1%), largely due to uneven disbursement of UK Department for International Development (DFID) funding. The EC also dropped its funding by $12.1m (-11.5%). There were also decreases from a number of other European governments including the Netherlands (down $11.1m, -47.9%) and France (down $6.1m, -10.3%). On the other hand, several countries increased their funding, such as Germany (albeit from a very low base) and Canada (partially due to better reporting).

Philanthropic funding increased again, mostly due to a $53.0m rise (up 56.0%) in funding from the Wellcome Trust. Investment from the Bill & Melinda Gates Foundation, which was by far the largest philanthropic funder in 2012, remained stable (down $3.8m, -0.8%). Multinational pharmaceutical companies (MNCs) were solely responsible for the small rise in industry investment, increasing funding by $17.4m (up 3.7%), whereas investment from small pharmaceutical and biotechnology firms (SMEs) continued to drop (down $5.0m, -23.1%).

FUNDING FLOWS

Just under three-quarters of 2012 R&D funding was in the form of external grants (72.2% or $2,285m), while intramural funding (self-funding) by public research institutions and private companies accounted for the rest ($879.8m, 27.8%). The slight increase in overall neglected disease R&D investment was reflected in a rise in both external funding (up $70.2m, 3.4%) and self-funding (up $21.8m, 2.7%).

"Funding to PDPs saw the largest cut so far"

YOY funding to product development partnerships (PDPs) has been declining since 2009, but this year saw its largest cut so far (down $87.4m, -20.0%). This means that only $376.1m (16.5%) of the grant pie went to PDPs, down from a fifth in 2011. The funding cuts partially reflect uneven disbursement of multi-year grants and the fact that the World Health Organization Special Programme for Research and Training in Tropical Diseases (WHO/TDR) ceased its neglected disease R&D activities (and had received $30.6m in 2011). However, it also reveals more entrenched underlying trends, with over half of top YOY PDP funders either freezing or further decreasing their PDP investments in 2012.

DISCUSSION

Funding between disease tiers continued to rebalance

- While investment in the top tier diseases overall continued to drop, funding for the second and third tier diseases increased. Top tier funding accounted for 66.6% of global R&D funding for neglected diseases in 2012, down from 69.4% in 2011. Second tier diseases accounted for 24.4% (up from 24.1% in 2011) and third tier diseases for 0.9% (up from 0.8% in 2011)

- The drop in top tier investment was driven by funding cuts for both TB and malaria, while investment in HIV/AIDS increased for the first time since 2008. The funding increase in second tier diseases was mainly due to additional industry investment, particularly in dengue
- Investment in non-disease specific fields also increased in 2012. The rise in platform technology investments (up $25.6m, 153%) came from new funding from the US National Institutes of Health (NIH) for adjuvants and immunomodulators and increased interest from the Gates Foundation. Core-funding of multi-disease organisations was also up (by $20.6m, 26.5%), mainly driven by additional funding going to the University of Oxford.

Increased US public funding masked a large drop in funding from other HICs

- A large increase in YOY US public funding (up $86.3m, 6.4%), largely via the US NIH, masked a significant drop in neglected disease R&D investment from the remaining HIC governments. Non-US HIC public funding fell $52.6m (-12.4%) in 2012, with 11 governments cutting or freezing funding. Since the global financial crisis, total annual investment from this group has fallen by 20% ($90.6m, -19.6%) from its 2009 peak
- Funding from low- and middle-income countries (LMICs) increased by $9.3m (up 30.8%), but LMICs still only accounted for 4.0% of public funding in 2012. LMIC funding is usually directed towards domestic institutions, reflecting the dual LMIC objectives of balancing the advancement of science and development of new products, with generating and strengthening their domestic research capabilities
- As reported last year, the 2007-2011 period saw a large increase in basic research investment, while public funding for product development was flat. Unfortunately, public funding of product development has not picked up between 2011 and 2012, which could result in poor outcomes for some diseases that rely on investment from this sector.

Historically largest drop in PDP investment

- PDP funding saw its largest cut so far (down $60.5m, -14.8% when excluding WHO/TDR), partially due to uneven disbursement of multi-year grants, but also showing actual investment cuts from PDP funders
- Over the years, PDPs have diversified their funding sources from philanthropic organisations and aid agencies to recently include some science and technology agencies. However, investment from all three funding streams was down in 2012
- Other funding vehicles, such as the Global Health Investment Fund (GHIF) and investment in other intermediaries such as the European and Developing Countries Clinical Trials Partnership (EDCTP), may be seen as an alternative way to channel funding to PDPs or target industry directly.

Industry funding of least-commercial diseases may wane in absence of PDP involvement

- Industry funding was mainly targeted at semi-commercial diseases and those that have PDP involvement, such as dengue, malaria and TB. However, as funding to PDPs decreases, industry may direct its attention solely to semi-commercial diseases. Additional mechanisms to encourage industry funding of second and third tier diseases are therefore needed.

INTRODUCTION

Background to the G-FINDER survey

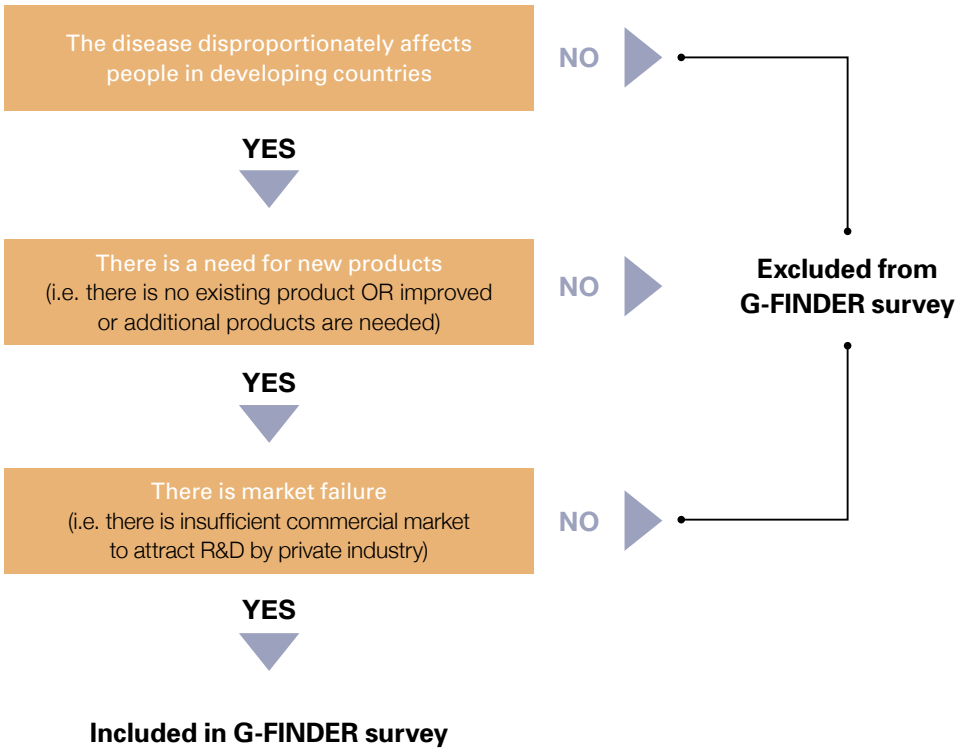
The first five G-FINDER reports have shed light on global investment into research and development (R&D) of new products to prevent, diagnose, manage or cure neglected diseases of the developing world each year since 2007. The sixth G-FINDER survey reports on 2012 investments.

The survey

WHICH DISEASES AND PRODUCTS ARE INCLUDED?

The scope of the G-FINDER survey is determined by applying three criteria (see Figure 1). Application of these criteria results in a list of neglected diseases and products, for which R&D would cease or wane if left to market forces.

Figure 1. 3-step filter to determine scope of neglected diseases covered by G-FINDER



All product R&D is covered by the survey, including:

- Drugs
- Vaccines (preventive and therapeutic)
- Diagnostics
- Microbicides
- Vector control products (pesticides, biological control agents and vaccines targeting animal reservoirs)
- Platform technologies (adjuvants, diagnostic platforms and delivery devices). These are technologies that can potentially be applied to a range of neglected diseases and products but which have not yet been attached to a specific product for a specific disease.

We note that not all product types are needed for all diseases. For example, effective pneumonia management requires new developing-world specific vaccines, but does not need new drugs as therapies are either already available or in development.

Funders were asked to only report investments *specifically* targeted at developing-country R&D needs. This is important to prevent neglected disease data being swamped by funding for activities not directly related to product development (e.g. advocacy, behavioural research); or by 'white noise' from overlapping commercial R&D investments (e.g. HIV/AIDS drugs and pneumonia vaccines targeting Western markets; and investments in platform technologies with shared applications for industrialised countries). As an example, G-FINDER defines eligible pneumonia vaccine investments by strain, vaccine type and target age group; while eligible HIV/AIDS drug investments are restricted to developing-country relevant products such as fixed-dose combinations (FDCs) and paediatric formulations. Eligibility for inclusion is also tightly defined for platform technologies to ensure that only funding for platforms for developing world applications are included, as opposed to investment into platforms developed for commercial markets. Private sector investment into platform technologies is therefore excluded (see Annexe 5 for outline of R&D funding categories, setting out inclusions and exclusions).

The initial scope of G-FINDER diseases and eligible R&D areas was determined in 2007 in consultation with an International Advisory Committee of experts in neglected diseases and neglected disease product development (see Annexe 2). A further round of consultations took place in Year Two. As a result of this process, for the 2008 survey, the typhoid and paratyphoid fever disease category was broadened to include non-typhoidal *Salmonella enterica* (NTS) and multiple salmonella infections; while diagnostics for lymphatic filariasis were added as a neglected area. There have been no changes in survey scope since 2008. The final agreed scope of G-FINDER diseases, products and technologies is shown in Table 1.

Table 1. G-FINDER diseases, products and technologies

Disease	Basic research	Drugs	Vaccines (Preventive)	Diagnostics	Microbicides	Vaccines (Therapeutic)	Vector control products
HIV/AIDS	Restricted	Restricted	Y	Y	Y		
Malaria							
Plasmodium falciparum	Y	Y	Y	Y			Y
Plasmodium vivax	Y	Y	Y	Y			Y
Other and/or unspecified malaria strains	Y	Y	Y	Y			Y
Tuberculosis	Y	Y	Y	Y		Y	
Diarrhoeal diseases							
Rotavirus			Restricted				
Enterotoxigenic *E.coli* (ETEC)			Y	Y			
Cholera	Y	Restricted	Y	Y			
Shigella	Y	Restricted	Y	Y			
Cryptosporidium	Y	Restricted	Y	Y			
Enteroaggregative *E.coli* (EAggEC)			Y	Y			
Giardia				Y			
Multiple diseases	Y	Restricted	Y	Y			
Dengue	Y	Y	Y	Y			Y
Kinetoplastids							
Chagas' disease	Y	Y	Y	Y		Y	Y
Leishmaniasis	Y	Y	Y	Y		Y	
Sleeping sickness	Y	Y	Y	Y			Y
Multiple diseases	Y	Y	Y	Y		Y	Y
Helminth infections							
Roundworm (ascariasis)	Y	Y					
Hookworm (ancylostomiasis & necatoriasis)	Y	Y	Y				
Whipworm (trichuriasis)	Y	Y					
Strongyloidiasis & other intestinal roundworms	Y	Y	Y	Y			
Lymphatic filariasis (elephantiasis)	Y	Y		Y			Y
Onchocerciasis (river blindness)	Y	Y	Y	Y			Y
Schistosomiasis (bilharziasis)	Y	Y	Y	Y			Y
Tapeworm (cysticercosis/taeniasis)	Y	Y					Y
Multiple diseases	Y	Y	Y	Y			Y
Bacterial pneumonia & meningitis							
Streptococcus pneumoniae			Restricted	Y			
Neisseria meningitidis			Restricted	Y			
Both bacteria				Y			
Salmonella infections							
Non-typhoidal *Salmonella enterica* (NTS)	Y	Y	Y	Y			
Typhoid and paratyphoid fever *(S. typhi, S. paratyphi A)*	Y	Y	Y	Y			
Multiple salmonella infections	Y	Y	Y	Y			
Leprosy	Y	Y		Y			
Rheumatic fever			Y				
Trachoma			Y	Y			
Buruli ulcer	Y	Y	Y	Y			

	Adjuvants and immunomodulators	Delivery technologies and devices	Diagnostic platforms
Platform technologies (non-disease specific)	Restricted	Restricted	Restricted

Restricted denotes a category where only some investments are eligible, as defined in the outline of the R&D funding categories (see Annexe 5)
Y (Yes) denotes a category where a disease or product was included in the survey

WHAT TYPES OF INVESTMENTS ARE INCLUDED?

G-FINDER quantifies neglected disease investments in the following R&D areas:

- Basic research
- Product discovery and preclinical development
- Product clinical development
- Phase IV/pharmacovigilance studies of new products
- Baseline epidemiology in preparation for product trials.

Although we recognise the vital importance of activities such as advocacy, implementation research, community education and general capacity building, these are outside the scope of G-FINDER. We also exclude investment into non-pharmaceutical tools such as bednets or circumcision, and general therapies such as painkillers or nutritional supplements, as these investments cannot be ring-fenced to neglected disease treatment only.

HOW WAS DATA COLLECTED?

Two key principles guided the design of the G-FINDER survey. We sought to provide data in a manner that was consistent and comparable across all funders and diseases, and as close as possible to 'real' investment figures.

G-FINDER was therefore designed as an online survey into which all organisations entered their data in the same way according to the same definitions and categories, and with the same inclusion and exclusion criteria. All funders were asked to only include disbursements, as opposed to commitments made but not yet disbursed; and we only accepted primary grant data.[i] Survey respondents were asked to enter every neglected disease investment they had disbursed or received in 2012 into a password-protected online database. The exception was the United States National Institutes of Health (US NIH), for whom data was collected by mining the US NIH's Research Portfolio Online Reporting Tools (RePORTER) and Research, Condition and Disease Categorization (RCDC) systems.

Multinational pharmaceutical companies (MNCs) agreed to provide full data on their neglected disease investments. However, as these companies do not operate on a grant basis, the reporting tool was varied somewhat in their case. Instead of grants, companies agreed to enter the number of staff working on neglected disease programmes, their salaries, and direct project costs related to these programmes. All investments were allocated by disease, product and research type according to the same guidelines used for online survey recipients. As with other respondents, companies were asked to include only disbursements rather than commitments. They were also asked to exclude 'soft figures' such as in-kind contributions and costs of capital.

The sixth G-FINDER survey was open for a 5-week period from May to June 2012, during which intensive follow-up and support for key recipients led to a total of 9,204 entries being recorded in the database for financial year 2012 (a 13% increase from the previous year).

With the exception of US NIH grants, all entries over $0.5m (i.e. any grant over 0.02% of total funding) were then verified against the inclusion criteria and cross-checked for accuracy. Cross-checking was conducted through automated reconciliation reports that matched investments reported as disbursed by funders with investments reported as received by intermediaries and product developers. Any discrepancies were resolved by contacting both groups to identify the correct figure. US NIH funding data was supplemented and cross-referenced with information received from the Office of AIDS Research (OAR) and the National Institute of Allergy and Infectious Diseases (NIAID). Industry data was aggregated for MNCs and for smaller pharmaceutical companies and biotechs (SMEs) in order to protect their confidentiality.

[i] An exception was made for some US NIH data, where a proportion of grants could not be collected in this way due to changes in their data management system

WHO WAS SURVEYED?

G-FINDER is primarily a survey of funding, and thus of funders. In its sixth year, the survey was sent to 504 funders in 52 countries around the world. These included:

- Public, private and philanthropic funders in:
  - High-income countries (HICs) that are part of the Organisation for Economic Co-operation and Development (OECD)
  - European Union (EU) Member States and the European Commission (EC)
  - HICs and middle-income countries (MICs) outside the OECD but with a significant research base (such as Singapore and the Russian Federation)
- Public funders in three Innovative Developing Countries (IDCs) (South Africa, Brazil and India)
- Public funders in an additional 16 low- and middle-income countries (LMICs) (Argentina, Chile, Colombia, Ghana, Guatemala, Honduras, Iran, Malaysia, Mozambique, Nicaragua, Nigeria, Papua New Guinea, Senegal, Tanzania, Thailand, and Uganda)
- Private sector funders in four LMICs (Brazil, India, Indonesia and Thailand).

G-FINDER also surveyed a wide range of funding intermediaries, product development partnerships (PDPs) and researchers and developers who received funding. Data from these groups was used to better understand how and where R&D investments were made, to track funding flows through the system, to prevent double-counting, and to verify reported data.

In all, the 2012 survey was sent to 880 organisations identified as being involved in neglected disease product development as either funders or recipients, a 2.5% decrease on the number of organisations surveyed in 2011 (903 survey recipients). These were prioritised into three groups based on their R&D role (funder, PDP/intermediary or developer), level of funding, geographical location and area of disease and product activity:

- The maximum priority group included 25 organisations known from previous surveys to be major funders (over $10m per year) or major private sector developers investing internally into one of the target neglected diseases
- A high priority group of 96 organisations included known significant funders ($5–10m per year); potential research funders in high-Gross Expenditure on R&D (GERD) countries;[ii] and a range of academic research institutes, PDPs, government research institutes, multinational pharmaceutical firms and small companies, who collectively provided good coverage of R&D in all disease areas. This represented a reduction of 7% in the number of organisations in the high priority group compared to 2011 (103 organisations)
- The remaining survey recipients were known smaller funders (less than $5m per year) and other known grant recipients.

The G-FINDER process focused on the 121 organisations in the maximum and high priority groups, who likely represented the majority of global neglected disease R&D funding and activity during financial year 2012.

Survey participation remained consistent in 2012, with 201 organisations providing data (including 20 with no investment to report), compared to 204 in 2011, 240 in 2010, 218 in 2009, 208 in 2008 and 150 in 2007. However, there was some loss-to-follow-up, with 51 organisations reporting data for 2011, but not submitting data for 2012. In the maximum priority group, 23 recipients (96%) provided funding information for 2012. In the high priority group, 75 organisations (78%) provided full funding information for 2012, similar to the 80% seen last year. See Annexe 4 for a full list of survey participants.

[ii] Gross Expenditure on R&D as a percentage of Gross Domestic Product (GDP)

HOW WERE CHANGES IN SCOPE MANAGED?

It is important when comparing figures between survey years to distinguish between real changes in funding and *apparent* changes due to fluctuating numbers of survey participants. Funding figures have therefore been broken down to distinguish between:

1. Increases or decreases reported by repeat survey participants – called year-on-year (YOY) funders – which represent real funding changes
2. Changes associated with irregular survey participants. These include increases reported by new survey participants and decreases due to non-participation by organisations that provided data to G-FINDER in previous years but which were lost-to-follow-up. These do not represent true changes in neglected disease funding, but rather are related to expansion or contraction of G-FINDER's data capture.

Reading the findings

All reported funding is for investments made in the 2012 financial year (Year Six). Comparison is made, where relevant, to investments made in the 2011 (Year Five) financial year.

Throughout the text references to years are made as follows:

- 2007 refers to financial year 2007 or Year One of the survey
- 2008 refers to financial year 2008 or Year Two of the survey
- 2009 refers to financial year 2009 or Year Three of the survey
- 2010 refers to financial year 2010 or Year Four of the survey
- 2011 refers to financial year 2011 or Year Five of the survey
- 2012 refers to financial year 2012 or Year Six of the survey

For consistency, 2012, 2011, 2010, 2009 and 2008 funding data is adjusted for inflation and reported in 2007 US dollars (US$), unless indicated otherwise. This is important to avoid conflating real year-on-year changes in funding with changes due to inflation and exchange rate fluctuations. For reference purposes, unadjusted 2012 figures are also occasionally included. When this occurs, the unadjusted (nominal) figure is shown in italicised text in parentheses after the adjusted figure. For example, "Reported funding for R&D of neglected diseases reached $3,165m ($*3,475*m) in 2012". In this example, $3,475m represents the unadjusted nominal 2012 figure. In tables, unadjusted figures are also labelled as '2012 Nominal (US$)'. Unlike 2007, the subsequent surveys include aggregate industry figures in top 12 lists (2007 comparators have been updated to include aggregate industry data, and therefore differ from published top 12 figures for 2007).

Any changes in funding (increases or decreases) noted in the report refer only to those organisations that participated across all years of the survey, i.e. YOY funders. YOY amounts reported in previous years may not always match the YOY amount reported in Y6 due to dropouts (i.e. loss to follow-up).

Unless noted otherwise, all DALY (Disability Adjusted Life Year) figures in the report are 2010 DALYs for LMICs taken from the Global Burden of Disease Study 2010 (GBD 2010)[1], which represent the most comprehensive and recent figures available. We note that the 2010 GBD report used updated methods and data compared to previous GBD surveys, and so the DALYs quoted here may not be directly comparable to the 2004 GBD update figures used in previous G-FINDER reports.[2] The greater level of detail in the 2010 GBD data also means that the quoted figures for diarrhoeal diseases and bacterial pneumonia & meningitis reflect only DALYs and mortality related to pathogens that are within G-FINDER scope. In some cases, GBD 2010 estimates are lower than those derived using other methods or published by other groups, however they allowed the most consistent approach across diseases.

For brevity, we use the terms 'LMICs' and 'Developing Countries' (DCs) to denote low- and middle-income countries and 'HICs' to denote high-income countries as defined by the World Bank.[3] 'Innovative Developing Countries' (IDCs) refers to developing countries with a strong R&D base who participated in the G-FINDER survey (South Africa, Brazil, India). MNCs are defined as multinational pharmaceutical companies with revenues of over $10bn *per annum*.

Around 3.2% ($100.3m) of funding was reported to the survey as 'unspecified', usually for multi-disease programmes where funds could not easily be apportioned by disease. A proportion of funding for some diseases was also 'unspecified', for instance, when funders reported a grant for research into tuberculosis (TB) basic research and drugs without apportioning funding to each product category. This means that reported funding for some diseases and products will be slightly lower than actual funding, with the difference being included as 'unspecified' funding. This is likely to particularly affect figures from the US NIH for individual diseases, as the US NIH had a higher number of multi-disease grants than other funders.

A further 3.5% ($111.4m) was given as core funding to R&D organisations that work in multiple disease areas, for example, the European and Developing Countries Clinical Trial Partnership (EDCTP) and the Foundation for Innovative New Diagnostics (FIND). As this funding could not be accurately allocated by disease it was reported as unallocated core funding. In cases where grants to a multi-disease organisation were earmarked for a specific disease or product, they were included under the specific disease-product area.

Finally, readers should be aware that, as with all surveys, there are limitations to the data presented. Survey non-completion by funders will have an impact, as will methodological choices (See Annexe 1 for further details).

FUNDING BY DISEASE

In 2012, reported funding for neglected disease R&D was $3,165m (*$3,475m*). Funding increased slightly compared to 2011, with YOY funders (excluding variations due to irregular survey participants) investing $2,981m in 2012 (up $92.1m, 3.2%). This is a positive change compared to the small drop in YOY funding seen between 2010 and 2011 (down $3.6m, -0.1%). A further $183.9m was reported by irregular survey participants (those who have participated in the survey in some years, but not in others).

As in previous years, diseases fell into three distinct tranches when analysed by funding levels. The 'top tier' diseases – HIV/AIDS, malaria and tuberculosis (TB) – received two-thirds of total global neglected disease R&D funding, with HIV/AIDS receiving 33.6%, malaria 17.1% and TB 15.9%. HIV/AIDS was the only top tier disease that saw an increase in YOY funding (up $37.8m, 3.8%), which represents the first increase for this disease since 2008. YOY funding for TB continued to drop at a similar rate to the previous year (down $32.5m, -6.5%), while malaria funding also fell (down $22.3m, -4.2%) after seeing a modest increase in 2011.

The 'second tier' diseases each received between 1% and 8% of total funding, and include (as per last year's report, and in the same order) dengue, diarrhoeal diseases, kinetoplastids, bacterial pneumonia & meningitis, helminth infections and salmonella infections. Again, dengue saw the largest YOY increase in funding, although this year's increase was moderate at $17.7m (up 7.9%) compared to the $54.0m increase seen in 2011. Investment in the remaining second tier diseases was fairly stable with small increases seen for salmonella infections (up $6.7m, 16.5%) and helminth infections (up $5.1m, 7.4%) and a drop for bacterial pneumonia & meningitis (down $2.2m, -2.4%). Funding for diarrhoeal diseases (up $1.0m, 0.7%) and kinetoplastids (down $1.0m, -0.9%) was essentially stable.

The most poorly funded of the neglected diseases covered in this report are those in the 'third tier', which each received less than 0.5% of global funding. Diseases in the third tier include leprosy, trachoma, Buruli ulcer and rheumatic fever. Funding for leprosy more than doubled in 2012, with YOY funders increasing investment by $6.1m (up 135%), pushing it to the top of this group and increasing its overall share from 0.2% in 2011 to 0.4% in 2012. Funding for the other third tier diseases was relatively stable, with rheumatic fever investment up $46,000 (5.7%), trachoma down $0.7m (-7.7%) and Buruli ulcer down $22,000 (-0.6%). However, these changes are tiny in absolute terms and cannot be interpreted as trends.

Platform technologies are those that can potentially be applied to a range of neglected diseases and products, but which are not yet focused on a specific product or disease. In 2012, investment in platform technologies was up across the board, but particularly for adjuvants and immunomodulators, where YOY funding increased by $19.1m (up 371%). The vast majority of this rise came from new funding from the US National Institutes of Health (NIH, up $15.0m), which had invested virtually nothing in this area in 2011. The Bill & Melinda Gates Foundation also increased funding for adjuvants and immunomodulators (up $4.7m, 141%) as part of their Grand Challenges Explorations initiative and the start and ramp up of several other grants, including a grant given to the Infectious Disease Research Institute (IDRI) to develop new adjuvants.

Core funding – investment that was not earmarked and was given to an organisation that researches and develops products for multiple neglected diseases – reached $109.6m in 2012. This represents a YOY increase of $20.6m (up 26.5%), predominantly due to an increase in funding to the University of Oxford for its overseas research partnerships. YOY funding for unspecified diseases increased by $30.1m (up 47.9%), partially due to funding for the newly-established Global Health Investment Fund (GHIF).

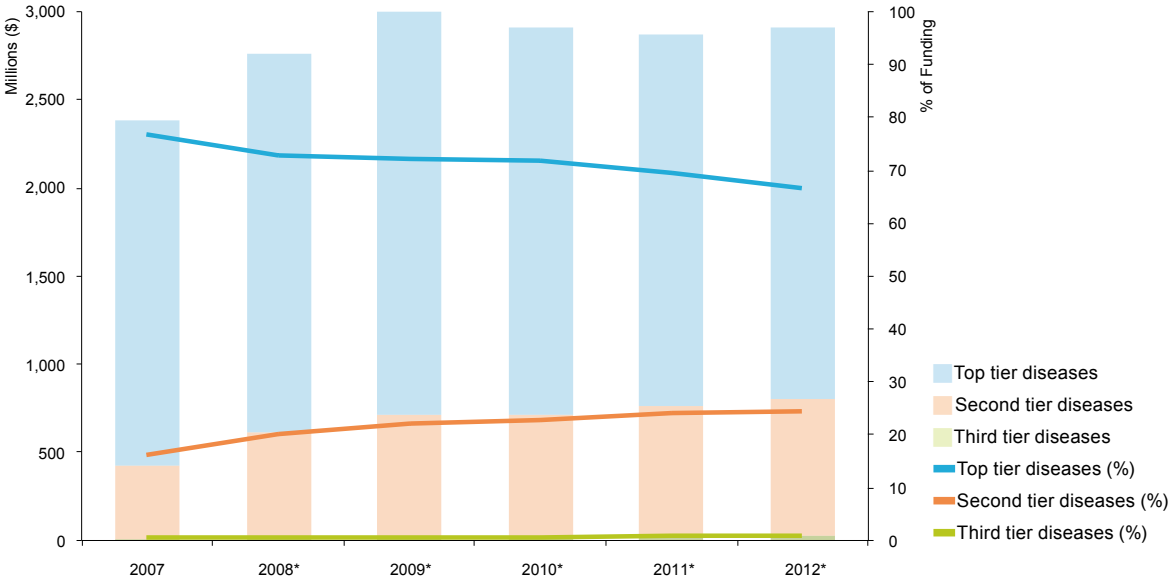
Table 2. Total R&D funding by disease 2007-2012#

Disease or R&D area	US$ (millions)^							Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2012 nominal*	2007	2008	2009	2010	2011	2012
HIV/AIDS	1,083	1,165	1,139	1,073	1,029	1,064	1,169	42.3	39.4	35.9	35.0	33.8	33.6
Malaria	468.4	541.7	593.9	547.0	558.8	542.5	587.1	18.3	18.3	18.7	17.9	18.4	17.1
Tuberculosis	410.4	445.9	550.9	575.4	525.8	502.1	564.2	16.0	15.1	17.4	18.8	17.3	15.9
Dengue	82.0	126.8	165.8	177.6	229.0	248.9	275.1	3.2	4.3	5.2	5.8	7.5	7.9
Diarrhoeal diseases	113.9	132.2	180.4	158.9	152.2	152.2	166.9	4.4	4.5	5.7	5.2	5.0	4.8
Kinetoplastids	125.1	139.2	162.3	147.9	131.7	136.3	148.1	4.9	4.7	5.1	4.8	4.3	4.3
Bacterial pneumonia & meningitis	32.5	90.8	69.0	92.9	96.6	99.2	108.9	1.3	3.1	2.2	3.0	3.2	3.1
Helminths (worms & flukes)	51.6	66.8	79.4	73.7	81.1	84.4	92.4	2.0	2.3	2.5	2.4	2.7	2.7
Salmonella infections	9.1	39.5	39.4	44.0	44.4	52.6	57.1	0.4	1.3	1.2	1.4	1.5	1.7
Leprosy	5.6	9.8	11.0	8.8	7.4	13.1	14.9	0.2	0.3	0.3	0.3	0.2	0.4
Trachoma	1.7	2.1	1.8	4.5	9.6	8.7	9.5	0.1	0.1	0.1	0.1	0.3	0.3
Buruli ulcer	2.4	2.0	1.8	5.5	5.8	6.1	6.6	0.1	0.1	0.1	0.2	0.2	0.2
Rheumatic fever	1.7	2.2	3.0	1.7	0.8	0.9	1.0	0.1	0.1	0.1	0.1	0.0	0.0
Platform technologies	10.0	16.3	22.1	27.4	17.2	43.8	48.9	0.4	0.6	0.7	0.9	0.6	1.4
Adjuvants and immunomodulators	2.7	2.2	5.6	9.2	5.1	24.4	27.0	0.1	0.1	0.2	0.3	0.2	0.8
General diagnostic platforms	4.8	5.3	8.6	9.4	10.3	15.4	17.1	0.2	0.2	0.3	0.3	0.3	0.5
Delivery technologies and devices	2.5	8.8	7.9	8.8	1.7	4.0	4.8	0.1	0.3	0.2	0.3	0.1	0.1
Core funding of a multi-disease R&D organisation	110.9	101.1	74.1	76.9	91.3	109.6	113.6	4.3	3.4	2.3	2.5	3.0	3.5
Unspecified disease	51.6	74.7	75.7	47.5	64.7	100.3	111.6	2.0	2.5	2.4	1.6	2.1	3.2
Disease total	2,560	2,956	3,169	3,063	3,045	3,165	3,475	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Figures are in current (2012) US dollars
# Please note that some of the diseases listed above are actually groups of diseases, such as the diarrhoeal illnesses and helminth infections. This reflects common practice and also the shared nature of research in some areas. For example, *Streptococcus pneumoniae* R&D is often targeted at both pneumonia and meningitis

The rebalancing between the three tiers continued in 2012, again mainly due to increased funding for the second and third tier diseases overall and a funding cut for the top tier diseases overall. As a result, funding concentration for the top tier diseases decreased to 66.6% in 2012 (down from 69.4% in 2011), with YOY funders cutting investment by $17.0m (-0.8%). The overall share of the second tier diseases went up slightly to 24.4%, with YOY funders increasing funding by $27.3m (up 4.0%). Third tier diseases also saw a small increase in overall share to 0.9% – largely driven by increases in leprosy funding – with YOY funders increasing investment by $5.4m (up 29.3%).

Figure 2. Funding concentration 2007-2012^



^ Percentages do not add to 100% because of non-disease specific and unclassified funding
* Figures are adjusted for inflation and reported in 2007 US dollars

HIV/AIDS

The Acquired Immune Deficiency Syndrome (AIDS) is caused by the Human Immunodeficiency Virus (HIV). This virus infects cells of the human immune system, destroying or impairing their function. As the immune system becomes progressively weaker, the patient becomes more susceptible to other diseases, often dying from TB or other infections.

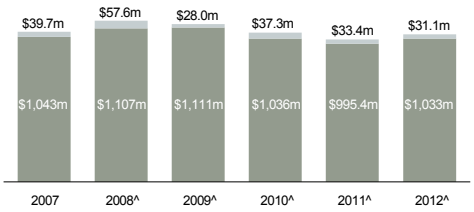
HIV/AIDS was responsible for 80.4 million disability adjusted life years (DALYs) and 1.4 million deaths in the developing world in 2010, making it the second highest cause of morbidity and the highest cause of mortality from neglected diseases.

The rapid mutation of the HIV virus has posed a significant challenge for vaccine development, with an efficacious vaccine still many years away. Whilst proving for the first time that a vaccine could prevent HIV infection, Phase III clinical trials of the most advanced vaccine candidate (a prime boost combination), demonstrated a very modest 30% efficacy in 2009.[4] Antiretroviral drugs are available, but most are not adapted for developing country (DC) use; for instance, paediatric formulations and fixed-dose combinations (FDCs) are needed. Current methods for early diagnosis and support of HIV treatment are also often unsuitable for DCs, although there has been some progress towards robust, simple, rapid point-of-care diagnostics, with several promising candidates in preclinical and clinical development.[5]

Several microbicide candidates are under study and being tested. Following several failures in Phase II/III trials (PRO 2000, BufferGel and VivaGel), new candidates using active ingredients from antiretrovirals (ARVs) have shown promising results in Phase II trials. These include dapivirine gel, which has completed Phase I/II trials,[6] and a long acting dapivirine-based microbicide ring, which has moved into Phase III trials.[7] Tenofovir gel has had contrasting results from two Phase III trials: CAPRISA 004, which found it to be safe and effective, and VOICE, which found the gel to be ineffective.[8] Tenofovir gel is being further evaluated in another Phase III trial, FACTS 001.[8] Additionally, resistance to the ARV component of these microbicides in HIV infected individuals or those who develop HIV while using the microbicide is a growing concern.[5]

R&D needed for HIV/AIDS in DCs includes:

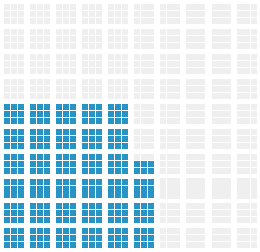
- Basic research
- Drugs specific to DC needs
- Preventive vaccines
- Diagnostics
- Microbicides



IRREGULAR SURVEY PARTICIPANTS
REPEAT SURVEY PARTICIPANTS
^ Figures are adjusted for inflation and reported in 2007 US dollars

$1.06 BILLION

TOTAL SPEND ON HIV/AIDS R&D IN 2012



33.6%

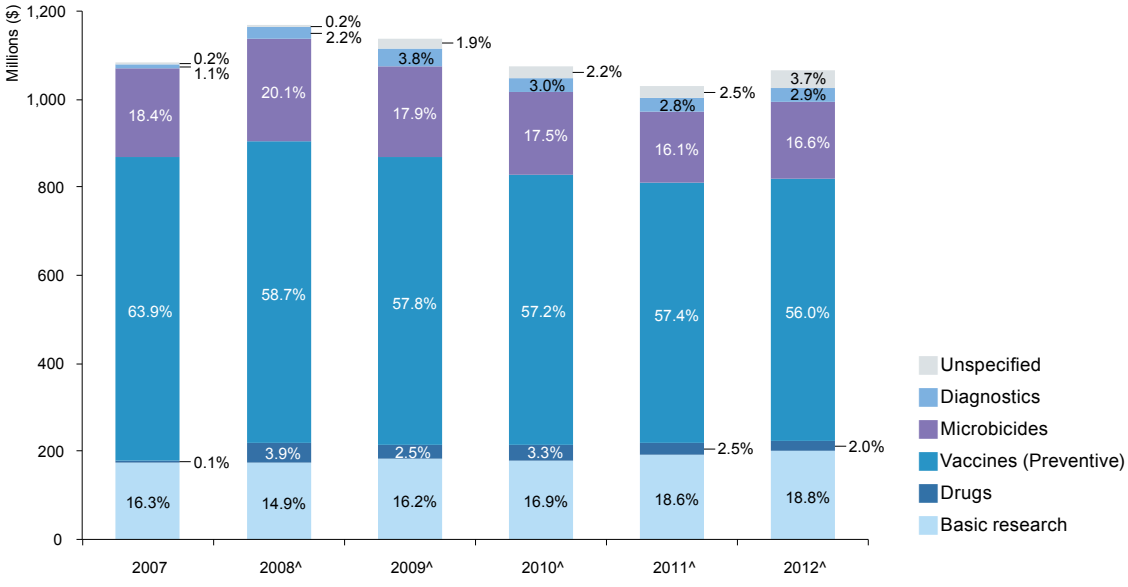
OF GLOBAL R&D FUNDING

HIV/AIDS received $1,064m (*$1,168m*) in R&D funding in 2012. YOY funding increased by $37.8m (up 3.8%) to $1,033m, reversing the previous year's drop of $41.1m (-4.0%). The remaining $31.1m in funding was provided by irregular survey participants. Despite this change, HIV/AIDS' share of total funding remained the same at 33.6%.

As in previous years, over half of HIV/AIDS funding was directed towards vaccine development ($596.1m, 56.0%). Basic research and microbicides each received similar levels of funding at $200.5m (18.8%) and $176.5m (16.6%), respectively, while much smaller amounts were invested in diagnostics ($30.7m, 2.9%) and drug development ($21.4m, 2.0%).

Almost all product areas enjoyed an increase in YOY funding, including microbicides (up $9.8m, 6.0%), vaccines (up $9.3m, 1.6%), basic research (up $8.4m, 4.6%) and diagnostics (up $2.7m, 11.9%). The only exception was drug development, which saw a drop in YOY investment of $5.3m (-22.3%). The majority of this decrease was due to the completion of a Gates Foundation grant for the Partners PrEP Study (a study into the use of pre-exposure prophylaxis [PrEP] to prevent HIV infection).

Figure 3. HIV/AIDS R&D funding by product type 2007-2012



^ Figures are adjusted for inflation and reported in 2007 US dollars

The top 12 funders accounted for 93.0% of total HIV/AIDS R&D funding in 2012. The US NIH was once again by far the largest funder, contributing $649.2m (61.0%), and had the largest increase in funding (up $17.8m, 2.8%). Other large increases came from the Wellcome Trust (up $11.0m, 65.2%, partially due to uneven disbursement across their funding cycle) and the UK Department for International Development (DFID, up $5.5m, 33.3%). Those funders that decreased their investment did so in moderation, including the European Commission (EC, down $4.1m, -22.2%) and the Gates Foundation (down $1.7m, -1.5%). The apparent drop in industry investment came from irregular survey participants, with YOY funders actually increasing their contributions by $0.4m (up 3.2%).

Table 3. Top 12 HIV/AIDS R&D funders 2012

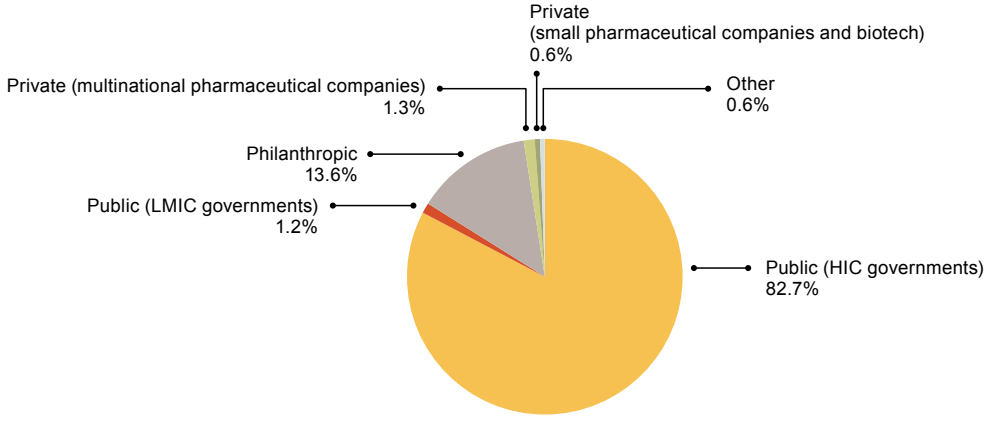
Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
US NIH	678.8	643.8	688.9	657.3	631.4	649.2	62.7	55.3	60.5	61.3	61.4	61.0
Gates Foundation	92.0	160.5	119.4	118.7	110.9	109.3	8.5	13.8	10.5	11.1	10.8	10.3
USAID	67.5	67.8	68.2	68.4	65.0	63.6	6.2	5.8	6.0	6.4	6.3	6.0
US DOD	27.8	24.4	34.2	31.7	42.2	45.9	2.6	2.1	3.0	3.0	4.1	4.3
Wellcome Trust	6.9	9.4	9.3	11.4	16.8	27.8	0.6	0.8	0.8	1.1	1.6	2.6
UK DFID	31.2	28.7	38.3	21.1	16.6	22.2	2.9	2.5	3.4	2.0	1.6	2.1
Aggregate industry	19.6	47.4	35.3	30.1	23.0	20.3	1.8	4.1	3.1	2.8	2.2	1.9
European Commission	24.8	26.3	27.1	19.1	18.6	14.4	2.3	2.3	2.4	1.8	1.8	1.4
Inserm	0.3	1.2	12.5	13.9	13.8	13.1	0.0	0.1	1.1	1.3	1.3	1.2
French ANRS	10.5	14.7	11.9	11.1	9.5	10.3	1.0	1.3	1.0	1.0	0.9	1.0
Canadian CIHR	3.4	1.9	5.5	8.6	8.0	7.8	0.3	0.2	0.5	0.8	0.8	0.7
Undisclosed participant	-	1.1	3.1	3.9	1.5	5.9	0.0	0.1	0.3	0.4	0.1	0.6
Subtotal of top 12*	1,010	1,068	1,064	1,003	962.7	989.8	93.3	91.7	93.5	93.5	93.6	93.0
Disease total	1,083	1,165	1,139	1,073	1,029	1,064	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 12 reflect the top funders for those respective years, not the top 12 for 2012
- No reported funding

Public and philanthropic organisations provided the vast majority of HIV/AIDS R&D funding in 2012, with public funders investing $892.9m (83.9%), and a further $145.1m (13.6%) coming from the philanthropic sector. Almost all public funding (98.6%) came from funding agencies in high-income countries (HICs), of which the US NIH accounted for almost three-quarters. The pharmaceutical industry was again barely active in HIV/AIDS R&D, contributing $20.3m (1.9%). Of this total, two-thirds came from multinational pharmaceutical companies (MNCs, $13.7m, 67.4%) and a third from small pharmaceutical and biotechnology firms (SMEs, $6.6m, 32.6%).

Reflecting the increases seen from the US NIH and the Wellcome Trust respectively, YOY public funders increased their investment by $26.6m (up 3.1%) and the philanthropic sector increased its funding by $10.8m (up 8.3%). The pharmaceutical industry showed only a small increase as previously mentioned.

Figure 4. HIV/AIDS R&D funding by funder type 2012



MALARIA

Malaria is a parasitic disease transmitted through the bite of an infected mosquito. The two most common types of malaria are caused by *Plasmodium falciparum* and *Plasmodium vivax*. Left untreated, malaria can cause severe illness and death, with children and pregnant women being the most vulnerable (85% of malaria deaths are children under five years of age).[9]

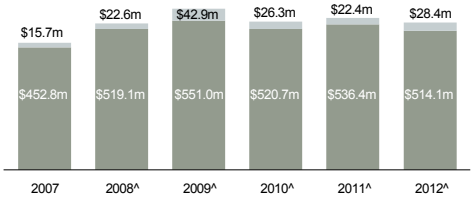
Malaria caused 82.7 million DALYs and at least 1.2 million deaths in the developing world in 2010, making it the highest cause of morbidity and third highest cause of mortality from neglected diseases. *P. falciparum* is by far the most deadly, and in 2010 accounted for 98% of malaria cases in Africa.[10] However, *P. vivax* is estimated to account for 25-40% of the global malaria burden[11] and is particularly common in South-East Asia and South America.[12]

The emergence of resistance to artemisinin-based combination therapies (ACTs) and insecticides means new therapies are needed.[13] Cheap, sensitive and specific Rapid Diagnostic Tests are available, but their quality and heat stability can be problematic, and new diagnostics are needed to distinguish between uncomplicated and severe malaria, and between malaria and other febrile illnesses.[5]

The Phase III trial of the most advanced malaria candidate, RTS,S, showed a 46% and 27% decrease in clinical malaria cases in children and infants respectively over 18 months of follow-up. However, vaccine efficacy did decline over time.[14,15] The next most advanced malaria vaccine candidates are in earlier stage clinical trials (Phase IIb).[16] Several promising synthetic artemisinin drug candidates are also in registration or late-stage clinical trials, including the ozonides arterolane/PQP (registration) and OZ439 (Phase IIa).[17] Malaria diagnostics received a boost in 2013 as the first field molecular assay (LAMP test) entered the market.[18] Vector control also improved slightly as two longer acting product reformulations were registered.[19,20]

Malaria R&D is needed in many areas including:

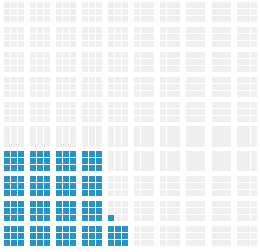
- Basic research
- Drugs
- Preventive vaccines
- Diagnostics
- Vector control products



^ Figures are adjusted for inflation and reported in 2007 US dollars

$542.5 MILLION

TOTAL SPEND ON MALARIA R&D IN 2012



17.1%

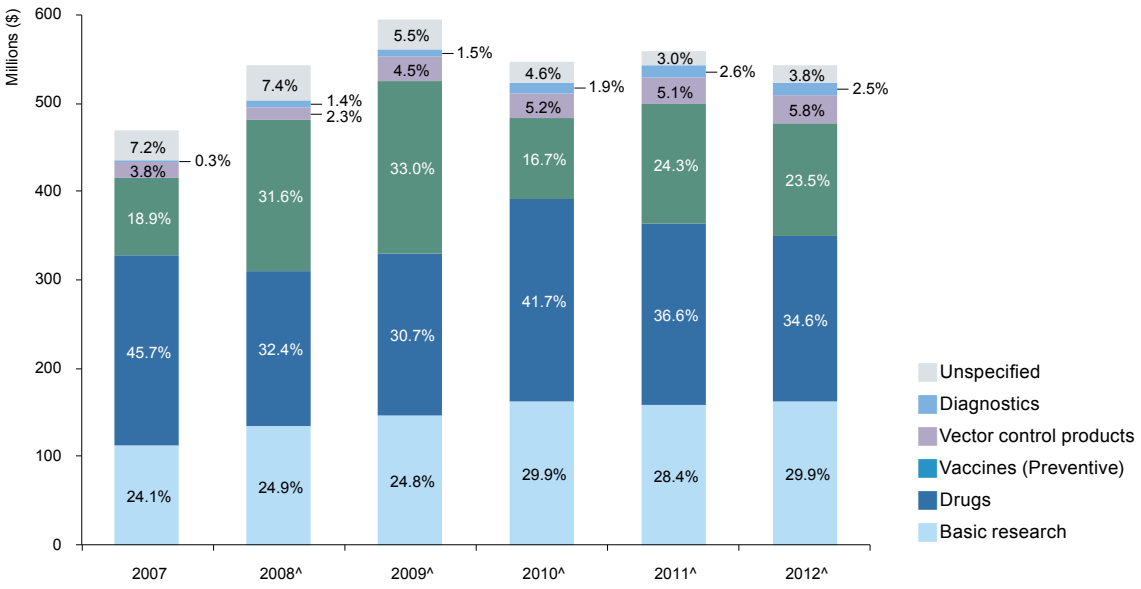
OF GLOBAL R&D FUNDING

Global funding for malaria R&D in 2012 was $542.5m (*$587.1m*). YOY funding dropped moderately (down $22.3m, -4.2%) to $514.1m, after seeing an increase in investment in 2011. Irregular survey participants provided the remaining $28.4m in funding. Although malaria remained the second most highly-funded disease, its share of total funding dropped to 17.1% (from 18.4% in 2011).

Drug development accounted for a third of total funding ($187.6m, 34.6%), closely followed by basic research ($162.3m, 29.9%). Another $127.5m (23.5%) went to preventive vaccine development, $31.3m (5.8%) to vector control products and $13.4m (2.5%) to diagnostics.

The majority of the overall drop in funding for malaria was due to decreased investments from YOY funders in drug development (down $19.2m, -9.5%), although funding for vaccine development was also cut (down $9.5m, -7.0%). All other product areas remained fairly stable, with YOY investment increasing slightly for vector control products (up $2.9m, 12.8%) and basic research (up $1.7m, 1.1%) and decreasing for diagnostics (down $1.0m, -8.1%).

Figure 5. Malaria R&D funding by product type 2007-2012



^ Figures are adjusted for inflation and reported in 2007 US dollars

Funding concentration remained high and stable, with the top 12 funders accounting for 91.7% of all malaria R&D funding in 2012, and the top four funding organisations (the US NIH, the Gates Foundation, industry and the Wellcome Trust) accounting for three-quarters (76.1%) of total funding.

The two top funders of malaria R&D went in opposite directions in 2012, with the US NIH increasing their investment by $29.2m (up 23.9%) and the Gates Foundation decreasing theirs by $29.7m (-20.5%). The drop in funding from the Gates Foundation was mainly seen in drug and vaccine development, with reasons for the drop including the completion of a vaccine grant to IDRI, and the ramping down of a drug development grant to the Medicines for Malaria Venture (MMV) and a vaccine development grant to the Program for Appropriate Technology in Health (PATH). Other top funders also cut funding in 2012, including the UK DFID (down $14.2m, -67.5%, although this was due to uneven disbursement across their funding cycle), the US Department of Defense (DOD, down $8.8m, -48.5%) and the EC (down $7.5m, -34.2%). The large increase by the US NIH and the modest increase of YOY pharmaceutical industry investment (up $13.2m, 13.7%) were not sufficient to balance these decreases. However, the additional funding by industry is notable, as they had cut funding in 2011 by $22.7m (-19.0%), and was due an increase of $14.2m in vaccine development by MNCs.

Table 4. Top 12 malaria R&D funders 2012

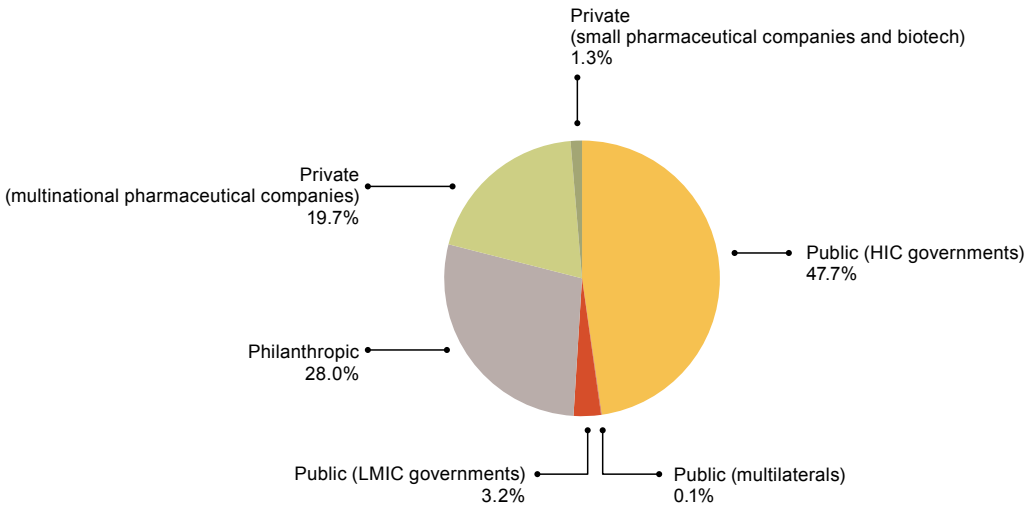
Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
US NIH	84.4	104.8	116.0	132.9	122.2	151.4	18.0	19.3	19.5	24.3	21.9	27.9
Gates Foundation	124.5	173.7	182.4	87.3	144.9	115.3	26.6	32.1	30.7	15.9	25.9	21.2
Aggregate industry	90.8	90.6	99.3	125.6	101.6	114.0	19.4	16.7	16.7	23.0	18.2	21.0
Wellcome Trust	28.3	26.7	27.2	34.0	31.6	32.0	6.0	4.9	4.6	6.2	5.7	5.9
UK MRC	18.6	19.0	20.0	22.4	20.6	18.5	4.0	3.5	3.4	4.1	3.7	3.4
European Commission	21.7	25.3	24.9	25.2	21.8	14.4	4.6	4.7	4.2	4.6	3.9	2.6
Australian NHMRC	7.7	9.0	10.2	9.6	11.6	13.6	1.6	1.7	1.7	1.8	2.1	2.5
USAID	9.2	8.2	8.2	8.8	7.8	10.0	2.0	1.5	1.4	1.6	1.4	1.8
US DOD	33.1	30.5	37.6	22.7	18.1	9.3	7.1	5.6	6.3	4.1	3.2	1.7
UK DFID	4.0	3.7	3.6	23.8	21.0	6.8	0.9	0.7	0.6	4.3	3.8	1.3
Inserm	0.5	0.5	3.5	4.6	5.0	6.3	0.1	0.1	0.6	0.8	0.9	1.2
Institut Pasteur	13.1	7.7	7.1	9.1	6.3	5.8	2.8	1.4	1.2	1.7	1.1	1.1
Subtotal of top 12*	442.4	507.9	544.6	505.8	512.5	497.4	94.4	93.7	91.7	92.5	91.7	91.7
Disease total	468.4	541.7	593.9	547.0	558.8	542.5	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 12 reflect the top funders for those respective years, not the top 12 for 2012

Over half of all malaria R&D funding came from public funders ($276.6m, 51.0%), with the philanthropic sector's contribution ($151.8m, 28.0%) being the next largest. Although HIC governments continued to contribute to the majority of public funding (accounting for 93.6%), the share of public funding coming from low- and middle-income countries (LMICs) increased to 6.3% (from 3.7% in 2011). About a fifth of funding came from industry ($114.0m, 21.0%), the vast majority of which was provided by MNCs ($106.8m, 93.7%).

In line with reduced investments from the Gates Foundation, which accounted for three-quarters of philanthropic funding of malaria R&D, the philanthropic sector's YOY funding decreased by $28.7m (-16.2%). YOY public funders also decreased their investment slightly (down $6.8m, -2.6%). Investment from YOY industry funders, on the other hand, increased with both MNCs (up $11.9m, 12.6%) and SMEs (up $1.2m, 84.8%) contributing to this rise.

Figure 6. Malaria R&D funding by funder type 2012



TUBERCULOSIS

Tuberculosis (TB) is a bacterial disease that usually affects the lungs, and is spread by air droplets from infected people. After infection, TB may remain latent with no symptoms. However, if it progresses to active disease, it causes coughing, night sweats, fever and weight loss. TB is a leading cause of death among people with HIV/AIDS.

TB was responsible for 49.0 million DALYs and 1.2 million deaths in the developing world in 2010. It was the fourth highest cause of morbidity and second highest cause of mortality from neglected diseases.

The only available TB vaccine is the BCG vaccine, an 80 year-old vaccine that is highly effective only against disseminated TB in children.[21] A new vaccine is needed, which should have greater efficacy than BCG, whilst matching or improving its safety profile. Current TB treatment regimens require adherence to a complex array of drugs over a lengthy period (from 6 to 24 months), leading to poor compliance and fuelling drug resistance, treatment failure and death. There is a need for rapid acting, potent antitubercular drugs that are efficacious against multidrug-resistant and extensively drug-resistant TB (MDR-TB and XDR-TB), as well as being safe to co-administer with antiretroviral therapies for HIV. Existing TB point-of-care diagnostics suitable for DC use are also inadequate, detecting less than half of active TB cases;[22] there is need for cheap, rapid, easy-to-use diagnostics that can distinguish between active and latent disease, with or without HIV co-infection.

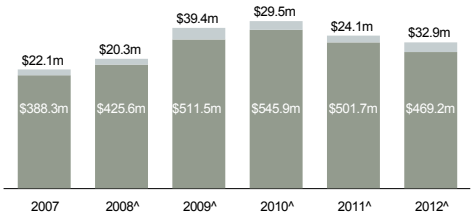
There are several vaccine candidates in late stage clinical trials. GSK M72 and AERAS-402/ Crucell Ad35 are in Phase II trials, and the ID93 + GLA-SE candidate (under co-development by Aeras and IDRI) entered Phase I clinical trials in August 2012.[23] In 2013, results from the MVA85A/AERAS-485 Phase IIb trial showed that the vaccine failed to show adequate efficacy.[24]

There are multiple drug candidates in development, including a novel three-drug combination (PA-824, moxifloxacin and pyrazinamide) that has shown promising results against both drug-sensitive and MDR-TB, and which could shorten the treatment of drug-resistant TB from two years to four months.[25] Encouragingly, bedaquiline (TMC207), a drug to treat pulmonary MDR-TB, was granted priority review by the US Food and Drug Administration (FDA) in September 2012,[26] and has now been registered.[27] Delamanid (OPC-67683) is currently in Phase III trials, after failing to gain approval from the European Medicines Agency (EMA) in July 2013.[28] The EMA considered the duration of treatment in the main study to be too short to establish the medicine's effectiveness.[29]

Progress has been made in diagnostic development with Cepheid's nucleic acid detection device (Xpert® MTB/RIF), with a total of 88 countries ordering the device by August 2013. Negotiated price reductions are increasing the affordability of this test for DCs, but the cost of both the unit itself and the test cartridges remains a barrier to access.[30]

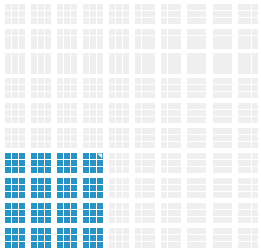
R&D needs for TB include:

- Basic research
- Drugs
- Diagnostics
- Preventive vaccines
- Therapeutic vaccines



$502.1 MILLION

TOTAL SPEND ON TB R&D IN 2012



15.9%

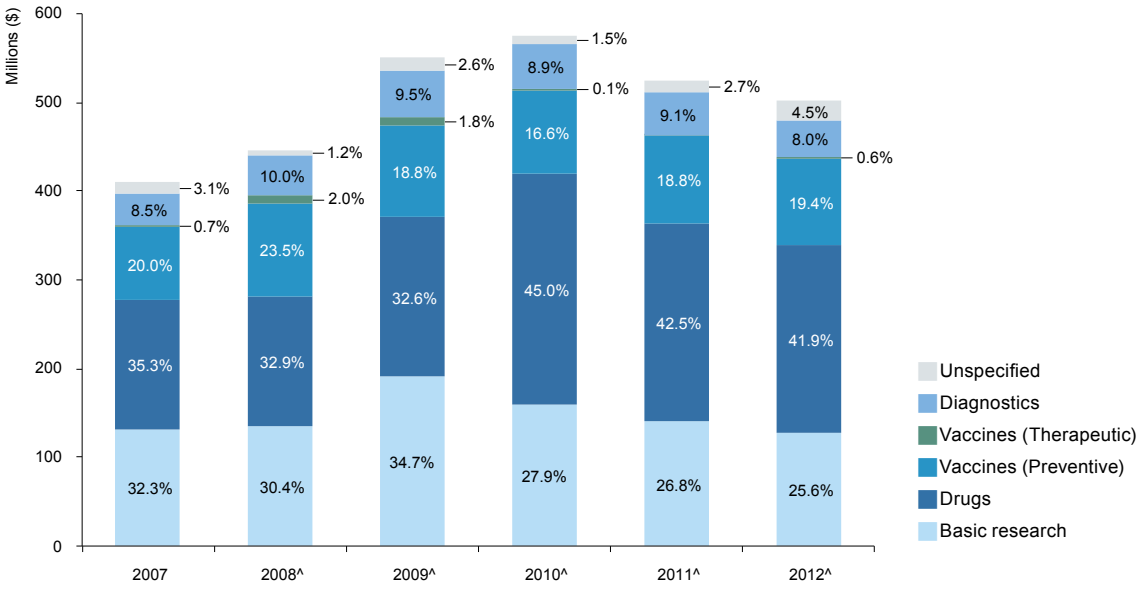
OF GLOBAL R&D FUNDING

TB received $502.1m (*$564.2m*) in R&D funding in 2012. Although it remained well within the 'top tier' of diseases, funding for TB dropped considerably for the second year in a row. YOY funders decreased their investment by $32.5m (-6.5%) to $469.2m – the largest absolute decrease among all neglected diseases in 2012. The remaining $32.9m in funding was provided by irregular participants. As a result of this decrease, TB's share of global funding dropped to 15.9% (from 17.3% in 2011).

Once again, the vast majority of TB funding went to drug development ($210.3m, 41.9%), followed by basic research ($128.6m, 25.6%) and preventive vaccines ($97.6m, 19.4%). Of the remaining funding, $40.0m (8.0%) was directed to diagnostics and $3.2m (0.6%) to therapeutic vaccines.

The decrease in TB funding was spread across most product areas, with YOY funders decreasing investment in drug development (down $15.2m, -7.0%, mainly due to a YOY industry cut of $27.9m, -21.5%), basic research (down $14.1m, -10.5%) and diagnostics (down $9.7m, -22.5%). Only therapeutic vaccines saw an increase in YOY funding (up $3.0m) albeit from a very low base, while funding for preventive vaccines remained stable.

Figure 7. TB R&D funding by product type 2007-2012



^ Figures are adjusted for inflation and reported in 2007 US dollars

Funding concentration for TB R&D remained very high, with just three funders (the US NIH, the pharmaceutical industry and the Gates Foundation) providing three-quarters of total funding ($380.3m, 75.7%).

Only two of the top 12 funders of TB R&D cut their funding in 2012, but both were relatively large drops: YOY funding from the pharmaceutical industry decreased by $19.8m (-13.3%) and the EC reduced its investment by $6.4m (-36.2%). Small increases from other top funders were not enough to balance these drops. The US NIH increased funding by $6.1m (up 4.0%), the Gates Foundation by $4.7m (up 5.4%), the Indian Council of Medical Research (ICMR) by $2.6m (up 97.6%) and the German Federal Ministry of Education and Research (BMBF) by $1.1m (up 27.1%). The Australian Agency for International Development (AusAID) became a top 12 funder for the first time – reflecting the first funding disbursements under that agency's new Medical Research Strategy – while the apparent increase from the Canadian Institutes of Health Research (CIHR) is because this is the first year that the survey has directly captured TB funding data.

Table 5. Top 12 TB R&D funders 2012

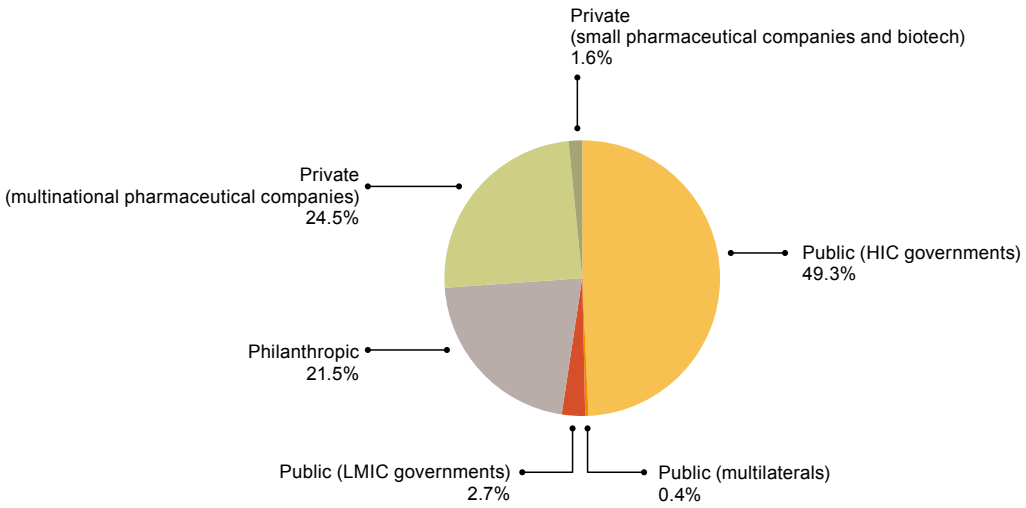
Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
US NIH	121.7	112.8	163.3	157.0	152.4	158.5	29.7	25.3	29.7	27.3	29.0	31.6
Aggregate industry	66.0	87.0	123.2	160.0	151.3	131.1	16.1	19.5	22.4	27.8	28.8	26.1
Gates Foundation	115.9	132.0	96.9	102.3	86.1	90.7	28.2	29.6	17.6	17.8	16.4	18.1
UK MRC	12.7	12.8	12.6	15.1	15.7	16.0	3.1	2.9	2.3	2.6	3.0	3.2
Wellcome Trust	2.6	5.5	8.2	13.5	13.2	14.0	0.6	1.2	1.5	2.3	2.5	2.8
European Commission	21.5	27.9	28.7	22.2	17.6	11.2	5.2	6.3	5.2	3.9	3.3	2.2
USAID	3.9	6.6	8.1	8.4	8.2	8.6	0.9	1.5	1.5	1.5	1.6	1.7
Indian ICMR		0.8	2.0	2.6	2.7	5.3		0.2	0.4	0.5	0.5	1.1
German BMBF	4.4	0.3	5.0	4.3	3.9	5.0	1.1	0.1	0.9	0.8	0.7	1.0
AusAID						4.5						0.9
Inserm	0.3	0.4	5.9	0.0	3.2	4.0	0.1	0.1	1.1	0.0	0.6	0.8
Canadian CIHR	2.9	2.7	3.6			3.7	0.7	0.6	0.7			0.7
Subtotal of top 12*	385.8	408.5	495.3	531.5	478.1	452.7	94.0	91.6	89.9	92.4	90.9	90.2
Disease total	410.4	445.9	550.9	575.4	525.8	502.1	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 12 reflect the top funders for those respective years, not the top 12 for 2012
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

Public funders accounted for about half of total TB funding ($263.0m, 52.4%), with the pharmaceutical industry providing the second largest share ($131.1m, 26.1%), followed by the philanthropic sector ($108.0m, 21.5%). Public funding was dominated by HIC governments (contributing $247.4m, 94.1%), two thirds of which ($158.5m, 64.1%) came from the US NIH. MNCs continued to contribute to the majority of industry funding (accounting for 93.9%), while the SME share of industry investment decreased to 6.1% (from 9.0% in 2011).

The philanthropic sector was the only one to increase its YOY TB funding in 2012 (up $5.3m, 5.3%), mainly due to the increase in funding from the Gates Foundation. The large cut in industry investment came from both MNCs (down $14.9m, -10.9%) and SMEs (down $5.0m, -39.6%), while the drop in public funding (down $18.0m, -7.1%) was largely due to a cut from HIC governments of $15.6m (down -6.5%).

Figure 8. TB R&D funding by funder type 2012



DENGUE

Dengue is transmitted by *Aedes* mosquitoes, and causes a severe flu-like illness. In its most severe form, dengue haemorrhagic fever, it is a leading cause of serious illness and death among children in regions of Asia, with outbreaks also occurring frequently in Central and South America.

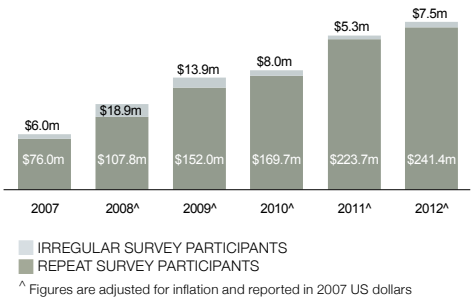
Dengue differs from many other tropical diseases in that it has a relatively large commercial market, driven by demand from travellers, the military and a high prevalence in several wealthier DCs in South-East Asia and Latin America. Dengue was responsible for 777,384 DALYs and 13,042 deaths in 2010. It ranked as the tenth highest cause of morbidity and mortality from neglected diseases.

As there is no curative drug or preventive vaccine for dengue, management is focused on control of transmission, and supportive therapy to minimise patient dehydration or shock from haemorrhagic fever. There is need for a vaccine that is effective against all four serotypes; an antiviral that is effective once infection has occurred; and a diagnostic that is able to detect early stage disease, differentiate between serotypes, and distinguish dengue from other causes of fever.[5] There is also a need for evaluation of the currently available diagnostic kits.[31]

There are a number of new dengue vaccines in development, with a live attenuated tetravalent vaccine candidate in Phase III and four candidates in Phase I and II clinical trials. Unexpectedly, initial Phase III results for the most advanced candidate showed it was only protective against three out of four serotypes, albeit with a strong safety profile.[32] Results from additional sites are yet to come. A small number of early stage drug candidates are also in development.[5] In mid-2012, the US Centers for Disease Control and Prevention (CDC) received approval from the US FDA for a new diagnostic test which can detect the presence of all four dengue virus types in a patient.[33]

R&D needed for dengue includes:

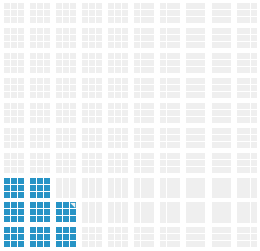
- Basic research
- Drugs
- Preventive vaccines
- Diagnostics
- Vector control products



^ Figures are adjusted for inflation and reported in 2007 US dollars

$248.9 MILLION

TOTAL SPEND ON DENGUE R&D IN 2012



7.9%

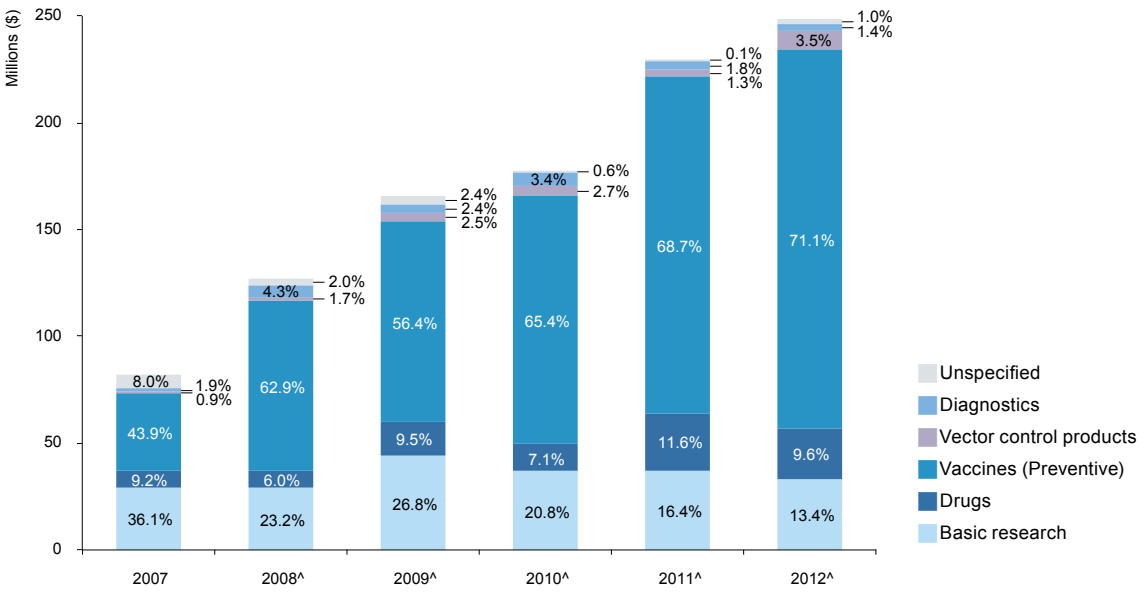
OF GLOBAL R&D FUNDING

Global funding for dengue R&D in 2012 was $248.9m (*$275.1m*). YOY funding increased by $17.7m (up 7.9%), to a total of $241.4m, after a much larger increase in YOY funding in 2011 (up $54.0m, 31.8%). The remaining $7.5m was provided by irregular participants. As a result of this year's increase, dengue's share of total funding went up to 7.9% (from 7.5% in 2011).

Preventive vaccine development accounted for more than two-thirds of total funding ($176.9m, 71.1%), followed by basic research ($33.3m, 13.4%), drug development ($23.9m, 9.6%), vector control products ($8.8m, 3.5%) and diagnostics ($3.5m, 1.4%).

YOY investment increased for both preventive vaccines (up $19.3m, 12.3%) and vector control products (up $4.5m, 215%), but fell for both basic research (down $5.5m, -16.1%) and drug development (down $2.4m, -9.1%). YOY investment in diagnostics remained fairly stable compared to last year.

Figure 9. Dengue R&D funding by product type 2007-2012



^ Figures are adjusted for inflation and reported in 2007 US dollars

The pharmaceutical industry continued to be the largest funder of dengue R&D, providing about two-thirds of total investment ($169.0m, 67.9%). It was also responsible for the largest increase compared to 2011 among all the top funders, with YOY investment rising by $15.0m (up 9.8%). A smaller increase came from the Gates Foundation (up $4.6m) although this was due to the uneven distribution of a dengue vaccine grant in 2011, and came from a very low base. Three of the top 12 funders reported a drop in funding: the US NIH (down $4.1m, -7.9%), the Wellcome Trust (down $1.5m, -20.7%) and the Institut Pasteur (down $0.8m, -27.1%). Both the Colombian Department for Science, Technology and Innovation (Colciencias) and the US CDC reported dengue funding in 2012 after not reporting any in 2011.

Table 6. Top 12 dengue R&D funders 2012

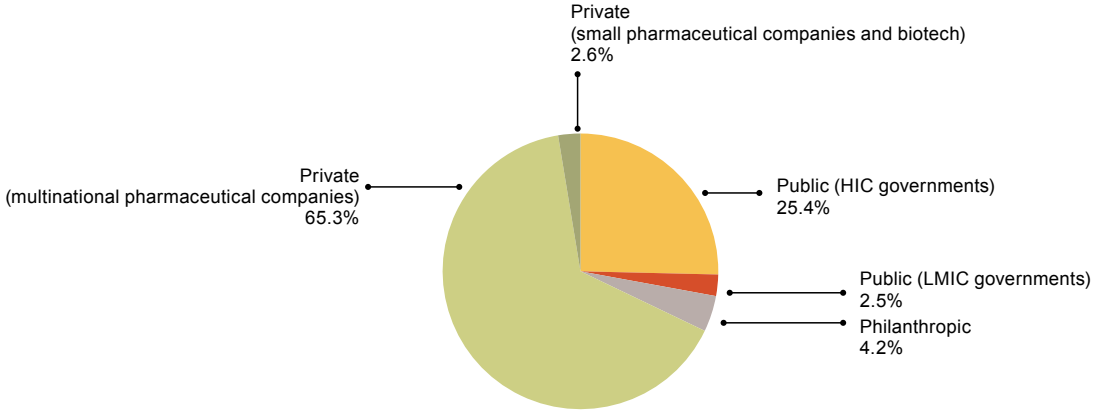
Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
Aggregate industry	19.4	43.8	63.1	99.2	154.1	169.0	23.6	34.6	38.1	55.8	67.3	67.9
US NIH	34.6	26.6	54.0	46.3	51.4	47.3	42.2	21.0	32.6	26.1	22.5	19.0
Wellcome Trust	1.1	1.2	1.6	2.4	7.1	5.6	1.3	0.9	1.0	1.3	3.1	2.3
Gates Foundation	1.0	16.3	11.7	6.5	<0.1	4.6	1.2	12.9	7.1	3.6	0.0	1.9
US DOD	14.4	7.5	10.5	5.5	4.0	4.3	17.5	5.9	6.3	3.1	1.7	1.7
Colombian Colciencias			0.9	0.9	-	2.8			0.5	0.5	0.0	1.1
Australian NHMRC	0.6	1.0	1.0	1.2	1.7	2.5	0.8	0.8	0.6	0.7	0.7	1.0
US CDC	-	-	1.4	1.4	-	2.3	0.0	0.0	0.9	0.8	0.0	0.9
Institut Pasteur	3.9	2.7	2.5	3.6	2.8	2.0	4.8	2.2	1.5	2.0	1.2	0.8
European Commission	2.0	1.7	1.1	0.5	0.5	1.9	2.5	1.4	0.6	0.3	0.2	0.8
German DFG	-		<0.1	<0.1	<0.1	1.6	0.0		0.0	0.0	0.0	0.6
Brazilian DECIT	1.6	1.3	6.7	1.2	0.2	1.3	2.0	1.1	4.1	0.7	0.1	0.5
Subtotal of top 12*	81.6	119.6	157.3	171.4	226.1	245.3	99.5	94.4	94.9	96.5	98.7	98.5
Disease total	82.0	126.8	165.8	177.6	229.0	248.9	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 12 reflect the top funders for those respective years, not the top 12 for 2012
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

The pharmaceutical industry provided more than two-thirds of dengue funding in 2012, the vast majority of which came from MNCs ($162.5m, 96.2%). Public funders accounted for about a quarter of total dengue investment ($69.4m, 27.9%) followed by the philanthropic sector ($10.5m, 4.2%). Although HIC governments continued to contribute to the majority of public funding (accounting for 91.0%), the LMIC share of public funding increased to 9.0% (from 6.5% in 2011).

The large increase in YOY industry funding came from both MNCs (up $11.9m, 7.9%) and SMEs (up $3.1m, 118%). Philanthropic sector funding also increased (up $3.1m, 43.5%), reflecting increased investment from the Gates Foundation. Although YOY public funding remained stable overall (down $0.4m, -0.6%), this masked a small cut from HIC governments (down $1.4m, -2.2%) and an increase from LMIC governments (up $1.0m, 167%).

Figure 10. Dengue R&D funding by funder type 2012



DIARRHOEAL DISEASES

Diarrhoeal diseases are a group of illnesses caused by viruses, bacteria or protozoa, that all present with fever and diarrhoea. They range from rotavirus and *E. coli*, which are relatively common in the West; to cholera and shigella, which are mostly prevalent in DC settings. Diarrhoeal diseases mainly affect children under five years of age and are often transmitted by contaminated food or water. Although they rarely cause death in Western settings due primarily to better health care, their impact in the developing world is severe.

Diarrhoeal illnesses were collectively responsible for 66.5 million DALYs and 1.1 million deaths in the developing world in 2010, making them the third highest cause of neglected disease morbidity and fourth highest cause of mortality.[i]

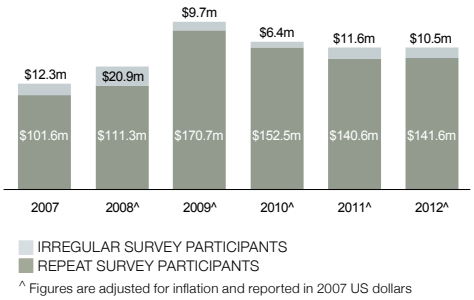
Current vaccines against diarrhoeal diseases such as cholera are not always suitable for infants under the age of one, and some are relatively ineffective; new bi- and multivalent vaccines that are suitable for infants, and which have longer durations of protection, are needed for most of the diarrhoeal diseases. New, safe, effective and affordable drugs are needed for some diarrhoeal diseases to complement supportive interventions such as oral rehydration therapy (ORT) and zinc supplementation.[34] New rapid diagnostic tests capable of distinguishing between diarrhoeal diseases are also required.[5]

Progress has been made with the licensure of a new oral cholera vaccine (Shanchol™) in 2009, and several vaccine candidates are in Phase II and III trials, including ACE527 for enterotoxigenic *E. coli* (ETEC), Invaplex 50 for shigella and ORV 116E (ROTAVAC®) for rotavirus.[35] However, discontinuation of Intercell's LT vaccine patch for ETEC in 2010 was a major drawback for the field. A new diagnostic test capable of distinguishing between causes of diarrhoeal diseases is also in early development.[5]

On the rotavirus front, the vaccine candidate ROTAVAC® released positive Phase III clinical trial results in 2013. The result of a collaborative initiative between PATH, the Indian Department of Biotechnology (DBT) and Indian pharmaceutical company Bharat Biotech, ROTAVAC will cost $1 per dose, making it far more accessible to DCs.[36] Other advanced candidates include RV3 which is in Phase IIb trials in Indonesia and is under development by Murdoch Children's Research Institute, BioFarma and Universitas Gadjah Mada.[37,38]

R&D needs for the diarrhoeal illnesses include:

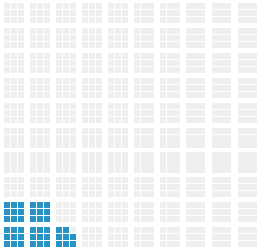
- Basic research for cholera, shigella and *cryptosporidium*
- Drugs for cholera, shigella and *cryptosporidium*
- Vaccines for rotavirus, *E. coli*, cholera, shigella and *cryptosporidium*
- Diagnostics



^ Figures are adjusted for inflation and reported in 2007 US dollars

$152.2 MILLION

TOTAL SPEND ON DIARRHOEAL DISEASE R&D IN 2012



4.8%

OF GLOBAL R&D FUNDING

[i] The diarrhoeal disease burden of disease DALYs and mortality figures include rotaviral enteritis, shigellosis, enterotoxigenic *E. coli* infection, cryptosporidiosis and cholera; and excludes the pathogens of campylobacter, enteropathogenic *E. coli* and amoebiasis.

Diarrhoeal diseases received $152.2m (*$166.9m*) in R&D funding in 2012. Funding was therefore stable compared to last year, with YOY investors increasing funding by only $1.0m (up 0.7%) to $141.6m. Irregular survey participants provided the remaining $10.5m. Diarrhoeal diseases' share of overall funding, however, dropped slightly to 4.8% (from 5.0% in 2011).

Within the diarrhoeal diseases, the distribution of funding remained weighted towards rotavirus, cholera and shigella, which accounted for 68.3% ($103.9m) of total investment. While YOY funding for cholera increased considerably (up $8.5m, 36.6%), funding for shigella and rotavirus decreased by $4.5m (-19.3%) and $1.7m (-3.7%), respectively. YOY investment in the less well-funded diarrhoeal diseases was mixed: funding for *cryptosporidium* was down $2.0m (-27.0%), ETEC was down $1.6m (-32.0%) and giardia was up $0.2m (46.7%).

For diseases where data was collected for all product types (cholera, shigella and *cryptosporidium*), funding profiles varied across product areas, although basic research featured heavily for all three. For cholera, more than half of all funding ($19.0m, 57.4%) went to basic research, followed by preventive vaccines ($10.6m, 31.9%). For shigella, most investments went to preventive vaccines ($8.2m, 42.0%) while basic research received about a third of funding ($7.2m, 36.8%). More than half of *cryptosporidium* funding was directed to basic research ($2.9m, 54.8%). YOY funding for diarrhoeal diseases in general decreased for vaccines (down $6.6m, -8.3%), diagnostics (down $3.1m, -35.7%) and drugs (down $1.1m, -9.9%), which was balanced by increases for basic research (up $6.5m, 20.2%) and non pathogen-specific investment (up $2.1m, 6.3%).

Table 7. Funding for diarrhoeal disease R&D 2012 (US$)^*

Disease	Basic research	Drugs	Vaccines (Preventive)	Diagnostics	Unspecified	Total	%
Rotavirus			48.3		2.9	**51.2**	33.6
Cholera	19.0	2.4	10.6	0.6	0.5	**33.1**	21.8
Shigella	7.2	1.0	8.2	1.1	2.0	**19.6**	12.9
Cryptosporidium	2.9	1.7	0.1	0.6	-	**5.4**	3.5
Enterotoxigenic *E. coli* (ETEC)			3.0	0.3	0.9	**4.2**	2.7
Giardia				0.4	0.5	**1.0**	0.6
Enteroaggregative *E.coli* (EAggEC)			-	0.2	<0.1	**0.3**	0.2
Multiple diarrhoeal diseases	11.0	5.1	8.8	2.3	10.3	**37.5**	24.6
Total	40.2	10.2	78.9	5.6	17.3	152.2	100.0

^ All figures are FY2012, adjusted for inflation and reported in 2007 US dollars
* Please note that there were strict eligibility conditions on drug and vaccine investments for some diarrhoeal diseases products to avoid inclusion of overlapping commercial activity. Due to this, total funding between product categories cannot be reasonably compared
- No reported funding
Category not included in G-FINDER

As in previous years, the top three funders accounted for almost three-quarters of total diarrhoeal disease R&D funding ($110.0m, 72.3%), with the US NIH providing almost a third ($47.7m, 31.3%). The majority of funders kept their investment stable, with the only notable decrease coming from the US NIH (down $4.9m, -9.3%). The Wellcome Trust increased funding by $4.0m (up 794%), albeit from a very low base and likely reflecting uneven disbursement across their funding cycle. Other small increases in funding were reported by YOY pharmaceutical industry funders (up $3.8m, 17.6%), the Gates Foundation (up $3.8m, 12.4%) and the US DOD (up $2.6m, 53.4%). It should also be noted that the Global Alliance for Vaccines and Immunizations (GAVI) participated for the first time this year, entering the top 12 with a $3.5m investment in diarrhoeal disease R&D.

Table 8. Top 12 diarrhoeal disease R&D funders 2012

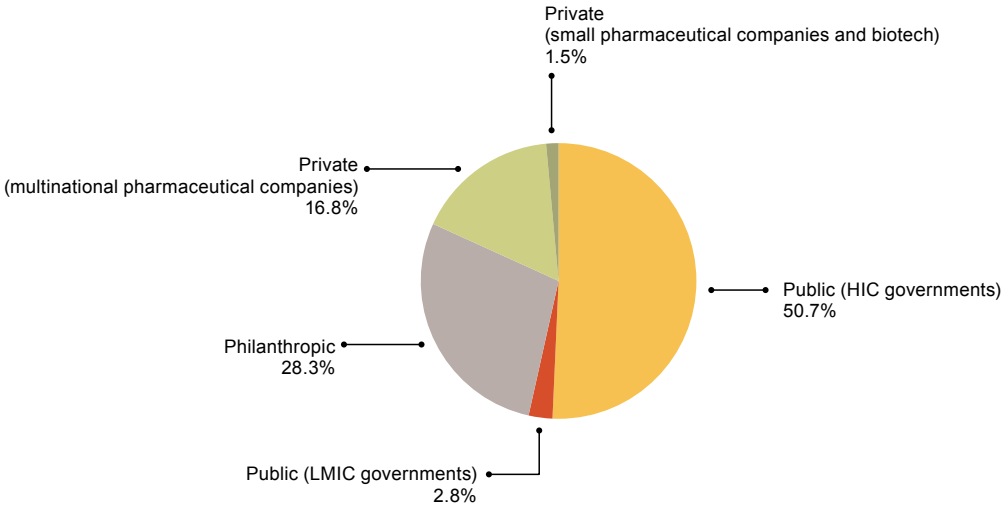
Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
US NIH	31.0	39.5	60.9	50.4	52.6	47.7	27.2	29.9	33.8	31.7	34.5	31.3
Gates Foundation	44.3	26.7	46.8	44.9	30.8	34.6	38.9	20.2	25.9	28.3	20.2	22.8
Aggregate industry	13.7	24.1	37.2	31.6	26.0	27.7	12.0	18.2	20.6	19.9	17.1	18.2
Inserm	0.3	0.3	1.5	1.7	8.5	8.9	0.2	0.2	0.8	1.1	5.6	5.9
US DOD	5.4	5.9	11.0	5.9	4.8	7.4	4.8	4.5	6.1	3.7	3.1	4.8
Wellcome Trust	1.0	0.4	0.3	0.5	0.5	4.5	0.9	0.3	0.2	0.3	0.3	3.0
Institut Pasteur	3.4	3.8	5.2	4.3	4.2	4.0	3.0	2.9	2.9	2.7	2.8	2.6
GAVI	10.1	14.8				3.5	8.9	11.2				2.3
European Commission	0.7	0.6	0.6	0.8	2.8	2.9	0.6	0.4	0.3	0.5	1.9	1.9
Indian ICMR		3.7	3.5	3.6	2.2	2.1		2.8	1.9	2.3	1.4	1.4
Research Council of Norway		0.5	1.0	1.1	1.5	1.6		0.3	0.5	0.7	1.0	1.0
UK MRC	0.4	0.9	0.8	0.7	0.4	1.1	0.3	0.7	0.4	0.4	0.2	0.7
Subtotal of top 12*	112.6	125.3	175.3	153.0	145.7	146.0	98.9	94.7	97.1	96.3	95.7	96.0
Disease total	113.9	132.2	180.4	158.9	152.2	152.2	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 12 reflect the top funders for those respective years, not the top 12 for 2012
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

Public funders accounted for more than half of diarrhoeal disease R&D funding ($81.4m, 53.5%), followed by the philanthropic sector ($43.1m, 28.3%) and the pharmaceutical industry ($27.7m, 18.2%). HIC governments continued to contribute to the majority of public funding (94.8%), of which more than half came from the US NIH ($47.7m, 61.8%). The LMIC share of public funding decreased to 5.2% (from 12.6% in 2011). Industry funding also became more concentrated, with MNCs contributing 92.0% in 2012 compared to 83.3% in 2011.

A cut in YOY public sector funding (down $10.6m, -12.1%) was contributed to by both HIC governments (down $5.7m, -7.1%) and LMIC governments (down $4.9m, -76.0%). The philanthropic sector, on the other hand, increased investment by $7.8m (up 24.9%), which was entirely due to increases from the Gates Foundation and the Wellcome Trust (the only philanthropic funders of diarrhoeal diseases in 2012). YOY MNC funding increased by $3.8m (up 17.6%).

Figure 11. Diarrhoeal disease R&D funding by funder type 2012



KINETOPLASTIDS

Kinetoplastid infections include three diseases: Chagas' disease, leishmaniasis and Human African Trypanosomiasis (HAT), also known as African sleeping sickness. Sleeping sickness initially presents with similar symptoms to a viral illness but eventually infects the brain where it causes confusion, coma and death. Chagas' disease also has two stages, with late stage Chagas' disease leading to heart failure and death. Leishmaniasis causes skin lesions and, in its more severe form, damages internal organs (spleen, liver and bone marrow). Kinetoplastid diseases are often fatal if left untreated.

In 2010, kinetoplastid diseases were responsible for 4.4 million DALYs and 70,075 deaths in the developing world. They ranked as the eighth highest cause of mortality and ninth highest cause of morbidity from neglected diseases.

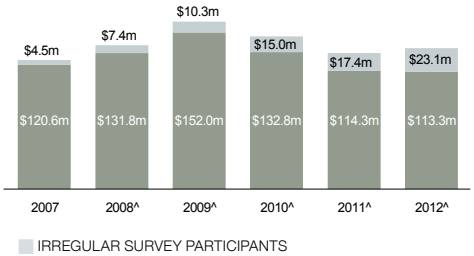
Treatment of kinetoplastid infections is hampered by outdated drugs, and a lack of vaccines and effective standard diagnostic tools. The two drugs currently used for treatment of Chagas' disease are toxic, lack specificity and require multiple dosing for several months, increasing the likelihood of non-compliance and drug resistance.[39] Chagas' disease needs preventive and therapeutic vaccines; safe, effective drugs that are suitable for children; treatments for the chronic form of the disease; and diagnostics that can reliably detect chronic disease and monitor treatment. A Chagas' paediatric drug formulation was registered in Brazil in 2011,[40] and there are a number of other promising drug candidates in preclinical and clinical stages.[41]

Sleeping sickness needs new, safe, oral drugs that are active against both stages of the disease to replace the injectable treatments now used, as well as a rapid, easy to use, point-of-care diagnostic that can distinguish between disease stages. However, there is a lack of advanced projects, particularly for vaccines, for which there are no candidates in clinical trials.[5] There are some promising sleeping sickness drug candidates, with fexinidazole entering Phase II/III clinical trials in October 2012[42] and a number of other compounds in preclinical stages.[43] In December 2012, the first ever rapid diagnostic test designed for sleeping sickness was launched by the Foundation for Innovative New Diagnostics (FIND) and Standard Diagnostics, Inc of the Republic of Korea. The diagnostic, SD BIOLINE HAT, is cheap, simple to administer, can be stored at ambient temperature and can obtain results in 15 minutes.[44]

Leishmaniasis is in need of a modern vaccine, as well as more effective, oral drug formulations, and a diagnostic that can detect early-stage disease. The leishmaniasis drug pipeline is relatively healthy, with five new combinations or new formulations of existing drugs in late stage clinical trials, novel compounds in earlier stages, and several candidates in preclinical stages.[5]

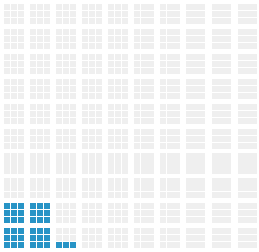
R&D is needed in every area, including:

- Basic research
- Drugs
- Preventive vaccines
- Diagnostics
- Vector control products for sleeping sickness and Chagas' disease
- Therapeutic vaccines for leishmaniasis and Chagas' disease



$136.3 MILLION

TOTAL SPEND ON KINETOPLASTID R&D IN 2012



4.3%

OF GLOBAL R&D FUNDING

Global funding for kinetoplastid R&D in 2012 was $136.3m (*$148.1m*). Investment was essentially steady compared to last year, with YOY investors decreasing funding by only $1.0m (-0.9%) to $113.3m. The remaining $23.1m in funding was provided by irregular survey participants. There was no change in kinetoplastids' share of global neglected disease R&D funding at 4.3%.

Funding within the kinetoplastid family was split more evenly between the three diseases than it was in 2011, with each receiving about a quarter of total funding. Most funding continued to be directed to leishmaniasis ($38.7m, 28.4%), followed by sleeping sickness ($36.8m, 27.0%) and Chagas' disease ($31.7m, 23.2%). The rebalancing between the diseases was due to both a decrease in YOY funding for leishmaniasis (down $7.6m, -16.4%) and an increase for Chagas' disease (up $7.1m, 28.9%) while funding for sleeping sickness remained fairly stable (up $2.6m, 7.7%).

YOY funding for basic research saw the largest drop (down $5.4m, -10.3%), which was felt by all diseases but particularly by leishmaniasis, for which YOY basic research funding dropped by $4.0m (-19.9%). Across diseases, the only other product area that saw a small decrease in YOY funding was therapeutic vaccines (down $0.3m, -38.0%). All other areas enjoyed small increases in YOY investment, most notably drug development (up $2.2m, 4.5%), followed by diagnostics (up $0.9m, 14.3%) and preventive vaccines (up $0.1m, 2.8%).

Table 9. Funding for kinetoplastid R&D 2012 (US$ millions)^

Disease	Basic research	Drugs	Vaccines (Preventive)	Vaccines (Therapeutic)	Vector control products	Diagnostics	Unspecified	Total	%
Leishmaniasis	19.9	10.3	5.1	0.6		1.8	1.1	**38.7**	28.4
Sleeping sickness	21.6	10.9	<0.1		-	3.3	0.9	**36.8**	27.0
Chagas' disease	12.8	15.5	0.2	<0.1	<0.1	2.9	0.2	**31.7**	23.2
Multiple kinetoplastids	2.9	23.3	-	-	-	2.9	-	**29.1**	21.3
Total	57.2	60.0	5.4	0.6	<0.1	10.9	2.2	136.3	100.0

^ All figures are FY2012, adjusted for inflation and reported in 2007 US dollars
- No reported funding
Category not included in G-FINDER

The US NIH was again the top funder of kinetoplastid R&D in 2012, keeping its investment relatively stable at $45.7m (down $1.8m, -3.7%). Modest increases in funding came from the German BMBF (up $4.8m, 583%), YOY industry funders (up $4.2m, 45.2%) and the Wellcome Trust (up $2.8m, 26.2%). After not having funded kinetoplastid R&D in 2011, Colombian Colciencias reported renewed investment of $2.9m in 2012.

After almost halving its funding for kinetoplatids in 2011 due to uneven grant disbursement and the completion of several large multi-year grants, the Gates Foundation further decreased its investment by $2.9m (-26.4%) in 2012. Other cuts came from the Institut Pasteur (down $1.9m, -38.2%) and the EC (down $1.3m, -17.9%).

Table 10. Top 12 kinetoplastid R&D funders 2012

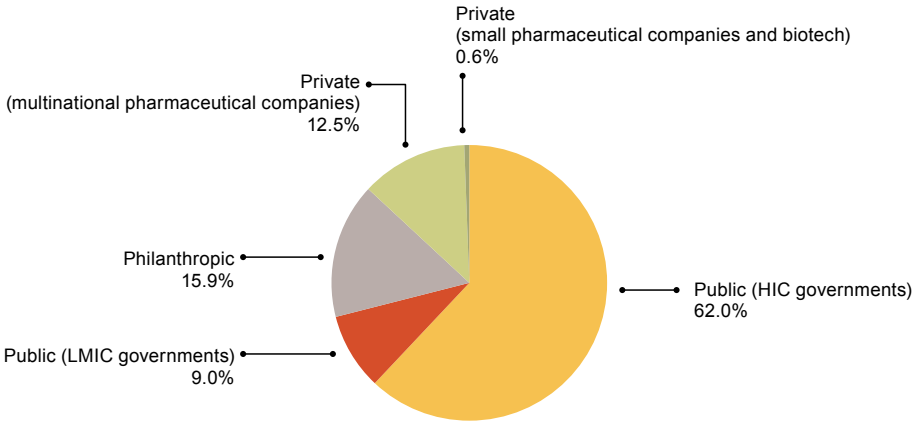
Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
US NIH	28.2	48.6	52.8	56.2	47.4	45.7	22.5	34.9	32.5	38.0	36.0	33.5
Aggregate industry	5.1	2.9	5.1	11.9	12.5	17.8	4.1	2.1	3.2	8.0	9.5	13.1
Wellcome Trust	15.1	12.4	11.5	9.6	10.6	13.4	12.0	8.9	7.1	6.5	8.1	9.8
UK DFID	3.6	3.7	9.0	9.9	10.5	11.1	2.9	2.7	5.5	6.7	8.0	8.1
Gates Foundation	45.1	29.0	36.0	19.9	10.8	8.0	36.1	20.8	22.2	13.4	8.2	5.8
European Commission	2.9	4.6	10.1	9.1	7.3	6.0	2.3	3.3	6.3	6.1	5.5	4.4
German BMBF			-	-	0.8	5.6			0.0	0.0	0.6	4.1
Brazilian DECIT	4.9	3.8	1.8	1.1	0.4	3.3	3.9	2.7	1.1	0.7	0.3	2.4
German DFG	<0.1		-	4.0	1.5	3.2	0.1		0.0	2.7	1.1	2.3
Institut Pasteur	-	2.9	3.2	5.9	4.9	3.0	0.0	2.1	1.9	4.0	3.7	2.2
Colombian Colciencias			1.5	2.7	-	2.9			0.9	1.8	0.0	2.2
Indian ICMR		-	0.1	1.5	2.8	2.5		0.0	0.1	1.0	2.1	1.9
Subtotal of top 12*	123.2	125.9	146.4	135.2	116.9	122.5	98.4	90.5	90.2	91.4	88.8	89.9
Disease total	125.1	139.2	162.3	147.9	131.7	136.3	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 12 reflect the top funders for those respective years, not the top 12 for 2012
- No reported funding
Funding organisation did not participate in the survey for this year

Almost three-quarters ($96.8m, 71.0%) of kinetoplastid R&D investment came from public funders, with an additional $21.7m (15.9%) provided by philanthropic organisations and $17.8m (13.1%) by the pharmaceutical industry. Industry funding became more reliant on investment from large companies, with MNCs contributing 95.6% of all industry investment in 2012 compared to 72.6% in 2011.

The largest increase in YOY funding in 2012 came from industry, with MNCs accounting for all of the additional funding reported (up $4.2m, 46.0%). Although YOY public funding dropped overall (down $5.1m, -6.1%), this masked a larger cut from HIC governments (down $7.4m, -9.0%) and an increase from LMIC governments (up $2.2m, 116%). Philanthropic funding remained stable (down $0.07m, -0.3%).

Figure 12. Kinetoplastid R&D funding by funder type 2012



BACTERIAL PNEUMONIA & MENINGITIS

Pneumonia is a lung infection transmitted by the cough or sneeze of infected patients. It presents with cough, fever, chest pain and shortness of breath, and can be fatal especially in young children and elderly patients. Although caused by a range of bacteria and viruses, *Streptococcus pneumonia* is by far the most common cause of pneumonia in the developing world.

Bacterial meningitis is an infection of the fluid that surrounds the brain and spinal cord and is mostly caused by *S. pneumonia* and *Neisseria meningitidis*. Meningitis is transmitted from person to person through droplets of respiratory or throat secretions. Symptoms include severe headache, fever, chills, stiff neck, nausea and vomiting, sensitivity to light and altered mental state. Even with early diagnosis and treatment, 5-10% of patients die within 24-48 hours of onset of symptoms. Meningitis epidemics occur commonly in the sub-Saharan African meningitis belt. The occurrence of these epidemics despite vaccination programmes confirms the unsuitability of previous vaccines, due to their inability to produce long lasting protection or to protect young children. However, there has been substantial progress with the rollout of a new meningitis vaccine against serogroup A meningococci (which has historically accounted for the majority of epidemic and endemic disease in the meningitis belt) in Central and West Africa since late 2010.[45] The impact of this vaccine has been dramatic, with no new cases of meningitis A among people who were vaccinated in the 2011 epidemic season.[46] However, vaccines are still needed for other meningitis serotypes.

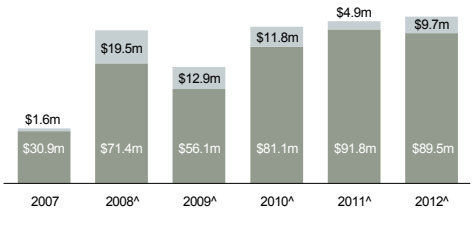
Bacterial pneumonia and meningitis were responsible for 38.3 million DALYs and 846,851 deaths in the developing world in 2010.[ii] Bacterial pneumonia and meningitis ranked as the fifth highest cause of mortality and morbidity from neglected diseases.

Traditional polysaccharide pneumococcal vaccines are unsuitable for DC use. The conjugate pneumococcal vaccine Prevnar (7-valent) has been licensed for use in infants and young children in DCs for some time now, but is expensive and does not cover all DC strains. The World Health Organization (WHO) prequalified conjugate vaccines Synflorix (a 10-valent vaccine) and Prevnar (13-valent) were confirmed in early 2010 as the first vaccines in GAVI's pilot pneumococcal Advance Market Commitment (AMC) scheme. Rapid introduction of these heavily subsidised vaccines is underway but its reach is currently limited to 24 countries.[47]

New products needed for pneumonia and meningitis are:

- Vaccines that include developing world strains (and possibly DC-specific vaccines that exclude Western strains)
- Diagnostics

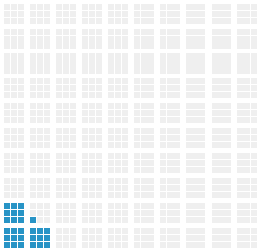
[ii] The bacterial pneumonia and meningitis burden of disease DALYs and mortality figures include the following categories: pneumococcal pneumonia, pneumococcal meningitis and meningococcal infection.



^ Figures are adjusted for inflation and reported in 2007 US dollars

$99.2 MILLION

TOTAL SPEND ON BACTERIAL PNEUMONIA & MENINGITIS R&D IN 2012



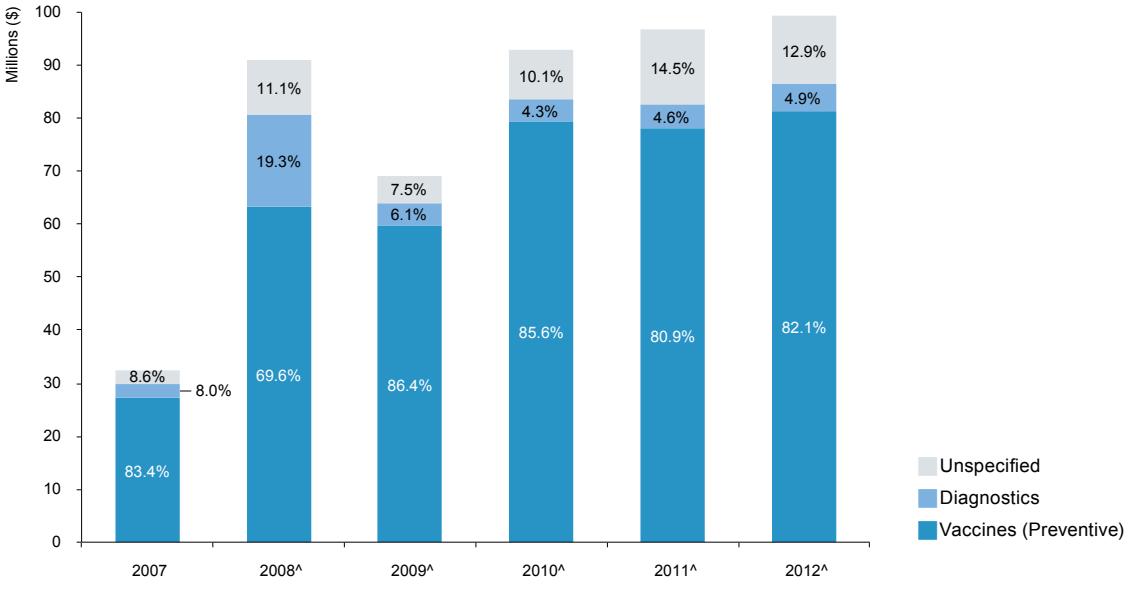
3.1%

OF GLOBAL R&D FUNDING

Bacterial pneumonia & meningitis received $99.2m (*$108.9m*) in R&D funding in 2012. Funding was essentially stable compared to last year, with YOY investors decreasing funding by only $2.2m (-2.4%) to $89.5m. Irregular survey participants provided the remaining $9.7m in funding. Bacterial pneumonia & meningitis' share of global neglected disease R&D funding went down slightly to 3.1% (from 3.2% in 2011).

Of the two product areas included in G-FINDER, the vast majority of bacterial pneumonia & meningitis funding went to vaccine development ($81.5m, 82.1%), with diagnostics receiving $4.9m (4.9%). As in previous years, most vaccine investment was directed towards pneumococcal vaccines ($66.4m, 81.5%). YOY funding remained stable for both product areas overall, with investment for vaccines decreasing by $1.0m (-1.3%) and for diagnostics increasing by $0.3m (up 8.0%).

Figure 13. Bacterial pneumonia & meningitis R&D funding by product type 2007-2012



^ Figures are adjusted for inflation and reported in 2007 US dollars

Just two funders – the pharmaceutical industry and the US NIH – accounted for three-quarters of total funding ($75.0m, 75.6%). Overall, funding concentration remained very high, with the top 12 contributing 99.2% of total investment. Although most funders kept their investment fairly stable, the US NIH cut its investment by $6.1m (-44.6%). This was somewhat balanced by small increases from the Gates Foundation (up $3.7m, 10.9%) and YOY pharmaceutical industry funders (up $1.4m, 4.4%). The Wellcome Trust also increased funding by $2.9m (up 358%), albeit from a very low base and likely reflecting uneven disbursement across their funding cycle. GAVI participated in the survey for the first time this year, entering the top 12 with an investment in bacterial pneumonia & meningitis R&D of $4.7m, mainly directed to post-registration research for newly available vaccines.

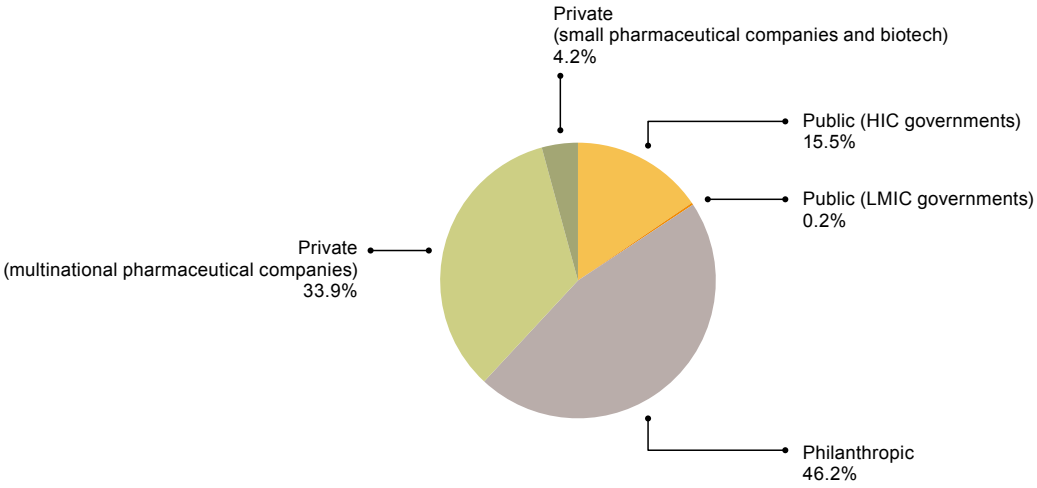
Table 11. Top 12 bacterial pneumonia & meningitis R&D funders 2012

Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
Aggregate industry	15.7	50.5	33.8	32.1	36.7	37.8	48.4	55.6	49.0	34.6	38.0	38.1
Gates Foundation	5.6	26.3	21.0	39.4	33.6	37.2	17.2	28.9	30.4	42.5	34.7	37.5
US NIH	4.2	4.0	3.7	8.8	13.6	7.5	12.9	4.4	5.3	9.5	14.1	7.6
GAVI				2.1		4.7	0.0	0.0	0.0	2.3	0.0	4.7
Inserm	-	0.1	-	-	4.4	4.5	0.0	0.1	0.0	0.0	4.5	4.5
Wellcome Trust	0.2	0.2	<0.1	0.3	0.8	3.7	0.6	0.2	0.1	0.3	0.8	3.8
Australian NHMRC	0.3	0.5	1.4	0.9	1.0	0.8	1.0	0.6	2.0	1.0	1.1	0.8
US CDC	1.5	1.4	1.4	1.4	-	0.7	4.5	1.5	2.0	1.5	0.0	0.7
Institut Pasteur	0.4	0.3	0.3	0.4	0.8	0.5	1.3	0.3	0.4	0.4	0.8	0.5
German DFG	-		0.6	0.6	-	0.4	0.0	0.0	0.8	0.7	0.0	0.4
UK MRC	1.8	2.0	2.0	1.1	0.7	0.3	5.5	2.2	2.9	1.1	0.7	0.3
German BMBF			-	0.2	0.2	0.2	0.0	0.0	0.0	0.2	0.2	0.2
Subtotal of top 12*	32.3	89.5	67.9	90.0	96.4	98.4	99.4	98.5	98.4	96.9	99.7	99.2
Disease total	32.5	90.8	69.0	92.9	96.6	99.2	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 12 reflect the top funders for those respective years, not the top 12 for 2012
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

Philanthropic organisations accounted for the majority of bacterial pneumonia & meningitis funding ($45.8m, 46.2%), closely followed by industry investment ($37.8m, 38.1%). The vast majority of philanthropic funding came from the Gates Foundation ($37.2m, 81.2%). As in previous years, industry funding was dominated by MNCs, investing $33.6m (88.9%). In contrast to most other neglected diseases, public funding provided only 15.7% ($15.6m) of total funding. Indeed, YOY public funding dropped considerably between 2011 and 2012 (down $10.2m, -40.6%). YOY philanthropic funding, on the other hand, increased by $6.6m (19.2%), while that of the pharmaceutical industry remained fairly stable.

Figure 14. Bacterial pneumonia & meningitis R&D funding by funder type 2012



HELMINTH INFECTIONS

Helminths are parasitic worms and flukes that can infect humans. Helminth infections include ancylostomiasis and necatoriasis (hookworm), ascariasis (roundworm), trichuriasis (whipworm) and cysticercosis/taeniasis (tapeworm), collectively referred to as soil-transmitted helminths. Other helminths include elephantiasis (lymphatic filariasis), river blindness (onchocerciasis) and schistosomiasis. Adult worms live in the intestines and other organs, and the infection is transmitted through food, water, soil or other objects.

Helminths can cause malnutrition and impaired mental development (hookworms), or progressive damage to the bladder, ureters and kidneys (schistosomiasis). Onchocerciasis is a major cause of blindness in many African and some Latin American countries, while elephantiasis causes painful, disfiguring swelling of the legs and genitals.

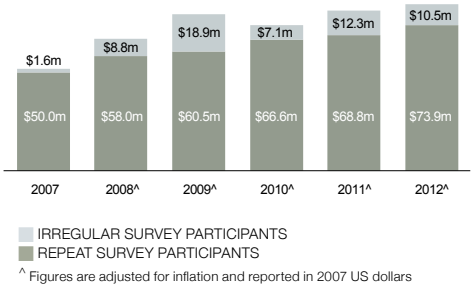
Helminth infections are the seventh highest cause of morbidity globally; they were responsible for 12.2 million DALYs and 15,448 deaths in 2010.

There is no vaccine against any of the above helminth infections. Growing concern exists that the drugs used to treat soil-transmitted helminths and schistosomiasis are becoming outdated, with evidence of loss of efficacy and increasing resistance.[48] Current diagnostic products for detection of some helminths are also outdated, meaning new effective diagnostics are needed.

A drug (moxidectin) and one vaccine candidate (Bilhvax) are currently in Phase III clinical trials for onchocerciasis and schistosomiasis respectively,[5] and one vaccine candidate against human hookworm infection (NaGST-1) is in Phase I clinical trials.[49]

Helminth infections require a range of R&D including:

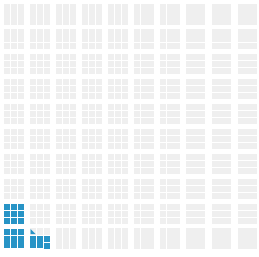
- Basic research for all listed infections
- Drugs for all listed infections
- Vaccines for strongyloidiasis, onchocerciasis, schistosomiasis and hookworm
- Diagnostics for strongyloidiasis, onchocerciasis and schistosomiasis
- Vector control products for lymphatic filariasis, onchocerciasis, schistosomiasis and tapeworm



^ Figures are adjusted for inflation and reported in 2007 US dollars

$84.4 MILLION

TOTAL SPEND ON HELMINTH R&D IN 2012



2.7%

OF GLOBAL R&D FUNDING

Global funding for helminth R&D in 2012 was $84.4m (*$92.4m*). Funding again increased slightly, with YOY funders increasing their investment by $5.1m (up 7.4%) to $73.9m. The remaining $10.5m was reported by irregular survey participants. Helminths' share of total R&D funding remained the same at 2.7%.

Almost a third of total helminth funding went to schistosomiasis ($26.2m, 31.1%), followed by lymphatic filariasis ($13.4m, 15.9%) and onchocerciasis ($11.4m, 13.6%). All other helminth infections received less than $8.0m (10.0%) of total helminth funding. YOY funding for schistosomiasis increased by $4.4m (up 21.0%), after a considerable drop in YOY funding last year (down $6.8m, -24.5%). Onchocerciasis also saw an increase in YOY investment (up $3.1m, 44.4%) while funding for lymphatic filariasis remained stable. YOY funding for all other diseases was mixed, with hookworm seeing the largest drop (down $1.8m, -19.2%) and tapeworm the largest increase (up $1.6m, 121%).

More than half of helminth funding went to basic research ($47.0m, 55.6%), which was also the area that saw the largest increase in YOY funding (up $5.1m, 14.0%). Another fifth of 2012 investment went to drug development ($17.5m, 20.7%), with YOY funding remaining stable. The largest decrease in YOY investment was seen in preventive vaccines, which went down by $3.7m (-32.0%).

Table 12. Funding for helminth R&D 2012 (US$ millions)^

Disease	Basic research	Drugs	Vaccines (Preventive)	Vector control products	Diagnostics	Unspecified	Total	%	
Schistosomiasis (bilharziasis)	16.1	2.0	2.7	-	2.1	3.4	**26.2**	31.1	
Lymphatic filariasis (elephantiasis)	8.0	3.6		0.4	<0.1	1.3	**13.4**	15.9	
Onchocerciasis (river blindness)	0.9	8.2	0.7	0.6	1.1	<0.1	**11.4**	13.6	
Hookworm (ancylostomiasis & nectoriasis)	1.8	0.5	4.5	-		0.9	**7.6**	9.1	
Tapeworm (cysticercosis/taeniasis)	3.2	1.5		0.2		0.1	**4.9**	5.8	
Roundworm (ascariasis)	1.0	0.9				-	**1.9**	2.3	
Strongyloidiasis & other intestinal roundworms	0.8	<0.1	<0.1		<0.1	-	**0.9**	1.1	
Whipworm (trichuriasis)	0.8	-				-	**0.8**	1.0	
Multiple helminths	14.3	0.9	1.6	-	0.4	-	**17.1**	20.3	
Total	47.0	17.5	9.5	1.1	3.7	5.7	84.4	100	

^ All figures are FY2012, adjusted for inflation and reported in 2007 US dollars
- No reported funding
Category not included in G-FINDER

Funding increases came from both the US NIH (up $9.0m, 37.9%) – which remained the top funder of helminth R&D in 2012 – and the German Research Foundation (DFG, up $2.0m, 302%). All other funders kept their investment fairly stable or decreased their funding, with cuts coming from the Wellcome Trust (down $2.1m, -24.1%), the Gates Foundation (down $1.4m, -7.6%) and the UK Medical Research Council (MRC, down $1.1m, -30.7%). The apparent drop in industry investment came from irregular survey participants, with YOY funders actually increasing their contributions by $0.9m (up 76.0%).

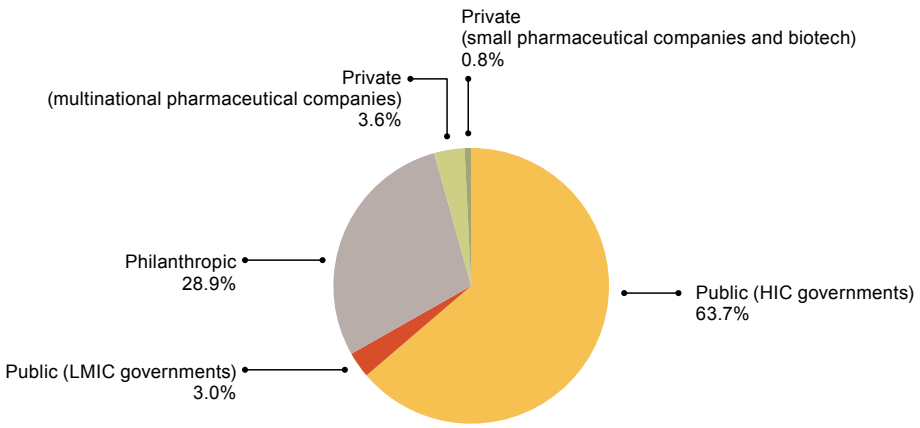
Table 13. Top 12 helminth R&D funders 2012

Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
US NIH	27.9	23.3	28.1	29.5	23.7	32.6	54.0	34.9	35.4	40.0	29.2	38.6
Gates Foundation	7.2	21.1	16.0	14.5	18.5	17.1	14.0	31.6	20.2	19.6	22.8	20.2
European Commission	4.3	3.1	3.0	7.9	6.6	7.6	8.3	4.7	3.7	10.8	8.1	9.0
Wellcome Trust	3.2	4.0	5.0	5.8	8.7	6.6	6.1	5.9	6.3	7.8	10.7	7.8
Aggregate industry	0.8	5.0	8.5	6.4	7.7	3.7	1.6	7.4	10.8	8.7	9.5	4.3
German DFG	-		6.8	0.6	0.7	2.7	0.0		8.6	0.8	0.8	3.2
UK MRC	1.1	1.4	1.1	1.2	3.5	2.4	2.1	2.1	1.4	1.6	4.3	2.9
Inserm	0.3	0.5	2.0	<0.1	1.9	2.1	0.5	0.8	2.5	0.0	2.3	2.5
Sandler Center					1.1	1.2					1.4	1.4
German BMBF			0.2	0.3	0.5	1.2			0.2	0.4	0.6	1.4
Indian ICMR		0.4	0.4	0.8	0.9	1.0		0.5	0.5	1.1	1.2	1.2
Australian NHMRC	1.1	1.7	1.9	2.3	1.1	1.0	2.0	2.5	2.4	3.1	1.4	1.2
Subtotal of top 12*	51.0	62.6	75.8	70.9	76.2	79.1	98.8	93.6	95.4	96.2	93.9	93.7
Disease total	51.6	66.8	79.4	73.7	81.1	84.4	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 12 reflect the top funders for those respective years, not the top 12 for 2012
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

Investment in helminth R&D was dominated by public funding ($56.4m, 66.8%) and the philanthropic sector ($24.4m, 28.9%), with industry providing less than 5.0% of total funding. More than half of public funding came from the US NIH ($32.6m, 57.8%). YOY public funders increased their investment by $7.7m (up 19.1%), driven by the US NIH. YOY philanthropic investment, on the other hand, fell by $3.5m (-13.0%).

Figure 15. Helminth R&D funding by funder type 2012



SALMONELLA INFECTIONS

Salmonella infections are a group of diseases caused by bacteria transmitted through contaminated food or drink. These infections can broadly be grouped into typhoid and paratyphoid fever (*S. typhi, S. paratyphi A*), which cause disease only in humans; and non-typhoidal *Salmonella enterica* (NTS), which has more than 2,000 serotypes that cause gastroenteritis in humans, and other serotypes that almost exclusively cause disease in animals.[50]

Symptoms include high fever, malaise, headache, constipation or diarrhoea, rose-coloured spots on the chest and enlarged spleen and liver. Young children, immunocompromised patients and the elderly are the most vulnerable to severe disease.

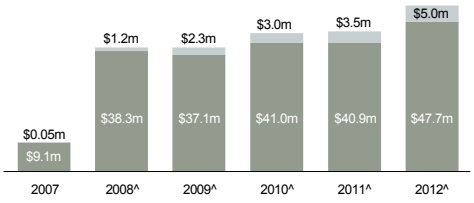
In 2010, salmonella infections were responsible for almost 17 million DALYs and 267,556 deaths.

Existing treatments are less than ideal due to widespread, worsening drug resistance, unsuitability for young children and rapid disease progression (rendering drug interventions ineffective if provided too late).[51] There are currently two safe and effective vaccines for preventing typhoid fever caused by *S. typhi*, however, there is no vaccine that targets both typhoid and paratyphoid fever, even though the latter accounts for up to half of all cases of enteric fever in some regions.[52] Similarly, no typhoid or NTS vaccine is readily available for HIV-infected individuals or children under two years of age.[52] In light of rising levels of drug resistance, vaccine development is an important priority in achieving disease control.

At the moment, new *S. paratyphi* A vaccines are undergoing clinical trials, and several groups are working on conjugate *S. typhi* vaccines, including a candidate (Vi-CRM 197) that completed Phase II trials in September 2012.[53] Recent research on humoral resistance to NTS has also delivered important clues for development of an NTS vaccine.[51]

R&D needed for salmonella infections includes:

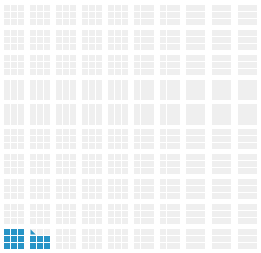
- Basic research
- Drugs
- Diagnostics
- Vaccines



^ Figures are adjusted for inflation and reported in 2007 US dollars

$52.6 MILLION

TOTAL SPEND ON SALMONELLA R&D IN 2012



1.7%

OF GLOBAL R&D FUNDING

Salmonella infections received $52.6m (*$57.1m*) in R&D funding in 2012. YOY investment increased slightly (up $6.7m, 16.5%) to $47.7m, after being unchanged in 2011. Irregular survey participants provided the remaining $5.0m in funding. As a result of this increase, salmonella's share of global R&D funding rose to 1.7% (from 1.5% in 2011).

Whereas funding was fairly evenly shared in 2011, in 2012 the vast majority of funding went to typhoid and paratyphoid fever ($36.2m, 68.7%), with NTS only receiving $8.1m (15.4%). Indeed, YOY funding for typhoid and paratyphoid fever increased considerably (up $17.8m, 121%) while funding for NTS fell by $9.7m (-57.9%). These fluctuations were almost entirely due to changes in YOY funding for basic research. Although overall YOY investment in basic research only increased by $3.3m (up 12.6%), this masked a substantial increase for typhoid and paratyphoid fever specifically (up $15.6m, 346%) and a decrease for NTS (down $9.8m, -78.0%).

Just under two-thirds of all salmonella R&D funding went to basic research ($32.1m, 60.9%), followed by preventive vaccines ($14.6m, 27.8%), diagnostics ($3.4m, 6.5%) and drug development ($2.5m, 4.8%). In addition to the changes seen in YOY funding for basic research, funding for drug development increased by $2.4m (albeit from a low base) and funding for diagnostics increased by $1.2m, (up 55.7%). The US NIH was the reason for the shift in basic research investment, as it increased basic research for typhoid and paratyphoid fever by $15.3m and decreased basic research for NTS by $8.6m. The net effect was a considerable increase in its salmonella funding R&D investment (up $7.5m, 34.0%).

Table 14. Funding for salmonella R&D 2012 (US$ millions)^

Disease	Basic research	Drugs	Vaccines (Preventive)	Diagnostics	Total	%
Typhoid and Paratyphoid fever (*S. typhi, S. paratyphi A*)	21.9	1.7	10.3	2.2	**36.2**	68.7
Non-typhoidal *Salmonella enterica* (NTS)	3.8	-	3.5	0.8	**8.1**	15.4
Multiple salmonella infections	6.4	0.8	0.8	0.4	**8.4**	15.9
Total	32.1	2.5	14.6	3.4	52.6	100.0

^ All figures are FY2012, adjusted for inflation and reported in 2007 US dollars
- No reported funding

In addition to the increase in US NIH funding, small increases came from the Wellcome Trust (up $0.9m, 16.8%) and the Gates Foundation (up $0.8m, 21.0%), while the largest decrease came from the Institut Pasteur (down $0.9m, -38.8%). Science Foundation Ireland participated in the survey for the first time this year, entering the top 12 with an investment in salmonella R&D of $0.4m.

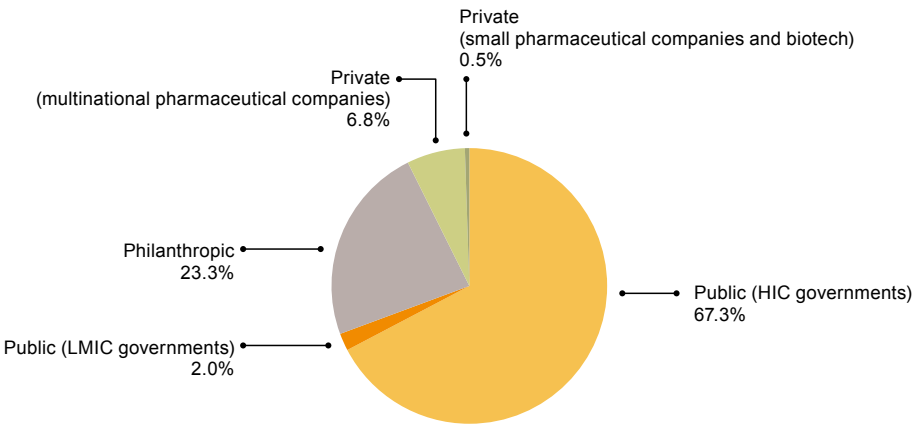
Table 15. Top 12 salmonella R&D funders 2012

Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
US NIH	8.1	20.4	25.5	27.0	22.0	29.5	88.7	51.6	64.7	61.4	49.5	56.0
Wellcome Trust	-	1.0	2.0	3.0	5.1	6.0	0.0	2.6	5.0	6.8	11.5	11.4
Gates Foundation	-	-	1.6	3.3	3.8	4.6	0.0	0.0	4.1	7.4	8.6	8.7
Aggregate industry	-	12.3	3.4	2.9	4.4	3.9	0.0	31.2	8.7	6.5	10.0	7.4
Sclavo Vaccines Association						1.5						2.9
Institut Pasteur	-	1.5	1.6	1.5	2.4	1.5	0.0	3.7	4.0	3.5	5.4	2.8
UK MRC	1.0	1.2	0.9	0.7	1.7	1.4	10.7	3.1	2.2	1.7	3.9	2.6
German DFG	-		0.5	1.3	1.2	0.9	0.0		1.4	2.9	2.8	1.8
Chilean FONDECYT				<0.1	0.6	0.6				0.1	1.5	1.1
Swiss SNSF				-	0.6	0.6				0.0	1.4	1.1
Swedish Research Council		0.5	0.4	0.5	0.5	0.5		1.2	1.0	1.1	1.2	1.0
Science Foundation Ireland						0.4						0.8
Subtotal of top 12*	9.1	39.4	39.4	43.1	43.6	51.4	100.0	99.8	100.0	98.0	98.2	97.6
Disease total	9.1	39.5	39.4	44.0	44.4	52.6	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 12 reflect the top funders for those respective years, not the top 12 for 2012
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

As in previous years, public funding accounted for more than two-thirds of salmonella investment ($36.5m, 69.3%), with the philanthropic sector contributing another $12.3m (23.3%). The vast majority of public funding came from the US NIH ($29.5m, 80.8%). The largest increase in YOY funding also came from the public sector (up $5.8m, 21.1%), entirely attributable to the US NIH increase, with a smaller increase from the philanthropic sector (up $1.7m, 18.6%). Pharmaceutical industry investment was low at $3.9m (7.4%).

Figure 16. Salmonella R&D funding by funder type 2012



LEPROSY

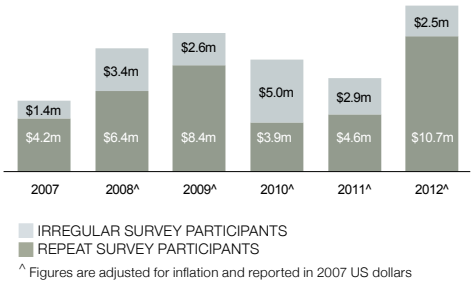
Leprosy is caused by the family of bacteria responsible for TB, and is also transmitted via droplets from the nose and mouth of untreated patients, but it is far less infectious than TB. Leprosy mainly affects the skin and nerves and, if left untreated, causes nerve damage that leads to muscle weakness and wasting, as well as permanent disabilities and deformities.

Leprosy was responsible for 6,047 DALYs in 2010. A successful leprosy eradication programme, which has resulted in improved diagnosis and treatment with multidrug therapy (MDT), means incidence is decreasing. Nevertheless, around a quarter of a million new cases are recorded each year.[54]

The move to treatment of leprosy with MDT was a significant step forward from dapsone monotherapy, and it has been provided free of charge in all endemic countries since 1995. The current regimen has been standard treatment for 30 years and, although highly effective, requires a 6-12 month course of multi-drug therapy.[55] Further research is needed to provide products for the management of nerve function, to improve and simplify chemotherapy, and to develop and improve diagnostics.[56,57]

R&D needed for leprosy includes:

- Basic research
- Drugs
- Diagnostics



^ Figures are adjusted for inflation and reported in 2007 US dollars

$13.1 MILLION

TOTAL SPEND ON LEPROSY R&D IN 2012

0.4%

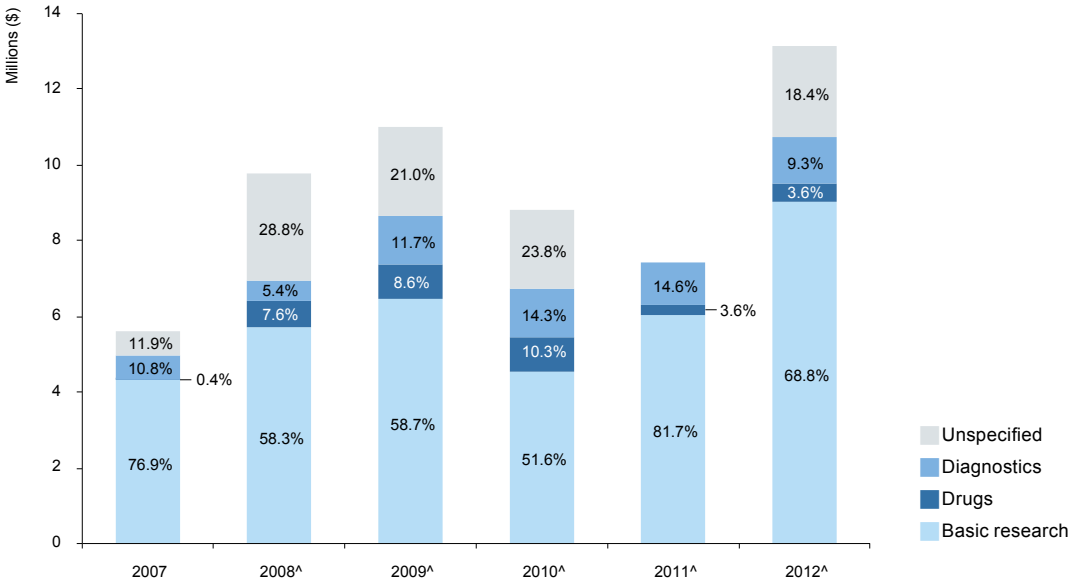
OF GLOBAL R&D FUNDING

Global funding for leprosy R&D in 2012 was $13.1m (*$14.9m*). YOY funders more than doubled their funding (up $6.1m, 135%) to $10.7m, after a very small increase in 2011. The remaining $2.5m in funding was provided by irregular survey participants. Overall, leprosy doubled its share of total R&D funding to 0.4% (from 0.2% in 2011).

As with other low-funded diseases, however, and as noted in previous years, apparent changes in leprosy R&D funding should be analysed with caution.

Basic research continued to receive the majority of leprosy funding ($9.0m, 68.8%) with its share of total funding only decreasing due to a rise in unspecified grants in 2012. Diagnostics received $1.2m (9.3%) and drug development $0.5m (3.6%). YOY funding for basic research doubled to $7.1m (up 98.7%) from $3.6m in 2011. YOY investment in drug development also increased (up $0.4m), albeit from a very low base. Diagnostic investment remained stable.

Figure 17. Leprosy R&D funding by product type 2007-2012



^ Figures are adjusted for inflation and reported in 2007 US dollars

The US NIH further consolidated its position as the largest funder of leprosy R&D, with an investment of $9.0m in 2012. This represented more than two thirds (68.8%) of total funding, and was a $5.2m increase (up 134%) on its funding for the previous year. The Brazilian Ministry of Health: Department of Science and Technology (DECIT) became the second-largest funder due to a more modest increase of $1.1m (from a low base), putting it ahead of the Indian ICMR, which decreased funding by $1.2m (-66.9%).

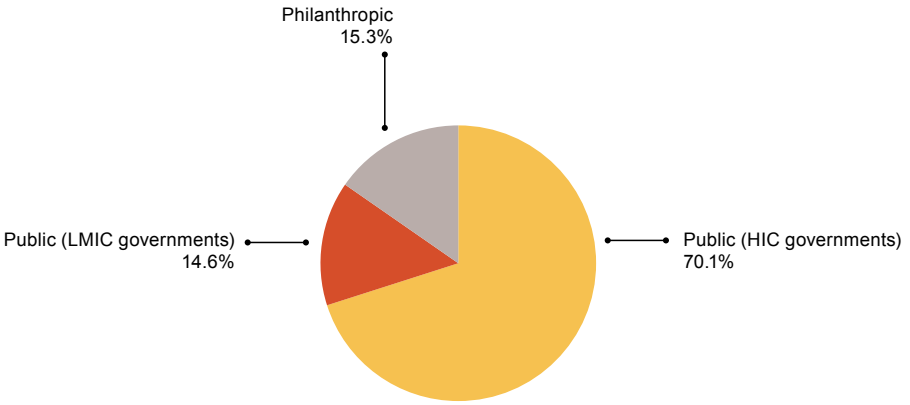
Table 16. Top 12 leprosy R&D funders 2012

Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
US NIH	2.0	3.1	5.1	3.2	3.9	9.0	35.5	32.1	46.3	36.7	52.2	68.8
Brazilian DECIT	1.5	2.3	1.9	-	<0.1	1.2	25.9	23.4	17.0	0.0	0.9	8.9
Indian ICMR		2.7	1.8	2.2	1.8	0.6		27.7	16.6	25.4	24.2	4.5
Turing Foundation				0.7		0.5				7.5		4.1
TLMI				0.3	0.3	0.3				3.0	4.5	2.5
NLR			0.1	0.6	0.3	0.3			0.6	7.1	4.6	2.4
ALM	0.7	0.6	0.5	0.4	0.5	0.3	11.7	6.6	4.7	4.7	6.5	2.2
Renaissance HSC						0.2						1.6
FRF				0.2	0.2	0.2				1.8	2.4	1.4
Institut Pasteur	0.1	0.2	0.2	0.2	<0.1	0.2	2.3	2.3	1.7	1.9	0.8	1.3
Colombian Colciencias			<0.1	0.2	-	0.1			0.9	1.8	0.0	1.0
DAHW			<0.1	<0.1	<0.1	<0.1			0.3	0.9	1.3	0.8
Subtotal of top 12*	5.6	9.6	10.8	8.6	7.4	13.1	100.0	98.7	98.0	97.6	99.7	99.4
Disease total	5.6	9.8	11.0	8.8	7.4	13.1	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 12 reflect the top funders for those respective years, not the top 12 for 2012
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

The vast majority of leprosy R&D investment came from the public sector ($11.1m, 84.7%), with YOY public funders increasing their investment by $6.3m (up 155%). This increase was due to funding increases from both HIC governments (up $5.3m, 133%) and LMIC governments (up $1.1m, 873%). Philanthropic organisations accounted for $2.0m (15.3%) of 2012 funding, with YOY contributors marginally decreasing their investment (down $0.2m, -38.6%). There was no industry investment in 2012.

Figure 18. Leprosy R&D funding by funder type 2012



TRACHOMA

Trachoma is an eye infection spread by contact with eye and nose discharge from an infected person, and by eye-seeking flies. Untreated trachoma is responsible for about 3% of blindness worldwide.[58]

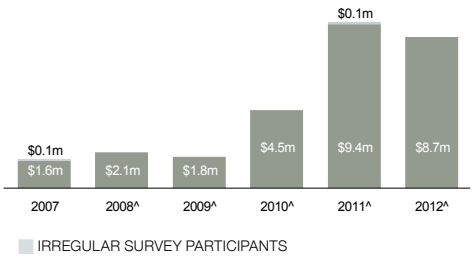
Trachoma is endemic in 57 countries with an estimated 7.6 million people severely visually impaired or blind from the disease, and many more millions in need of treatment.[59] Trachoma was responsible for 334,401 DALYs in 2010, making it the twelfth highest cause of morbidity from neglected diseases. Mortality was, however, zero because, although debilitating, trachoma is not a fatal disease (although some studies conducted in sub-Saharan Africa to assess excess mortality caused by visual impairment have found an increase in mortality among blind people compared with sighted controls).[60]

Surgery is the only effective management for the complications of trachoma that lead to blindness, but high recurrence rates and poor acceptance of surgery make this option ineffective. The International Trachoma Initiative (ITI) provides free azithromycin in 19 endemic countries,[61] with plans to be active in 42 countries by 2015.[62] It bears noting however, that over-reliance on a single drug increases the risk of resistance. Clinical diagnosis of trachoma is not always reliable, but current diagnostic tests are not a viable alternative due to their cost and complexity.

A simple, cheap, effective point-of-care dipstick test has shown promise in early trials.[63] There have recently been promising signs in early vaccine research, but there has not been a clinical trial of a trachoma vaccine since the 1970s.[64]

New products needed for trachoma include:

- Vaccines
- Diagnostics



^ Figures are adjusted for inflation and reported in 2007 US dollars

$8.7 MILLION

TOTAL SPEND ON TRACHOMA R&D IN 2012

0.3%

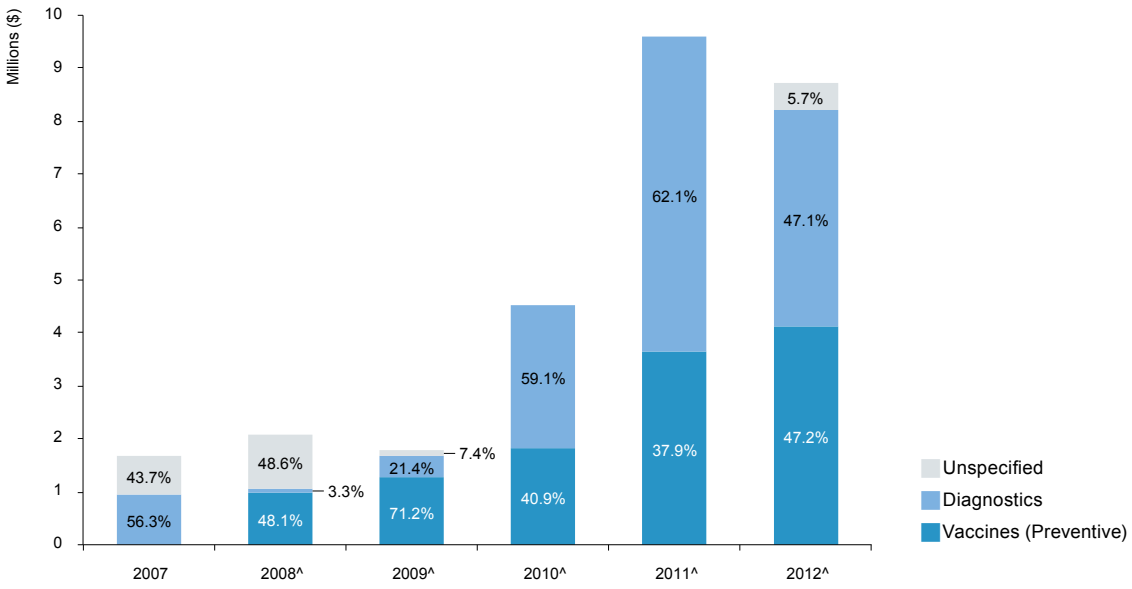
OF GLOBAL R&D FUNDING

Trachoma received $8.7m (*$9.5m*) in R&D funding in 2012. This represented a very minor decrease in YOY funding of $0.7m (-7.7%) from 2011, with no additional funding from irregular survey participants. Trachoma's share of total funding remained the same at 0.3%.

As with other low-funded diseases and as noted in previous years, apparent changes in funding should be analysed with caution.

Although diagnostics has received the majority of trachoma R&D funding in recent years, in 2012 funding was divided evenly between diagnostics ($4.1m, 47.1%) and preventive vaccines ($4.1m, 47.2%). This was mainly due to a decrease of YOY funding in diagnostics (down $1.7m, -29.4%), coupled with a small increase in vaccine funding (up $0.5m, 13.5%).

Figure 19. Trachoma R&D funding by product type 2007-2012



^ Figures are adjusted for inflation and reported in 2007 US dollars

Only two organisations reported funding for trachoma R&D in 2012, with the US NIH not only providing the vast majority ($8.1m, 92.8%) but also increasing funding by $2.6m (up 47.2%). The Wellcome Trust invested $0.6m (7.2%) in 2012, having not reported funding for trachoma since the first year of the survey in 2007. YOY pharmaceutical industry funders reported no investment in 2012, despite having funded trachoma R&D in the past.

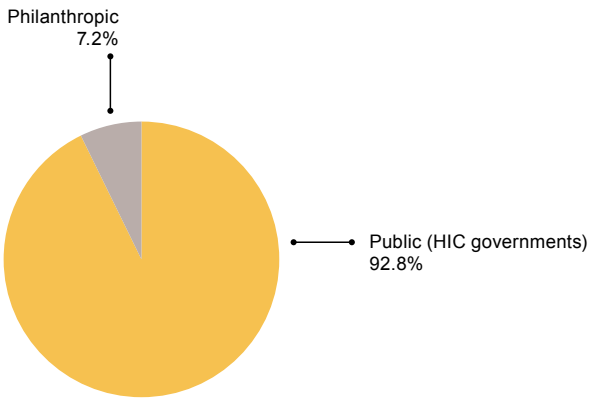
Table 17. Trachoma R&D funders 2012

Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
US NIH	-	1.0	1.7	2.6	5.5	8.1	0.0	50.0	92.6	57.5	57.3	92.8
Wellcome Trust	1.5	-	-	-	-	0.6	87.0	0.0	0.0	0.0	0.0	7.2
SSI	-	0.7	-	-	-	-	0.0	33.9	0.0	0.0	0.0	0.0
Brazilian DECIT	-	0.2	-	-	-	-	0.0	8.2	0.0	0.0	0.0	0.0
Swedish Research Council		<0.1	0.1	-	-	-		1.8	7.4	0.0	0.0	0.0
Institut Pasteur	-	<0.1	-	<0.1	<0.1	-	0.0	1.3	0.0	0.8	0.3	0.0
TI Pharma					0.1						1.5	
Aggregate industry	0.1	<0.1	-	1.9	3.9	-	6.2	4.6	0.0	41.8	40.8	0.0
Disease total	1.7	2.1	1.8	4.5	9.6	8.7	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

As there were just two organisations to report funding in 2012, the breakdown by funder type simply reflects the respective shares of the US NIH and the Wellcome Trust.

Figure 20. Trachoma R&D funding by funder type 2012



BURULI ULCER

Buruli ulcer begins as a painless lump that becomes an invasive ulcerating lesion, leading to disfiguration and functional impairment. It typically affects the rural poor, with the greatest number of cases in children under 15 years of age. There is emerging evidence to suggest that HIV co-infection may increase the risk for Buruli ulcer, and render the disease more aggressive.[65]

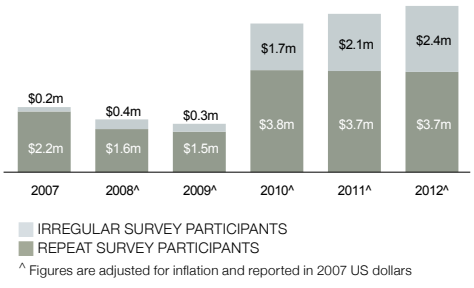
Buruli ulcer occurs in more than 33 countries, predominantly in Western Africa, especially in Benin, Côte d'Ivoire and Ghana. No DALY figures are available, although the WHO estimates that Buruli ulcer affects more than 7,000 people each year,[65] with almost 5,000 new cases reported each year from 2008 to 2011.[66]

Available treatment options for Buruli ulcer (antibiotics and surgery) are effective if the disease is diagnosed early. However, a vaccine may be the most effective way to combat Buruli ulcer in the long term. The BCG vaccine (designed for TB) provides short-term protection against Buruli ulcer, but this is not enough. Combination antibiotics (oral and injectable) are effective but cumbersome, as they must be given daily for eight weeks. Issues of treatment failure and resistance are also emerging, emphasising the need for new drugs that are less complicated to administer or can be given for a shorter period. Good diagnostics are particularly important, as early disease can be treated locally and inexpensively, however, current diagnostics are both costly and insufficiently sensitive.[65]

A new simple rapid diagnostic field test is currently in development for Buruli ulcer. Buruli ulcer vaccines are also in early development but are still many years away from being approved for human use.[67]

Buruli ulcer needs a wide range of R&D including:

- Basic research
- Drugs
- Vaccines
- Diagnostics



^ Figures are adjusted for inflation and reported in 2007 US dollars

$6.1 MILLION

TOTAL SPEND ON BURULI ULCER R&D IN 2012

0.2%

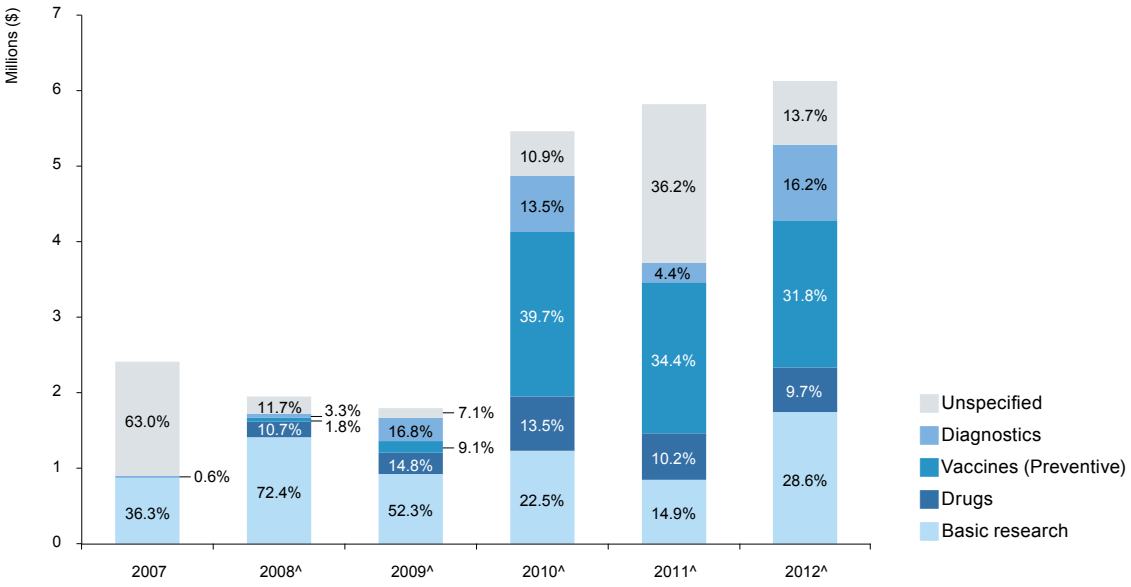
OF GLOBAL R&D FUNDING

Global funding for Buruli ulcer R&D in 2012 was $6.1m (*$6.6m*). Funding was therefore stable compared to last year, with YOY investors decreasing funding by only $0.02m (-0.6%) to $3.7m. The remaining $2.4m in funding was provided by irregular survey participants. Buruli ulcer's share of global funding was unchanged at 0.2%.

As with other low-funded diseases and as noted in previous years, apparent changes in funding should be analysed with caution.

While still receiving the majority of Buruli ulcer funding, investment in vaccines ($1.9m, 31.8%) is now closely followed by basic research ($1.7m, 28.6%). This is due both to an increase in YOY basic research funding (up $0.2m, 19.8%) and funding reported by the UBS Optimus Foundation and the German Leprosy and TB Relief Association (DAHW), who did not participate in every survey year. Another $1.0m (16.2%) went to diagnostics and $0.6m (9.7%) to drug development.

Figure 21. Buruli ulcer R&D funding by product type 2007-2012



^ Figures are adjusted for inflation and reported in 2007 US dollars

Funding for Buruli ulcer became somewhat less concentrated, with the top three funders – the UBS Optimus Foundation, the EC and the US NIH – providing 79.1% of total funding in 2012 (compared to 85.2% in 2011). Funders reporting Buruli ulcer investment for the first time included the Fondation Raoul Follereau (FRF, $0.2m, 2.9%), the French National Research Agency (ANR, $0.2m, 2.6%), DAHW (<$0.1m, 0.3%) and the American Leprosy Mission (ALM, <$0.1m, 0.2%). Funding from all other organisations remained fairly stable.

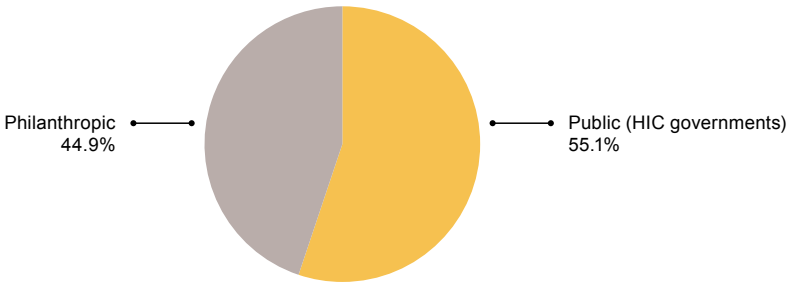
Table 18. Buruli ulcer R&D funders 2012

Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
UBS Optimus Foundation		0.1	0.1	1.1	1.9	2.1		7.2	7.1	20.2	33.2	34.4
European Commission	0.7	0.6	0.2	2.0	1.9	1.8	30.1	32.0	8.7	37.2	32.7	29.9
US NIH	0.7	0.4	0.8	1.1	1.1	0.9	27.2	20.7	42.5	19.3	19.3	14.9
Institut Pasteur	0.6	0.3	0.4	0.5	0.2	0.4	26.8	14.6	19.6	8.8	3.9	6.8
Wellcome Trust	-	<0.1	<0.1	<0.1	0.3	0.3	0.0	2.1	0.4	0.3	5.9	4.9
FRF				-	-	0.2				0.0	0.0	2.9
French ANR		-	-	-	-	0.2		0.0	0.0	0.0	0.0	2.6
Medicor Foundation				0.3	0.1	0.1				6.0	1.8	2.1
Australian NHMRC	0.2	0.1	0.1	0.1	<0.1	<0.1	9.1	3.8	6.9	2.2	1.2	1.1
DAHW				-	-	<0.1				0.0	0.0	0.3
ALM	-	-	-	-	-	<0.1	0.0	0.0	0.0	0.0	0.0	0.2
Volkswagen-Stiftung					<0.1	<0.1					1.1	0.1
Disease total	2.4	2.0	1.8	5.5	5.8	6.1	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

As in the previous year, investment in Buruli ulcer came exclusively from HIC governments ($3.4m, 55.1%) and the philanthropic sector ($2.7m, 44.9%), with YOY funding remaining unchanged for both sectors.

Figure 22. Buruli ulcer R&D funding by funder type 2012



RHEUMATIC FEVER

Rheumatic fever is a bacterial infection, caused by Group *A streptococcus*, that most commonly affects children 5-14 years of age. It usually follows an untreated bacterial throat infection and can lead to rheumatic heart disease, in which the heart valves are permanently damaged. It may progress to heart failure and stroke.

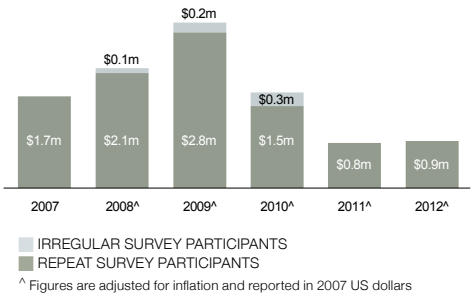
Rheumatic fever was responsible for 9.5 million DALYs and 295,592 deaths in 2010. It was the sixth highest cause of mortality and eighth highest cause of morbidity from neglected diseases.

Acute rheumatic fever can be treated using currently available products, although post-infection prophylaxis requires multiple dosing with antibiotics. Treatment of rheumatic heart disease often requires surgery. The primary area of R&D need is in the development of a vaccine.

A number of vaccines are currently in development, including one developed by the Queensland Institute of Medical Research (QIMR), currently in Phase I trials.[68] Disappointingly, in 2010, the Hilleman Laboratories in India (a joint venture between the Wellcome Trust and Merck & Co. to develop affordable and sustainable vaccines for DCs) decided not to pursue the development of a *Streptococcus A* vaccine, as it was not sufficiently close to Phase III trials and understanding of the immunopathogenesis of *Streptococcus A* diseases (particularly rheumatic fever) was deemed too limited.[69]

R&D needed for rheumatic fever is:

- Vaccines



$0.9 MILLION

TOTAL SPEND ON RHEUMATIC FEVER R&D IN 2012

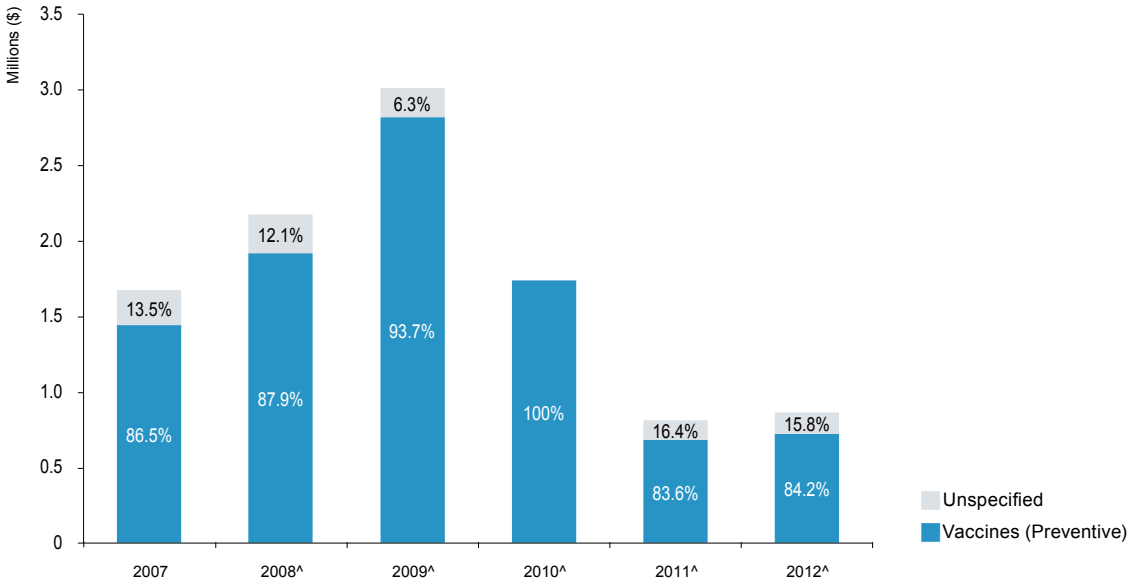
0.1%

OF GLOBAL R&D FUNDING

Rheumatic fever received $0.9m (*$1.0m*) in R&D funding in 2012. Investment was essentially stable compared to 2011, after funding levels were almost halved two years in a row. YOY investors increased their funding by only $0.05m (up 5.7%) to $0.9m, with no additional funding from irregular survey participants. Rheumatic fever's share of total R&D funding remained unchanged at 0.1%.

As with other low-funded diseases and as noted in previous years, apparent changes in funding should be analysed with caution. Furthermore, we note that the only rheumatic fever investments tracked by G-FINDER are for vaccines. YOY funding for vaccine development increased by $0.04m (up 6.4%).

Figure 23. Rheumatic fever R&D funding by product type 2007-2012*



^ Figures are adjusted for inflation and reported in 2007 US dollars
* G-FINDER's scope for rheumatic fever only includes preventive vaccines

The same three organisations that funded rheumatic fever in 2011 continued to invest in 2012, at essentially the same funding levels as in the previous year. The US NIH was the largest funder at $0.4m, providing almost half of total funding (49.7%). The Australian National Health and Medical Research Council (NHMRC) provided an additional $0.3m (34.5%), with a further $0.1m (15.8%) provided by the Swedish Research Council. Encouragingly, the Australian and New Zealand Prime Ministers have recently announced a co-funding arrangement to identify potential vaccines for rheumatic fever, which should lead to a welcome increase in rheumatic fever R&D funding in future years.[70]

Table 19. Rheumatic fever R&D funders 2012

Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
US NIH	1.3	0.6	0.7	0.8	0.4	0.4	76.9	28.9	24.8	46.0	46.8	49.7
Australian NHMRC	0.4	0.3	0.6	0.7	0.3	0.3	23.1	15.5	19.1	39.5	36.8	34.5
Swedish Research Council		<0.1	<0.1	-	0.1	0.1		2.7	2.0	0.0	16.4	15.8
Fondazione Cariplo		-	0.1	-				0.0	4.3	0.0		
Australia - India SRF				0.1						5.9		
Australian DIICCSRTE/ARC		0.1	-	-	-	-		4.9	0.0	0.0	0.0	0.0
Aggregate industry	-	1.0	1.4	-	-	-	0.0	44.2	48.2	0.0	0.0	0.0
Australian NHF		<0.1	<0.1	0.1				2.5	1.7	8.6		
Disease total	1.7	2.2	3.0	1.7	0.8	0.9	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

Funding for rheumatic fever R&D in 2012 was again exclusively provided by HIC governments ($0.9m).

Figure 24. Rheumatic fever R&D funding by funder type 2012

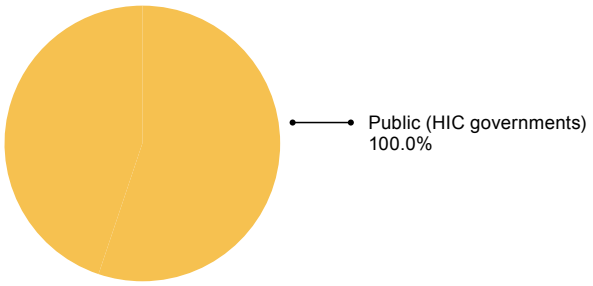


Table 20. Summary table of overall neglected disease and product funding in 2012 ($m)^

Disease or R&D area	Basic research	Drugs	Vaccines (Preventive)	Vaccines (Therapeutic)	Microbicides	Vector control products	Diagnostics	Unspecified	Total
HIV/AIDS	200.48	21.36	596.13		176.52		30.71	39.02	1,064.22
Malaria	162.29	187.55	127.49			31.28	13.40	20.48	542.49
P. falciparum	79.71	92.01	68.57			3.83	4.36	0.99	249.47
P. vivax	11.13	40.08	5.66			0.28	0.59	0.87	58.62
Other and/or unspecified malaria strains	71.45	55.47	53.25			27.17	8.45	18.62	234.40
Tuberculosis	128.56	210.27	97.57	3.22		-	40.04	22.43	502.09
Dengue	33.34	23.90	176.94			8.80	3.52	2.39	248.90
Diarrhoeal diseases	40.18	10.17	78.92				5.59	17.32	152.17
Rotavirus			48.26				-	2.92	51.18
Cholera	19.03	2.41	10.58				0.57	0.53	33.13
Shigella	7.22	0.99	8.23				1.14	2.02	19.60
Cryptosporidium	2.94	1.69	0.12				0.62	-	5.36
Enterotoxigenic *E.coli* (ETEC)			2.97				0.30	0.88	4.15
Giardia							0.44	0.54	0.98
Enteroaggregative *E.coli* (EAggEC)			-				0.19	0.09	0.28
Multiple diarrhoeal diseases	10.99	5.08	8.76				2.33	10.33	37.49
Kinetoplastids	57.16	60.00	5.41	0.63		0.03	10.94	2.18	136.34
Leishmaniasis	19.88	10.29	5.11	0.58			1.81	1.06	38.73
Sleeping sickness	21.64	10.91	0.08			-	3.31	0.90	36.85
Chagas' disease	12.77	15.52	0.22	0.04		0.03	2.91	0.21	31.69
Multiple kinetoplastids	2.88	23.28	-	-		-	2.91	-	29.07
Bacterial pneumonia & meningitis			81.48				4.90	12.84	99.21
Streptococcus pneumoniae			66.42				2.41	0.13	68.97
Neisseria meningitidis			15.05				0.45	2.29	17.80
Both bacteria							2.04	10.41	12.45
Helminths (worms & flukes)	46.97	17.49	9.47			1.10	3.67	5.71	84.41
Schistosomiasis (bilharziasis)	16.13	1.95	2.74			-	2.05	3.36	26.22
Lymphatic filariasis (elephantiasis)	8.04	3.60				0.35	0.10	1.33	13.41
Onchocerciasis (river blindness)	0.89	8.21	0.69			0.57	1.06	0.01	11.45
Hookworm (ancylostomiasis & necatoriasis)	1.79	0.50	4.45					0.90	7.65
Tapeworm (cysticercosis/taeniasis)	3.15	1.45				0.18		0.11	4.89
Roundworm (ascariasis)	1.01	0.91						-	1.92
Strongyloidiasis & other intestinal roundworms	0.84	0.02	0.02				0.04	-	0.92
Whipworm (trichuriasis)	0.82	-						-	0.82
Multiple helminths	14.29	0.85	1.56			-	0.43	-	17.13
Salmonella infections	32.08	2.51	14.62				3.44	-	52.65
Typhoid and paratyphoid fever (*S. typhi, S. paratyphi A*)	21.92	1.71	10.32				2.23	-	36.18
Non-typhoidal *Salmonella enterica* (NTS)	3.78	-	3.52				0.79	-	8.09
Multiple salmonella infections	6.39	0.80	0.78				0.41	-	8.38

Disease or R&D area	Basic research	Drugs	Vaccines (Preventive)	Vaccines (Therapeutic)	Microbicides	Vector control products	Diagnostics	Unspecified	Total
Leprosy	9.04	0.47					1.22	2.42	13.15
Trachoma			4.12				4.11	0.50	8.72
Buruli ulcer	1.75	0.59	1.95				0.99	0.84	6.12
Rheumatic fever			0.73					0.14	0.86
Core funding of a multi-disease R&D organisation									109.62
Unspecified disease									100.33
Platform technologies	Adjuvants and immunomodulators			General diagnostic platforms			Delivery technologies and devices		
	24.43			15.42			3.99		43.84
Total R&D funding									**3,165.11**

^ Figures are adjusted for inflation and reported in 2007 US dollars
- No reported funding
Category not included in G-FINDER

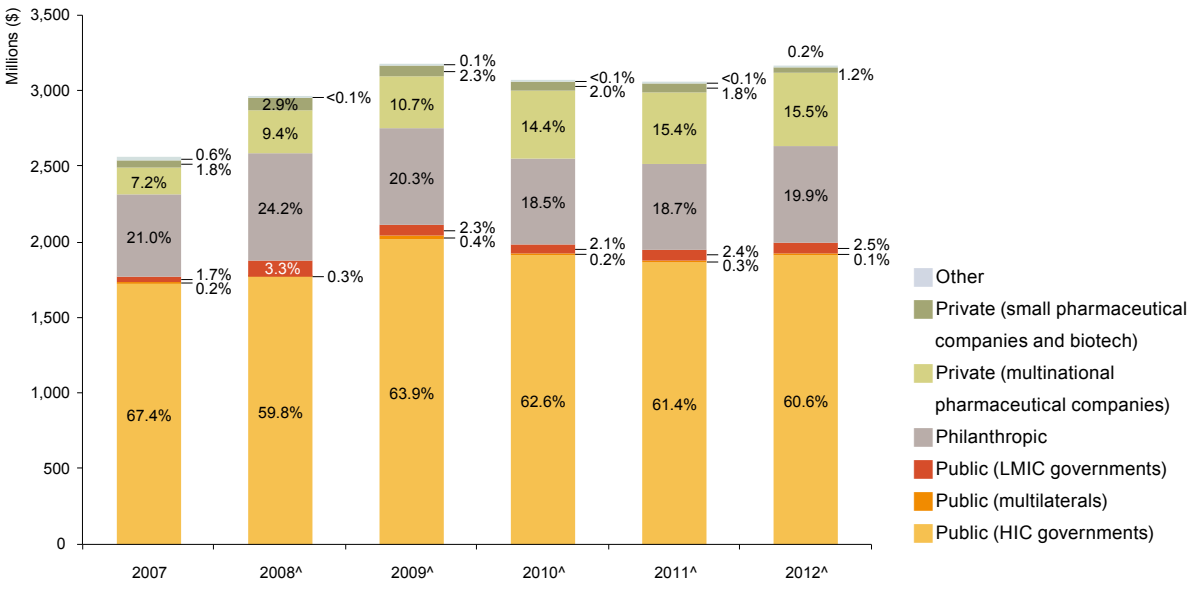
NEGLECTED DISEASE FUNDERS

Funder overview

The public sector remained the dominant funder of neglected disease R&D in 2012, providing almost two-thirds ($2.0bn, 63.2%) of global funding, compared to $1.9bn (64.0%) in 2011. Again, this funding came predominantly from HIC governments, who provided $1.9bn (or 95.9% of all public funding) a share which was unchanged from the previous year. The gap between the philanthropic sector contribution ($631.0m, 19.9%) and that of industry ($527.2m, 16.7%) widened slightly compared to 2011. The remaining funding originated from unspecified funders ($5.9m, 0.2%).

As noted earlier, overall global funding for neglected disease R&D increased slightly in 2012, with YOY funding increasing by $92.1m (up 3.2%). The philanthropic, public and private sectors all contributed to this growth in funding, with the largest increase coming from YOY philanthropic funders, who increased their investments by $51.9m (up 9.4%). YOY public funders in both HICs and LMICs increased funding by $24.8m (up 1.4%) and $9.3m (up 30.8%), respectively, increasing overall YOY public funding (up $27.8m, 1.5%), despite a funding cut from multilaterals (down $6.4m, -81.0%). Similarly, an increase in MNC investment (up $17.4m, 3.7%) meant that YOY funding from the pharmaceutical industry continued to grow in 2012 (up $12.4m, 2.5%), despite another drop in SME investment (down $5.0m, -23.1%). Irregular survey participants accounted for an additional $183.9m in reported funding.

Figure 25. Total funding by funder type 2007-2012



^ Figures are adjusted for inflation and reported in 2007 US dollars

Public funders

Twelve of the top 20 YOY government funders decreased or did not increase their neglected disease R&D funding in 2012, up from only 9 of the top 20 in 2011. These included 6 of the top 12 funders (these top 12 collectively accounted for 94.8% of all public funding). YOY funding from HIC governments rose slightly (up $24.8m, 1.4%), as did funding from LMIC governments (up $9.3m, 30.8%). In contrast, multilateral organisations cut their funding in 2012 (down $6.4m, -81.0%).

As in all five previous G-FINDER surveys, the top three public funders were the US, the UK and the EC. The US contributed just over 70% of global public funding ($1.4bn, 72.2%), a total which was over 15 times more than the next largest public funder (the UK). The US NIH remained the main instrument of US public funding, investing $1.3bn in neglected disease R&D.

Encouragingly, US public funding for neglected disease R&D increased for the first time since 2008 (up $86.3m, 6.4%). This change was entirely due to increased investment by the US NIH (up $94.1m, 7.9%), offset slightly by the US CDC which once again decreased its funding (down $7.9m, -62.4%). Public funding from the UK again decreased significantly (down $36.3m, -28.1%), although this was largely due to a considerable drop in reported funding by the UK DFID (down $30.3m, -40.1%), which in turn was due to the uneven disbursement of cyclical grants. A number of other European public sector funders also provided less funding in 2012 than they did in 2011, including the EC (down $12.1m, -11.5%), the Netherlands (down $11.1m, -47.9%) and France (down $6.1m, -10.3%).

On the positive side, German YOY investment in neglected disease R&D increased by $11.2m as a result of funding from the German Federal Ministry for Economic Cooperation and Development (BMZ) – the only German public funder to report data to G-FINDER every year of the survey – to the newly-established GHIF. Funding from Canada also rose (up $7.8m, 84.1%), mostly due to better reporting.

Innovative developing countries (IDCs) had a mixed investment record in 2012. Both Brazil (up $8.5m, 93.4%) and South Africa (up $1.1m, 24.7%) increased YOY funding, while Indian funding remained relatively stable (down $0.2m, -1.4%). India and Brazil were both among the top 12 public funders globally.

Table 21. Top 12 public funders 2012

Country	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
United States of America	1,253	1,258	1,461	1,387	1,355	1,445	70.6	67.2	69.2	69.7	69.5	72.2
United Kingdom	104.7	103.3	142.6	163.8	133.2	93.4	5.9	5.5	6.8	8.2	6.8	4.7
European Commission	121.4	129.9	118.3	92.5	105.2	93.1	6.8	6.9	5.6	4.6	5.4	4.7
Germany	12.1	3.7	34.1	37.8	31.8	54.6	0.7	0.2	1.6	1.9	1.6	2.7
France	15.7	29.3	48.2	40.5	59.9	53.3	0.9	1.6	2.3	2.0	3.1	2.7
Australia	18.2	25.1	22.8	25.0	31.3	39.5	1.0	1.3	1.1	1.3	1.6	2.0
India		32.5	24.6	31.1	33.8	34.4	0.0	1.7	1.2	1.6	1.7	1.7
Brazil	22.1	36.8	31.8	10.9	11.3	19.7	1.2	2.0	1.5	0.5	0.6	1.0
Sweden	21.6	25.6	33.1	18.9	19.4	18.2	1.2	1.4	1.6	0.9	1.0	0.9
Canada	19.1	23.1	16.9	9.5	9.3	17.1	1.1	1.2	0.8	0.5	0.5	0.9
Netherlands	34.1	27.0	28.7	18.1	24.2	15.3	1.9	1.4	1.4	0.9	1.2	0.8
Switzerland	6.6	3.9	7.0	11.9	11.9	13.4	0.4	0.2	0.3	0.6	0.6	0.7
Subtotal top 12 public funders*	1,666	1,734	1,982	1,854	1,829	1,897	93.9	92.6	93.9	93.1	93.8	94.8
Total public funding	1,775	1,873	2,112	1,990	1,949	2,001	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 12 reflect the top funders for those respective years, not the top 12 for 2012
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

PUBLIC FUNDING AND INTERNATIONAL AID

The impact of the global financial crisis has caused HIC governments to steer investments away from neglected disease R&D and towards domestic populations or global health programmes that demonstrated a more immediate impact. Although many aid agencies increased funding in 2011, the 2012 picture for aid agency funding was similar to the across-the-board cuts seen in 2010.

In 2012, YOY aid agency funding dropped by $39.1m (-17.5%) to $184.9m, although part of this reduction is due to the fact that the World Health Organization Special Programme for Research and Training in Tropical Diseases (WHO/TDR) ceased its neglected disease R&D activities in 2012. Excluding this effect, the drop was $19.0m (-9.3%). Most international agencies reported lower investments in neglected disease R&D than in 2011, including the UK DFID (down $30.3m, -40.1%, partially due to cyclical funding patterns), the Dutch Ministry of Foreign Affairs - Directorate General of Development Cooperation (DGIS, down $11.1m, -47.9%) and the Royal Norwegian Ministry of Foreign Affairs (NORAD, down $4.4m, -66.0%).

These decreases were softened by some agencies that increased YOY funding in 2012. As noted earlier, the German BMZ increased its funding by $11.2m (albeit from a very low base), while the Canadian International Development Agency (CIDA) increased its funding by $4.2m (up 362%). AusAID entered the neglected disease R&D space for the first time in 2012, reporting $7.3m in funding.

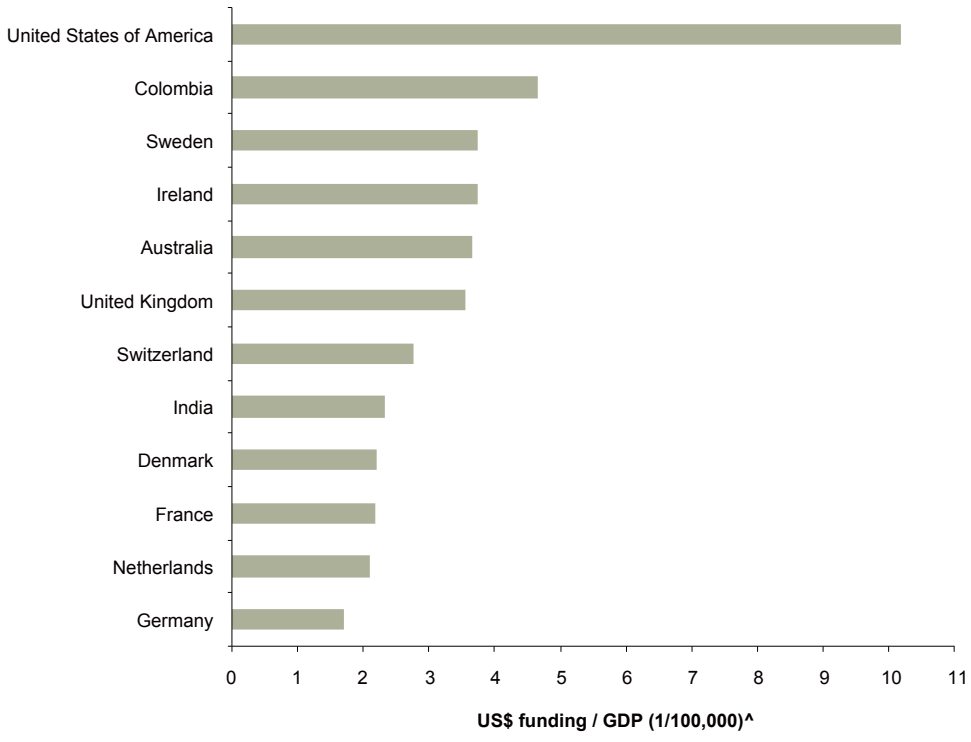
Aid agencies predominantly channel their funding for neglected disease R&D via product development partnerships (PDPs), and provided a total of $115.7m to these organisations in 2012. This represented 60.1% of all aid agency funding in 2012. There was, however, a cut of $56.6m (-34.4%) on the amount aid agencies invested in PDPs the previous year, although once WHO/TDR's cessation of neglected disease R&D projects is considered, the decrease in aid agency funding was $36.5m (-25.2%).

PUBLIC FUNDING BY GDP

Absolute funding can be a misleading measure of public R&D investment because it can underplay the contributions of smaller countries and LMICs. Therefore, country investments were also analysed in relation to gross domestic product (GDP).

When neglected disease R&D funding is analysed by GDP (Figure 26), a slightly different picture emerges. Three countries that are not in the in the top 12 funders by absolute funding (Table 21) do appear in the top 12 when ranked by contribution relative to GDP: Colombia, Ireland and Denmark, with Colombia reporting the second highest amount of public funding by GDP in 2012. In contrast, two countries in the top 12 funders by absolute amount – Brazil and Canada – drop out of the list when GDP is factored in, despite better reporting in 2012 for Canada. However, the majority of countries appear in the top 12 using either metric, including the US, UK, France, Australia, India, Sweden, Netherlands, Switzerland and Germany.

Figure 26. Public funding by GDP 2012



^ GDP figures taken from International Monetary Fund (IMF) World Economic Outlook Database

HIGH-INCOME COUNTRIES (HICs)

HIC governments and multilaterals increased their YOY R&D investment by $18.4m (up 1.0%), reversing the trend of funding cuts in 2011 and 2010, when funding decreased by $31.5m (-1.7%) and $109.8m (-5.6%), respectively. Notwithstanding this change, the pattern of funding across the neglected diseases was similar to 2011 and 2010. Three diseases accounted for nearly three-quarters (72.3%) of public funding: HIV/AIDS ($880.1m, 45.8%), malaria ($259.3m, 13.5%) and TB ($249.3m, 13.0%). No other disease received more than $100m in annual funding, and two diseases – Buruli ulcer and rheumatic fever – received less than $5m each.

Of the top three diseases, YOY funding for HIV/AIDS increased (up $21.2m, 2.5%), while funding for TB and malaria decreased by $15.7m (-6.4%) and $8.3m (-3.2%), respectively. There were additional cuts in funding for bacterial pneumonia & meningitis (down $10.4m, -41.3%), kinetoplastids (down $7.4m, -9.0%), diarrhoeal diseases (down $5.7m, -7.1%) and dengue (down $1.4m, -2.2%). However, HIC governments increased their funding for helminths (up $6.8m, 16.9%), salmonella (up $5.9m, 21.5%), leprosy (up $5.3m, 133%) and trachoma (up $2.6m, 46.3%). Overall, these changes are largely due to changes in US NIH funding.

Table 22. Public funding (high-income countries and multilaterals) by disease 2007-2012

Disease or R&D area	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
HIV/AIDS	934.2	919.5	959.4	891.2	855.1	880.1	54.0	51.8	47.1	46.3	45.6	45.8
Malaria	216.7	232.5	263.2	287.7	266.4	259.3	12.5	13.1	12.9	14.9	14.2	13.5
Tuberculosis	220.6	209.4	310.1	286.1	257.2	249.3	12.7	11.8	15.2	14.9	13.7	13.0
Kinetoplastids	45.9	79.4	95.0	96.0	87.1	84.6	2.7	4.5	4.7	5.0	4.6	4.4
Diarrhoeal diseases	43.8	60.4	91.4	75.6	82.7	77.2	2.5	3.4	4.5	3.9	4.4	4.0
Dengue	58.2	49.4	75.1	61.6	63.1	63.1	3.4	2.8	3.7	3.2	3.4	3.3
Helminths (worms & flukes)	37.3	32.6	47.4	45.3	43.8	53.8	2.2	1.8	2.3	2.4	2.3	2.8
Salmonella infections	9.1	26.1	32.3	33.3	29.4	35.4	0.5	1.5	1.6	1.7	1.6	1.8
Bacterial pneumonia & meningitis	10.0	9.6	12.1	16.2	25.3	15.4	0.6	0.5	0.6	0.8	1.3	0.8
Leprosy	3.5	3.6	6.2	3.5	4.0	9.2	0.2	0.2	0.3	0.2	0.2	0.5
Trachoma	<0.1	1.8	1.8	2.6	5.5	8.1	0.0	0.1	0.1	0.1	0.3	0.4
Buruli ulcer	2.2	1.5	1.5	3.7	3.4	3.4	0.1	0.1	0.1	0.2	0.2	0.2
Rheumatic fever	1.7	1.1	1.4	1.6	0.8	0.9	0.1	0.1	0.1	0.1	0.0	0.0
Platform technologies	3.6	5.5	6.8	10.0	10.6	23.2	0.2	0.3	0.3	0.5	0.6	1.2
Adjuvants and immunomodulators	<0.1	0.7	2.6	3.8	1.8	16.1	0.0	0.0	0.1	0.2	0.1	0.8
General diagnostic platforms	1.0	1.9	1.8	5.1	8.3	6.7	0.1	0.1	0.1	0.3	0.4	0.3
Delivery technologies and devices	2.5	2.8	2.4	1.2	0.4	0.4	0.1	0.2	0.1	0.1	0.0	0.0
Core funding of a multi-disease R&D organisation	96.8	87.3	66.9	69.8	85.6	65.6	5.6	4.9	3.3	3.6	4.6	3.4
Unspecified disease	47.7	56.6	68.1	41.1	57.0	92.9	2.8	3.2	3.3	2.1	3.0	4.8
Total public funding (HICs/multilaterals)	1,731	1,776	2,039	1,925	1,877	1,921	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars

LOW- AND MIDDLE- INCOME COUNTRIES (LMICs)

LMIC governments reported providing $79.7m for neglected disease R&D in 2012, or 4.0% of all public funding, with YOY LMIC funders increasing their investment by $9.3m (up 30.8%) compared to 2011. As in 2011, the majority ($59.6m, 74.8%) of LMIC funding came from the three IDCs included in the survey: Brazil, India and South Africa. Colombia's reported investment of $12.1m was equivalent to 15.2% of all LMIC investment – its highest share of funding since the start of the G-FINDER survey – while Brazil was responsible for the largest increase in YOY funding (up $8.5m, 93.4%). Other countries surveyed included Argentina, Chile, Ghana, Malaysia, Mexico, Nigeria, Thailand and Uganda.

LMIC funding for neglected diseases was concentrated on malaria, TB, HIV/AIDS and kinetoplastids, which collectively received just over 70% ($56.1m) of public funding. Trachoma received no funding at all from LMICs, and less than $1.0m went to bacterial pneumonia & meningitis.

Six diseases saw modest increases in funding, with HIV/AIDS increasing by $5.3m (up 88.8%), kinetoplastids by $2.2m (up 116%), malaria by $1.5m (up 29.2%), leprosy by $1.1m (up 873%), dengue by $1.0m (up 167%) and helminths by $0.9m (albeit from a very low base). YOY funding from LMIC governments for diarrhoeal diseases dropped by $4.9m (-76.0%), while funding for TB was cut by $2.3m (-24.2%). These changes largely reflect funding patterns in Brazil and India.

Table 23. Public funding (LMICs) by disease 2010-2012

Disease or R&D area	US$ (millions)^			Percentage of total (%)		
	2010	2011	2012	2010	2011	2012
Malaria	8.0	10.3	17.3	12.3	14.3	21.8
Tuberculosis	9.0	14.0	13.7	14.0	19.4	17.2
HIV/AIDS	16.6	15.4	12.8	25.6	21.4	16.1
Kinetoplastids	9.8	9.3	12.3	15.1	13.0	15.4
Dengue	6.8	4.4	6.2	10.5	6.1	7.8
Diarrhoeal diseases	6.0	11.9	4.2	9.3	16.5	5.3
Helminths (worms & flukes)	0.9	1.7	2.6	1.4	2.3	3.2
Leprosy	2.8	1.9	1.9	4.4	2.7	2.4
Salmonella infections	0.7	1.0	1.1	1.1	1.4	1.3
Bacterial pneumonia & meningitis	0.3	0.1	0.2	0.5	0.1	0.3
Platform technologies	2.7	0.4	3.6	4.2	0.5	4.6
Delivery technologies and devices	1.5	<0.1	3.0	2.3	0.0	3.7
General diagnostic platforms	0.7	0.4	0.5	1.1	0.5	0.6
Adjuvants and immunomodulators	0.5	-	0.1	0.8	0.0	0.2
Core funding of a multi-disease R&D organisation	1.0	0.3	-	1.6	0.4	0.0
Unspecified disease	-	1.3	3.6	0.0	1.7	4.5
Total philanthropic funding	64.8	72.0	79.7	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
- No reported funding

Philanthropic funders

YOY philanthropic funding continued to increase in 2012 (up $51.9m, 9.4%), although, even when added to the slight increase in 2011 (up $6.5m, 1.2%) this is yet to offset the large drop in funding seen in 2010 (down $87.0m, -13.8%). The growth in philanthropic funding was entirely due to increased investment by the Wellcome Trust (up $53.0m, 56.0%) and reflected cyclical funding patterns, with large disbursements to overseas research centres made in 2012. Funding from the Gates Foundation remained stable (down $3.8m, -0.8%).

The Gates Foundation and Wellcome Trust contributed 93.8% of all philanthropic funding in 2012, down from 95.1% in 2011, and the trend towards a rebalancing of their relative contributions continued. The Gates Foundation contributed 70.4% of all philanthropic funding in 2012, down from 78.5% in 2011 and 80.2% in 2010, while the Wellcome Trust contributed 23.4% of all philanthropic funding in 2012, up from 16.6% in 2011 and 14.2% in 2010.

Table 24. Top philanthropic funders 2012

Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
Gates Foundation	452.1	617.0	557.5	455.8	447.9	444.1	84.0	86.1	86.5	80.2	78.5	70.4
Wellcome Trust	60.0	60.9	65.1	80.5	94.8	147.8	11.1	8.5	10.1	14.2	16.6	23.4
GAVI	10.1	14.8		2.1		8.4	1.9	2.1		0.4		1.3
MSF	7.2	7.3	4.6	4.7	5.2	5.7	1.3	1.0	0.7	0.8	0.9	0.9
UBS Optimus Foundation	0.5	1.1	1.1	7.4	5.3	3.3	0.1	0.2	0.2	1.3	0.9	0.5
Funds raised from the general public	2.1	1.2	0.4	0.3	0.5	0.3	0.4	0.2	0.1	0.1	0.1	0.1
All other philanthropic organisations	6.3	14.3	15.6	17.3	17.0	21.4	1.2	2.0	2.4	3.0	3.0	3.4
Total philanthropic funding	538.3	716.5	644.3	568.1	570.6	631.0	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars

Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

Malaria, HIV/AIDS and TB combined received 64.2% of philanthropic funding in 2012. This was a decrease of nearly 10% compared to the proportion of funding these diseases received in 2011, largely due to a reduction in YOY malaria funding (down $28.7m, -16.2%).

YOY philanthropic investment for helminths also decreased (down $3.5m, -13.0%), but increased for HIV/AIDS (up $10.8m, 8.3%), diarrhoeal diseases (up $7.8m, 24.9%), and bacterial pneumonia & meningitis (up $6.6m, 19.2%).

Table 25. Philanthropic funding by disease 2007-2012

Disease or R&D area	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
Malaria	155.6	203.2	212.5	125.6	180.4	151.8	28.9	28.4	33.0	22.1	31.6	24.1
HIV/AIDS	101.0	174.8	132.9	134.9	135.2	145.1	18.8	24.4	20.6	23.8	23.7	23.0
Tuberculosis	118.7	138.4	107.8	120.2	103.2	108.0	22.0	19.3	16.7	21.2	18.1	17.1
Bacterial pneumonia & meningitis	6.2	26.8	22.4	43.7	34.5	45.8	1.1	3.7	3.5	7.7	6.1	7.3
Diarrhoeal diseases	55.6	42.3	47.1	45.7	31.6	43.1	10.3	5.9	7.3	8.0	5.5	6.8
Helminths (worms & flukes)	10.8	26.4	22.2	20.9	28.0	24.4	2.0	3.7	3.4	3.7	4.9	3.9
Kinetoplastids	67.9	49.4	53.6	30.2	22.8	21.7	12.6	6.9	8.3	5.3	4.0	3.4
Salmonella infections	<0.1	1.0	3.6	7.1	9.5	12.3	0.0	0.1	0.6	1.2	1.7	1.9
Dengue	2.1	17.5	13.3	10.0	7.4	10.5	0.4	2.4	2.1	1.8	1.3	1.7
Buruli ulcer	-	0.2	0.3	1.7	2.4	2.7	0.0	0.0	0.0	0.3	0.4	0.4
Leprosy	0.7	1.1	1.0	2.5	1.5	2.0	0.1	0.1	0.2	0.4	0.3	0.3
Trachoma	1.5	-	-	-	0.1	0.6	0.3	0.0	0.0	0.0	0.0	0.1
Rheumatic fever	-	<0.1	0.2	0.1	-	-	0.0	0.0	0.0	0.0	0.0	0.0
Platform technologies	2.0	8.1	14.4	12.8	6.0	16.9	0.4	1.1	2.2	2.3	1.1	2.7
General diagnostic platforms	2.0	2.7	6.8	3.6	1.4	8.2	0.4	0.4	1.1	0.6	0.3	1.3
Adjuvants and immunomodulators	-	1.3	2.2	4.9	3.3	8.1	0.0	0.2	0.3	0.9	0.6	1.3
Delivery technologies and devices	-	4.1	5.5	4.4	1.3	0.6	0.0	0.6	0.8	0.8	0.2	0.1
Core funding of a multi-disease R&D organisation	13.0	9.9	5.5	6.1	5.1	44.0	2.4	1.4	0.9	1.1	0.9	7.0
Unspecified disease	3.3	17.4	7.5	6.4	2.8	2.0	0.6	2.4	1.2	1.1	0.5	0.3
Total philanthropic funding	538.3	716.5	644.3	568.1	570.6	631.0	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
- No reported funding

Private sector funders

The pharmaceutical industry continued to increase its neglected disease R&D funding in 2012 (up $12.4m, 2.5%). Total industry investments reached $527.2m in 2012, with MNCs accounting for $490.6m (93.1%) of industry funding and SMEs accounting for the remaining $36.6m (6.9%).

The increase in YOY industry investment in 2012 was entirely due to increased investment by MNCs (up $17.4m, 3.7%), which offset a smaller drop in investment from SMEs (down $5.0m, -23.1%).

MULTINATIONAL PHARMACEUTICAL COMPANIES (MNCs)

The vast majority (80.0%) of MNC investment in neglected disease R&D in 2012 went to just three diseases: dengue, TB and malaria. However, YOY investment from MNCs increased for most diseases, including dengue (up $11.9m, 7.9%), malaria (up $11.9m, 12.6%), kinetoplastids (up $4.2m, 46.0%), diarrhoeal diseases (up $3.8m, 17.6%), and bacterial pneumonia & meningitis (up $1.4m, 4.4%). The only diseases where MNC YOY investment dropped in 2012 were TB (down $14.9m, -10.9%) and salmonella (down $0.8m, -17.3%). This was in contrast to 2011, when almost all diseases received funding cuts. There were no MNC investments in either year in trachoma, rheumatic fever or Buruli ulcer.

Table 26. Multinational pharmaceutical company (MNC) funding by disease 2007-2012

Disease	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
Dengue	16.0	43.1	58.9	94.5	150.9	162.5	8.6	15.5	17.4	21.4	32.2	33.1
Tuberculosis	50.4	73.8	107.4	142.9	137.7	123.1	27.2	26.5	31.8	32.3	29.4	25.1
Malaria	80.2	80.7	80.8	114.5	94.4	106.8	43.2	28.9	23.9	25.9	20.1	21.8
Bacterial pneumonia & meningitis	15.2	31.9	25.4	26.3	32.2	33.6	8.2	11.4	7.5	5.9	6.9	6.8
Diarrhoeal diseases	10.7	22.0	32.5	31.1	21.7	25.5	5.8	7.9	9.6	7.0	4.6	5.2
Kinetoplastids	5.1	1.3	3.8	10.5	9.0	17.1	2.8	0.5	1.1	2.4	1.9	3.5
HIV/AIDS	7.8	19.9	17.5	16.7	13.0	13.7	4.2	7.1	5.2	3.8	2.8	2.8
Salmonella infections	-	1.2	1.8	2.7	4.4	3.6	0.0	0.4	0.5	0.6	0.9	0.7
Helminths (worms & flukes)	<0.1	3.9	8.1	3.2	2.3	3.0	0.0	1.4	2.4	0.7	0.5	0.6
Trachoma	0.1	<0.1	-	-	-	-	0.1	0.0	0.0	0.0	0.0	0.0
Buruli ulcer	-	<0.1	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0
Rheumatic fever	-	1.0	1.4	-	-	-	0.0	0.3	0.4	0.0	0.0	0.0
Unspecified disease	-	-	-	-	3.6	1.7	0.0	0.0	0.0	0.0	0.8	0.4
Total MNC funding	185.6	279.0	337.9	442.4	469.2	490.6	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
- No reported funding

SMALL PHARMACEUTICAL AND BIOTECHNOLOGY FIRMS (SMEs)

SME funding totalled $36.6m in 2012, with overall YOY investment from SMEs dropping by $5.0m (-23.1%). YOY SME funding for TB dropped again (down $5.0m, -39.6%), as did the already minimal funding for HIV/AIDS (down $0.3m, -31.3%). There were small increases in funding for dengue (up $3.1m, 118%) and malaria (up $1.3m, 84.8%). It must be noted that SME participation in the survey has been inconsistent over the years, with YOY participants accounting for just under half of total SME funding reported in 2012.

Table 27. Small pharmaceutical and biotechnology firm (SME) funding by disease 2007-2012

Disease or R&D area	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
Tuberculosis	15.5	13.2	15.7	17.1	13.6	8.0	33.5	15.3	21.4	28.0	24.3	21.8
Malaria	10.6	9.9	18.5	11.2	7.2	7.2	22.9	11.5	25.2	18.3	12.9	19.8
HIV/AIDS	11.8	27.5	17.8	13.4	10.0	6.6	25.5	31.9	24.3	21.9	17.9	18.1
Dengue	3.4	0.6	4.2	4.7	3.2	6.5	7.4	0.8	5.7	7.7	5.8	17.7
Bacterial pneumonia & meningitis	0.6	18.6	8.4	5.8	4.5	4.2	1.3	21.5	11.4	9.5	8.1	11.5
Diarrhoeal diseases	3.0	2.1	4.6	0.5	4.4	2.2	6.4	2.4	6.3	0.8	7.8	6.0
Kinetoplastids	<0.1	1.6	1.3	1.4	3.4	0.8	0.0	1.9	1.7	2.2	6.1	2.2
Helminths (worms & flukes)	0.8	1.1	0.4	3.3	5.4	0.6	1.6	1.2	0.6	5.3	9.6	1.8
Salmonella infections	-	11.1	1.7	0.1	<0.1	0.3	0.0	12.9	2.3	0.2	0.1	0.7
Buruli ulcer	<0.1	0.2	-	-	-	-	0.0	0.2	0.0	0.0	0.0	0.0
Trachoma	-	-	-	1.9	3.9	-	0.0	0.0	0.0	3.1	7.0	0.0
Leprosy	-	-	-	<0.1	<0.1	-	0.0	0.0	0.0	0.1	0.2	0.0
Platform technologies	<0.1	0.2	0.8	1.8	0.1	0.2	0.1	0.3	1.1	2.9	0.2	0.5
General diagnostic platforms	<0.1	-	-	-	0.1	<0.1	0.1	0.0	0.0	0.0	0.2	0.2
Adjuvants and immunomodulators	-	-	0.8	-	-	<0.1	0.0	0.0	1.1	0.0	0.0	0.2
Delivery technologies and devices	-	0.2	<0.1	1.8	-	-	0.0	0.3	0.0	2.9	0.0	0.0
Unspecified disease	0.6	-	-	-	-	<0.1	1.3	0.0	0.0	0.0	0.0	0.0
Total SME funding	46.4	86.2	73.4	61.2	55.9	36.6	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
- No reported funding

PRIVATE FIRMS IN INDIA AND BRAZIL

Five SMEs from India and eight SMEs from Brazil participated in the G-FINDER survey this year, up from three and four respectively in 2011.

Neglected disease R&D funding from industry in IDCs totalled $7.6m. YOY funding for diarrhoeal diseases (which was entirely from Indian firms) decreased by $2.2m (-49.5%). Funding remained stable for all other diseases.

Table 28. Private sector IDC funding by disease 2009-2012

Disease	US$ (millions)^				Percentage of total (%)			
	2009	2010	2011	2012	2009	2010	2011	2012
Bacterial pneumonia & meningitis	8.4	5.6	4.5	4.2	44.5	53.3	28.1	55.0
Diarrhoeal diseases	4.3	0.5	4.4	2.2	22.7	4.3	27.0	28.8
Malaria	4.1	<0.1	<0.1	0.7	22.0	0.2	0.1	8.9
Salmonella infections	-	0.1	<0.1	0.3	0.0	1.4	0.4	3.6
Dengue	1.0	0.4	0.3	0.2	5.5	3.4	2.0	2.1
HIV/AIDS	-	<0.1	<0.1	<0.1	0.0	0.3	0.2	1.0
Kinetoplastids	0.8	0.7	1.8	<0.1	4.3	6.8	11.4	0.7
Helminths (worms & flukes)	0.2	3.1	5.0	-	1.0	29.6	30.7	0.0
Leprosy	-	<0.1	-	-	0.0	0.8	0.0	0.0
Total private sector IDC funding	18.8	10.4	16.1	7.6	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
- No reported funding

IN-KIND CONTRIBUTIONS

In addition to their direct R&D spend, companies conducting neglected disease R&D incur a range of other costs, such as infrastructure costs and costs of capital. These costs have not been included in G-FINDER due to the difficulty of accurately quantifying or allocating them to neglected disease programmes. Companies also provide in-kind contributions that are specifically targeted to neglected disease R&D but cannot easily be captured in dollar terms, as seen in Table 29.

We note that while some companies have nominated areas where they provide such contributions, others wished to remain anonymous. Although difficult to quantify, these inputs nevertheless represent a substantial value due to their recipients and a significant cost to companies.

Table 29. Typical industry in-kind contributions to neglected disease R&D 2012

In-kind contribution	Examples	Some company donors*
Transfer of technology & technical expertise to develop, manufacture, register and distribute neglected disease products	• Identifying scientific obstacles • Sharing best practices and developing systems for clinical, technical and regulatory support • Developing capacity for pharmacovigilance • Donating equipment	AstraZeneca GSK Janssen (Johnson & Johnson company) MSD Novartis Otsuka Sanofi
Provision of expertise	• Supporting clinical trials • Collaboration of scientists, sharing trial results and facilitating parallel, concurrent testing • Participation on scientific advisory or management boards of external organisations conducting neglected disease R&D • Providing expertise in toxicology/ADME and medicinal chemistry • Evaluating new compounds proposed by external partners • Allowing senior staff to take sabbaticals working with neglected disease groups	AbbVie AstraZeneca GSK Janssen (Johnson & Johnson company) MSD Novartis Otsuka Pfizer Sanofi
Teaching and training	• In-house attachments offered to Developing Country (DC) trainees in medicinal chemistry, clinical trial training etc • Providing training courses for DC researchers at academic institutions globally • Organising health care provider training in DCs for pharmacovigilance of new treatments • Organising conferences and symposia on neglected disease-specific topics	AstraZeneca GSK Janssen (Johnson & Johnson company) MSD Novartis Otsuka Pfizer
Intellectual property	• Access to proprietary research tools and databases • Sharing compound libraries with WHO or with researchers who can test and screen them for possible treatments • Providing public and non-for-profit groups with information on proprietary compounds they are seeking to develop for a neglected disease indication • Forgoing license or providing royalty-free license on co-developed products	AbbVie GSK Janssen (Johnson & Johnson company) MSD Novartis Pfizer Sanofi
Regulatory assistance	• Allowing right of reference to confidential dossiers and product registration files to facilitate approval of generic combination products • Covering the cost of regulatory filings • Providing regulatory expertise to explore optimal registration options for compounds in development	GSK Janssen (Johnson & Johnson company) Sanofi

* Company donors listed do not necessarily engage in all activities listed as examples of in-kind contributions

Funding by organisation

Neglected disease R&D funding remained highly concentrated, with the top 12 funders contributing 89.5% ($2.8bn) – almost identical to the 89.9% ($2.7bn) seen in 2011. The US NIH, the pharmaceutical industry and the Gates Foundation combined were responsible for 71.1% of all funding.

The most notable funding increase in 2012 came from the US NIH (up $94.1m, 7.9%), which remained the largest funder of neglected disease R&D in 2012. This increase included a $29.2m (up 23.9%) increase in funding for malaria, and a $17.8m (up 2.8%) increase in funding for HIV/AIDS. The Wellcome Trust also increased its funding significantly (up $53.0m, 56.0%), although this reflected cyclical funding changes, with a large disbursement to overseas research centres made in 2012.

There was another large drop in funding from the UK DFID (down $30.3m, -40.1%), also reflecting a cyclical funding pattern, with large up-front disbursements made in 2009 and 2010. Other key European funders also decreased their funding in 2012, including the EC (down $12.1m, -11.5%), the Institut Pasteur (down $8.9m, -28.5%) and the UK MRC (down $6.0m, -11.2%).

Table 30. Top neglected disease funders 2012

Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
US NIH	1,065	1,079	1,256	1,212	1,184	1,278	41.6	36.5	39.6	39.6	38.9	40.4
Aggregate industry	231.9	365.3	411.3	503.5	525.1	527.2	9.1	12.4	13.0	16.4	17.2	16.7
Gates Foundation	452.1	617.0	557.5	455.8	447.9	444.1	17.7	20.9	17.6	14.9	14.7	14.0
Wellcome Trust	60.0	60.9	65.1	80.5	94.8	147.8	2.3	2.1	2.1	2.6	3.1	4.7
European Commission	121.4	129.9	118.3	92.5	105.2	93.1	4.7	4.4	3.7	3.0	3.5	2.9
USAID	80.6	83.8	84.5	86.0	81.4	82.2	3.1	2.8	2.7	2.8	2.7	2.6
US DOD	86.9	72.5	98.2	69.9	75.4	74.8	3.4	2.5	3.1	2.3	2.5	2.4
UK MRC	51.7	52.8	51.7	60.9	53.7	47.7	2.0	1.8	1.6	2.0	1.8	1.5
UK DFID	47.6	43.3	84.4	97.2	75.7	45.4	1.9	1.5	2.7	3.2	2.5	1.4
Inserm	1.8	3.1	27.2	20.2	37.4	39.9	0.1	0.1	0.9	0.7	1.2	1.3
Australian NHMRC	15.5	18.7	20.2	19.5	26.8	29.4	0.6	0.6	0.6	0.6	0.9	0.9
Institut Pasteur	31.6	26.5	26.5	45.2	31.2	22.3	1.2	0.9	0.8	1.5	1.0	0.7
Subtotal top 12 funders*	2,287	2,577	2,808	2,743	2,739	2,832	89.3	87.2	88.6	89.6	89.9	89.5
Total R&D funding	2,560	2,956	3,169	3,063	3,045	3,165	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 12 reflect the top funders for those respective years, not the top 12 for 2012

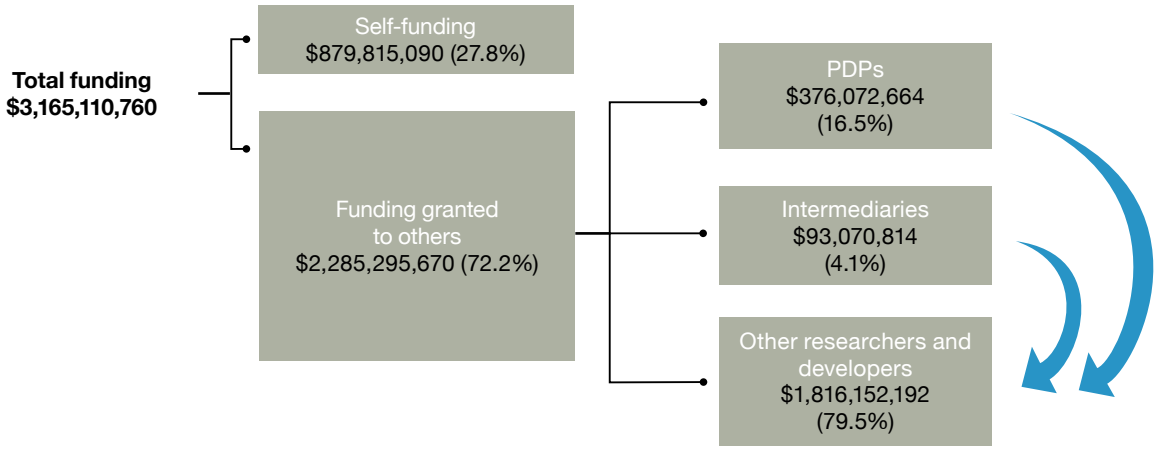
FUNDING FLOWS

Funding agencies disburse their neglected disease R&D investments in two main ways: through self-funding (intramural funders) and through grants to others (extramural funders). Traditional self-funders, such as pharmaceutical companies, invest mainly in their own internal research facilities and programmes, while extramural funders disburse funding through PDPs[iii] and intermediaries, or directly to researchers and developers. Some organisations are pure funders, such as the Wellcome Trust, which means all their funding is in the form of grants to third parties (i.e. they do not conduct research themselves). Other organisations, such as the US NIH and Indian ICMR use a mixed model, providing extramural funding to others in addition to funding their own internal research programmes.

Just under three-quarters of 2012 R&D funding was in the form of external grants (72.2% or $2,285m), while self-funding accounted for 27.8% ($879.8m). The slight increase in YOY investment of neglected disease R&D overall (up $92.1m, 3.2%) was reflected in a rise in both external funding (up $70.2m, 3.4%) and self-funding (up $21.8m, 2.7%). Of the funding given to others (external funding), the vast majority went directly to researchers and developers ($1.82bn, 79.5%). A cut in YOY funding to PDPs in 2012 of $87.4m (-20.0%) meant that only $376.1m (16.5%) of all external funding went to PDPs, down from a fifth in 2011. However, it must be noted that the WHO/TDR ceased its neglected disease R&D activities, thereby inflating the apparent drop in PDP funding. Nevertheless, even with 2011 WHO/TDR funding excluded, PDP funding still decreased by $60.5m (14.8%) in 2012. Other intermediaries received $93.1m (4.1%).

As noted in previous reports, the role of PDPs in this field is somewhat obscured by the 'NIH factor', since the largest global funder of neglected disease R&D, the US NIH, again provided only a very small amount ($7.0m, 0.5%) of its billion-dollar funding to PDPs. If the US NIH is excluded from this analysis, the central role of PDPs in product development becomes clearer, with PDPs collectively managing 30.6% of non-NIH global grant funding for neglected disease R&D in 2012.

Figure 27. Overall R&D funding patterns 2012



[iii] PDPs are defined as public health driven, not-for-profit organisations that typically use private sector management practices to drive product development in conjunction with external partners. PDPs tend to focus on one or more neglected diseases and aim to develop products suitable for DC use. While their primary goal is the advancement of public health rather than commercial gain, they generally use industry practices in their R&D activities, for instance portfolio management and industrial project management. Additionally, many PDPs conduct global advocacy to raise awareness of their target neglected diseases.

Self-funders

Well over half of all self-funding (59.5%) came from the pharmaceutical industry, which almost invariably funds only its own internal R&D programmes, with nearly all the remainder coming from governments investing into their own institutions.

There was an increase in self-funding from YOY participants of $21.8m (up 2.7%), continuing a trend seen in previous years. This included a relatively large increase in self-funding by the US NIH (up $48.0m, 32.0%) and smaller increases from the pharmaceutical industry (up $12.6m, 2.6%), the US DOD (up $3.4m, 6.8%) and Inserm – Institute of Infectious Diseases (Inserm, up $2.4m, 6.5%). Two organisations cut their self-funding, namely the Institut Pasteur (down $8.9m, -28.5%) and the US CDC (down $7.8m, -66.0%), although the reduction from the Institut Pasteur is likely due to altered reporting. It should also be noted that self-funding reported by the Indian Council of Scientific and Industrial Research (CSIR, $3.9m) was categorised as such for the first time this year to provide a better reflection of the organisational structure and funding flows. Several organisations that reported self-funding in previous survey years did not participate in 2012, including the Health Protection Agency: Centre for Emergency Preparedness and Response.

Table 31. Top 10 self-funders 2012

Funder	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
Aggregate industry	229.0	355.3	401.7	498.6	521.1	523.7	8.9	12.0	12.7	16.3	17.1	16.5
US NIH	133.1	158.4	141.9	156.3	150.0	198.0	5.2	5.4	4.5	5.1	4.9	6.3
US DOD	70.3	51.3	79.8	47.8	49.6	53.0	2.7	1.7	2.5	1.6	1.6	1.7
Inserm	1.8	3.1	27.2	20.2	37.4	39.9	0.1	0.1	0.9	0.7	1.2	1.3
Institut Pasteur	31.6	26.5	26.5	45.2	31.2	22.3	1.2	0.9	0.8	1.5	1.0	0.7
Indian ICMR		19.5	17.2	16.0	14.9	14.4		0.7	0.5	0.5	0.5	0.5
Undisclosed participant	-	2.6	7.3	6.6	7.8	7.3	0.0	0.1	0.2	0.2	0.3	0.2
US CDC	5.7	12.7	18.6	15.6	11.9	4.0	0.2	0.4	0.6	0.5	0.4	0.1
Indian CSIR[A]		-	-	-	-	3.9		0.0	0.0	0.0	0.0	0.1
SSI	3.7	3.9	10.2	5.2	2.6	3.6	0.1	0.1	0.3	0.2	0.1	0.1
Subtotal of top 10 self-funders*	525.3	668.4	767.0	853.4	864.3	870.3	20.5	22.6	24.2	27.9	28.4	27.5
Subtotal self-funders#	527.7	686.7	780.7	866.2	870.9	879.8	20.6	23.2	24.6	28.3	28.6	27.8
Total R&D funding	2,560	2,956	3,169	3,063	3,045	**3,165**	100.0	100.0	100.0	100.0	100.0	**100.0**

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 10 reflect the top self-funders for those respective years, not the top 10 for 2012
\# Figures for 2011 have been updated and therefore differ from previously published figures
A Indian CSIR has been included in the self-funders table for the first time this year to provide a better reflection of the organisational structure and funding flows
\- No reported funding
Funding organisation did not participate in the survey for this year.

Product development partnerships

PDPs received a total of $376.1m in 2012. This represented 11.9% of global funding, 16.5% of global grant funding, and 30.6% of global grant funding if the 'NIH factor' is excluded, as before. The top five PDPs – PATH, International AIDS Vaccine Initiative (IAVI), MMV, Global Alliance for TB Drug Development (TB Alliance) and Aeras – accounted for over two-thirds of all PDP funding ($254.9m, 67.8%).

YOY funding to PDPs has been declining since 2009, but this year saw its largest cut so far (down $87.4m, -20.0%). This partially reflects uneven disbursement of multi-year grants (for instance, the UK DFID disbursed their PDP funding investments up-front in 2009 and 2010) and the fact that the WHO/TDR ceased its neglected disease R&D activities (and had received $30.6m in 2011). But the decline in funding also reflects more entrenched underlying trends, with over half of top YOY PDP funders either freezing or further decreasing their PDP investments in 2012.

The majority of PDPs saw funding cuts in 2012, some of them significantly so, including MMV (down $26.7m, -37.6%), PATH (down $14.3m, -16.3%), IDRI (down $10.9m, -56.1%) and the European Vaccine Initiative (EVI, down $5.8m, -81.0%). Only two PDPs saw significant increases in their YOY funding: the Innovative Vector Control Consortium (IVCC, up $7.8m after not having received any funding from YOY funders in 2011) and the International Partnership for Microbicides (IPM, up $8.1m, 59.3%). Funding for other PDPs was relatively steady.

Table 32. Funds received by PDPs 2007-2012

PDPs	US$ (millions)^						Percentage of total (%)					
	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2012
PATH	38.0	111.2	124.0	67.2	87.8	74.3	8.1	19.2	23.4	13.9	19.5	19.7
IAVI	81.3	86.6	72.1	65.4	59.9	58.9	17.3	14.9	13.6	13.5	13.3	15.7
MMV	76.0	46.0	41.8	70.3	71.7	47.2	16.2	7.9	7.9	14.5	15.9	12.6
TB Alliance	39.6	34.1	36.3	48.5	35.7	39.8	8.4	5.9	6.8	10.0	7.9	10.6
Aeras	40.1	63.8	53.4	39.7	38.7	34.6	8.5	11.0	10.1	8.2	8.6	9.2
DNDi	28.5	22.4	32.4	33.8	36.8	32.2	6.1	3.9	6.1	7.0	8.1	8.6
IPM	46.3	60.5	35.6	30.8	14.3	22.8	9.9	10.4	6.7	6.4	3.2	6.1
FIND	22.9	30.4	20.3	24.4	21.2	21.2	4.9	5.2	3.8	5.1	4.7	5.6
IDRI	8.1	14.3	16.6	11.5	20.4	9.7	1.7	2.5	3.1	2.4	4.5	2.6
IVCC	-	9.6	13.3	14.7	<0.1	9.0	0.0	1.7	2.5	3.0	0.0	2.4
IVI	13.1	16.7	21.7	13.9	5.1	7.2	2.8	2.9	4.1	2.9	1.1	1.9
OWH	27.4	28.4	15.2	21.0	9.9	6.4	5.8	4.9	2.9	4.3	2.2	1.7
Sabin Vaccine Institute	7.6	14.5	8.8	3.8	7.9	5.6	1.6	2.5	1.7	0.8	1.8	1.5
TBVI	-	-	<0.1	4.2	3.8	4.9	0.0	0.0	0.0	0.9	0.8	1.3
EVI	7.7	4.4	3.9	5.3	7.6	2.2	1.7	0.8	0.7	1.1	1.7	0.6
WHO/TDR[A]	32.7	37.0	34.7	28.8	30.6	-	7.0	6.4	6.6	6.0	6.8	0.0
Total funding to PDPs	469.4	580.1	530.0	483.2	451.4	376.1	100.0	100.0	100.0	100.0	100.0	100.0

^ Figures are adjusted for inflation and reported in 2007 US dollars

[A] Although TDR's mission is far broader than neglected disease R&D, it has been included here since it has operated as a de facto PDP since the mid-1970s. In FY2012, the organisation decided to phase out R&D activities to focus on implementation research and research capacity strengthening, both outside the G-FINDER scope

- No reported funding

PDP funders

As in previous survey years, philanthropic organisations provided nearly two-thirds of total PDP funding in 2012 ($230.2m, 61.2%), virtually all of which came from the Gates Foundation. Although this was an increase on last year's share of total funding to PDPs, which was 53.2%, YOY philanthropic funding to PDPs in 2012 was actually down by $10.5m (-4.5%).

HIC governments provided essentially all of the remaining funding to PDPs ($142.6m, 37.9%), although they reduced their YOY funding by $70.4m (-36.1%). Most of this cut came from HIC government aid agencies, which predominantly channel their funding via investments in PDPs, and provided a total of $115.7m to these organisations in 2012. Notably, all 12 YOY aid agencies decreased or stabilised their funding to PDPs, with a total cut of $56.6m (-34.4%).

Twelve funders accounted for 93.0% ($349.9m) of PDP funding in 2012, with the Gates Foundation providing more than half ($210.1m, 55.9%) and aid agencies within the top 12 contributing $111.5m (29.7%). Contrary to the preceding two years, when the largest reductions in PDP funding came from the Gates Foundation, in 2012 it was the UK DFID that was responsible for the largest cut in PDP funding (down $30.3m, -40.1%, due to uneven disbursement across their funding cycle). Nevertheless, the Gates Foundation also cut PDP funding again by $12.3m (-5.5%), as did the US NIH (down $11.0m, -61.3%), DGIS (down $8.5m, -41.3%) and the EC (down $2.1m, -30.4%).

Only three YOY funders increased their investment in PDPs: the German BMBF (up $4.9m, 396%), the Wellcome Trust (up $1.2m, 36.7%) and Médecins Sans Frontières (MSF, up $0.8m, 17.0%). AusAID, which participated in the G-FINDER survey for the first time this year, provided $7.3m under its newly-established Medical Research Strategy.

Table 33. Top PDP funders 2012

Funder	US$ (millions)^						% of org's funds given to PDPs	Share of total PDP funding
	2007	2008	2009	2010	2011	2012	2012	2012
Gates Foundation	231.2	351.4	288.7	253.8	222.4	210.1	47.3	55.9
UK DFID	33.4	28.1	77.5	97.2	75.7	45.4	100.0	12.1
USAID	40.8	40.1	37.7	40.2	38.4	38.0	46.2	10.1
Dutch DGIS	32.2	19.8	19.5	15.8	20.7	12.1	100.0	3.2
AusAID						7.3	100.0	1.9
US NIH	4.1	3.3	7.5	2.5	18.0	7.0	0.5	1.9
German BMBF			-	-	1.2	6.1	37.0	1.6
Irish Aid	23.6	6.8	5.2	6.5	6.2	6.0	100.0	1.6
MSF	7.2	7.3	4.6	4.7	4.9	5.7	100.0	1.5
European Commission	4.0	0.0	1.5	7.9	7.1	4.9	5.3	1.3
Wellcome Trust	4.0	3.7	3.6	2.7	3.3	4.4	3.0	1.2
Swiss SDC	1.9	1.9	2.0	3.8	2.9	2.7	91.2	0.7
Subtotal top 12 PDP funders*	426.7	528.1	485.6	453.2	415.7	349.9		
Total PDP funding	469.4	580.1	530.0	483.2	451.4	376.1		
% of total PDP funding (top 12)	90.9	91.0	91.6	93.8	92.1	93.0		

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Subtotals for 2007–2011 top 10 reflect the top self-funders for those respective years, not the top 10 for 2012
\- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

DISCUSSION

Funding for top tier diseases is decreasing, whilst funding for second tier diseases is up

The share of funding going to the top tier diseases continued its downward trend, dropping to 66.6% in 2012 (down from 69.4% in 2011). This was despite the fact that funding for HIV/AIDS increased for the first time since 2008 (up $37.8m, 3.8%) to $1,033m in 2012, and was driven by reductions in funding for both TB and malaria. YOY TB funding fell by $32.5m (-6.5%) to $469.2m, extending last year's decrease of $45.7m (-8.3%). Likewise, YOY funding for malaria decreased by $22.3m (-4.2%) to $514.1m, after a 2.8% increase last year.

The funding share going to the second tier diseases increased slightly in 2012, to 24.4%, with YOY funders increasing funding by $27.3m (up 4.0%). The bulk of this second tier increase ($24.6m) came from the pharmaceutical industry, primarily through a $15.0m (9.8%) increase in dengue investment – a disease that already receives the most funding of the second tier diseases and also the vast bulk of industry investment. Overall, dengue funding increased by $17.7m (up 7.9%), although this was smaller than the $54.0m (31.8%) increase seen between 2010 and 2011.

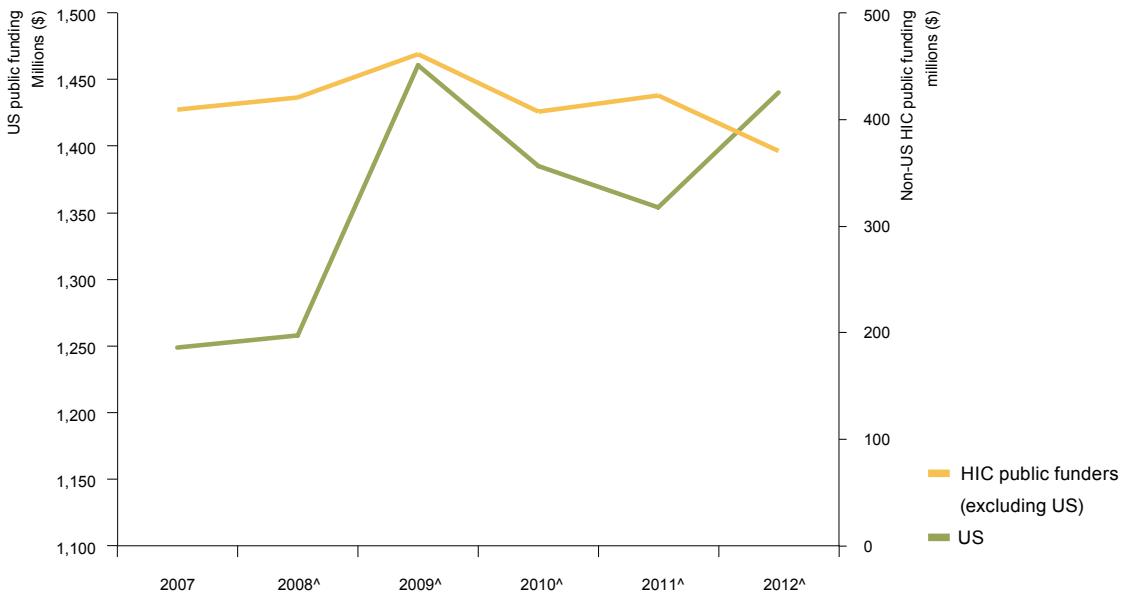
Funding for non-disease specific fields, including platform technologies, core funding of multi-disease organisations and unspecified diseases also increased in 2012. The increase in platform technology investment of $25.6m (up 153%) was largely due to $14.2m in new funding from the US NIH for adjuvants and immunomodulators (which all went to US-based academic and other research institutions and SMEs), and increased interest from the Gates Foundation (up $4.7m, 141%) as part of their Grand Challenges Explorations initiative, and a new grant to IDRI for the development of new adjuvants. YOY core funding also increased by $20.6m (up 26.5%), largely due to a $26.5m investment in the University of Oxford from the Wellcome Trust for the KEMRI-Wellcome Trust Research Programme in Kenya, the Vietnam Research Programme and Oxford University Clinical Research Unit, and the Wellcome Trust-Mahidol University-Oxford Tropical Medicine Research Programme.[71]

Decreasing investment from HIC public funders

Public funding from the majority of HICs actually continued its downward trend, obscured entirely by an increase in 2012 funding from the US. The majority of HIC funders either reduced their neglected disease R&D investment or kept it flat, with only 6 out of 17 HICs increasing funding in 2012. Similarly, few countries made announcements of new funding flows, although there were some exceptions, such as AusAID's new funding stream for PDPs and BMZ's contribution to the GHIF.

Although it appeared as though the downward trend in HIC public funding since 2009 had been reversed, with YOY HIC public funding increasing from $1,777m in 2011 to $1,811m in 2012, it was in fact the US funding increase of $86.3m (up 6.4%) that was the real reason for this change. Funding from HICs other than the US continued to fall. US investment almost returned to its peak of 2009, when there was a large infusion of funds – particularly via the US NIH and the US DOD – under the American Recovery and Reinvestment Act, created in response to the global financial crisis.

Figure 28. HIC public funding 2007-2012



^ Figures are adjusted for inflation and reported in 2007 US dollars

LMIC funding remains low

Given the strong economic presence of some LMIC countries such as India and Brazil, and their interest in neglected disease R&D, it is hoped that LMICs will be a potential new funding stream. Although LMIC funding has grown (up $9.3m, 30.8%), the promise of a new funding stream has not yet materialised, with LMICs still only accounting for 4.0% of public funding in 2012.

LMIC funding is usually directed towards domestic institutions, rather than to regional or international research efforts. This partly reflects the fact that many LMICs have dual objectives in funding global health R&D: the advancement of science and the development of new products, and the generating and strengthening of domestic research capabilities. In 2012, more than 99% of LMIC public funding was invested in domestic research institutions. For example, in 2012 over half ($19.9m, 58.0%) of India's funding went to ICMR, CSIR and other government research institutions, just under a quarter ($7.6m, 22.2%) went to Indian academic and other research institutions and $3.5m (10.1%) to Indian SMEs.

No improvement in public funding for product development

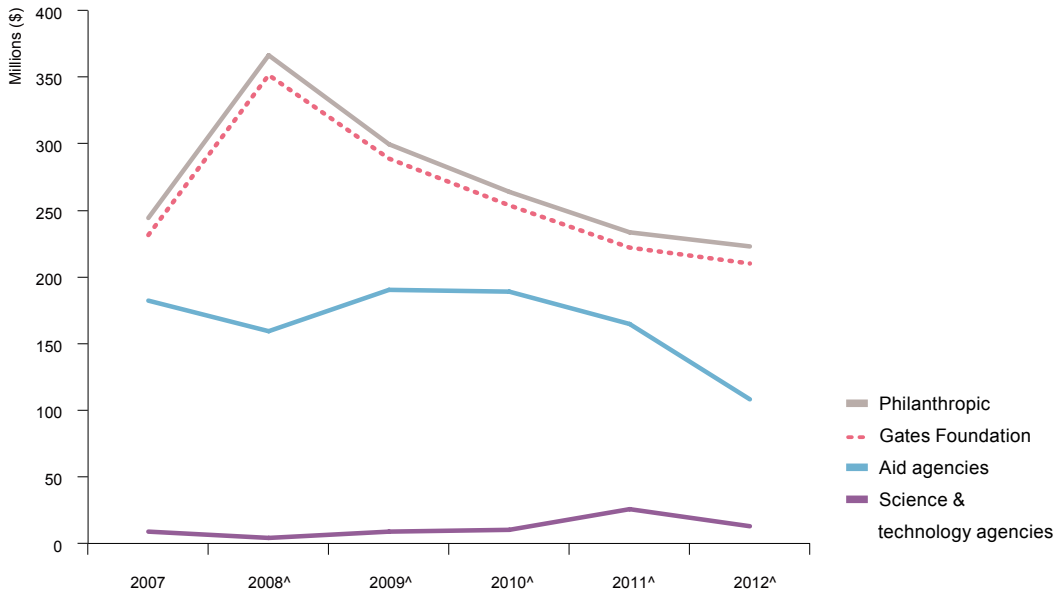
Differing investment patterns between sectors can affect the type of research that is funded for a given disease. In last year's G-FINDER report we noted that while there was a 28% increase in public sector funding for basic research between 2007 and 2011, this sector's funding for product development over the same period shrank by 1%. For diseases that are well funded, or which have a balance in funding sectors contributing to R&D investment, this may be less of an issue. However, for poorly funded diseases that mainly rely on public funding, the result is a skewing of investment away from product development. Unfortunately, 2012 saw no correction of this trend in public sector R&D investment, with YOY funding for both product development (-0.9%) and basic research (-0.7%) essentially flat.

Philanthropic funding for PDPs has been declining, and new funding sources have not been sustained

Overall PDP funding continued to decline in 2012, with a substantial 20.0% ($87.4m) decrease in 2012. In part, this decrease can be explained by WHO/TDR which, post-2011, no longer participates in neglected disease R&D activities. However, even with 2011 WHO/TDR funding excluded, PDP funding still decreased by $60.5m (-14.8%) in 2012, and has dropped by nearly a third ($128.9m, 27.0%) since 2009.

The PDP funding model was originally proposed and supported by philanthropic organisations and some key aid agencies; other aid agencies then followed suit, and lately a small number of science and technology agencies had increased their funding to PDPs. In 2012, however, all three of these funding streams were in decline. YOY philanthropic funding for PDPs peaked in 2008 at $366.6m, and since then has almost halved (down 39.2%, $143.7m) to $222.9m in 2012. Aid agency funding to PDPs decreased by $36.5m (-25.2%) between 2011 and 2012, and has been on the decline since 2009, whilst the already minimal science & technology agency funding to PDPs has almost halved (down $13.0m, -49.9%) from its 2011 peak.

Figure 29. PDP funding 2007-2012



^ Figures are adjusted for inflation and reported in 2007 US dollars

Declining funding for PDPs has been accompanied by a recent move to new funding vehicles such as innovative financing mechanisms like the GHIF, or other intermediary funding organisations such as the EDCTP – mechanisms which may channel funding to PDPs, or might target industry directly. Funding to non-PDP intermediary organisations has been increasing since 2010, with a $16.4m (22.5%) increase in funding in 2012 alone.

Decreased PDP involvement could lead to a greater focus on semi-commercial diseases, unless mechanisms to attract industry participation target second and third tier diseases

Semi-commercial markets and the presence of PDP partners are strong drivers of industry involvement in neglected diseases. Industry investment in neglected disease R&D focuses primarily on dengue, malaria and TB, with more than three quarters of all industry funding going to these three semi-commercial diseases in 2012 ($414.1m, 78.5%). Apart from dengue, the level of industry involvement is also strongly correlated with the presence of a PDP partner. As the relative involvement of PDPs decrease, so too does industry R&D activity, to the extent that diseases with no PDP involvement (trachoma and rheumatic fever) attracted no industry investment at all in 2012.

With declining funding for PDPs, industry may focus solely on semi-commercial diseases. New mechanisms used to encourage industry participation in neglected diseases, such as the GHIF or the second phase of the EDCTP programme, should target second and third tier diseases to strengthen industry involvement across all neglected diseases.

ANNEXE 1

Additional methodological considerations

IDENTIFICATION OF SURVEY RECIPIENTS

Year One G-FINDER survey recipients were identified through various avenues including our own contacts database; previous neglected disease surveys in HIV/AIDS, TB, and malaria; and research to find previously unknown funding organisations in countries with high R&D expenditure per GDP.

In 2008, we focused on groups and countries that were missing or poorly represented in Year One, developing proactive strategies to both increase the number of survey recipients and improve response rates in these areas. Major Indian public agencies involved in funding R&D for neglected diseases were identified and incorporated in our list of participants, and additional diagnostics organisations and SMEs were also included. In 2009, the survey was expanded to capture major public funding agencies in an additional three developing countries, Ghana, Colombia and Thailand, and in 2010 expanded again to reach public funders in Argentina, Chile, Malaysia, Mexico, Nigeria and Uganda. In 2011, several organisations known to be active in malaria R&D were surveyed for the first time as part of a project to measure R&D funding into malaria elimination and eradication specific activities conducted on behalf of the Malaria Eradication Scientific Alliance (MESA). In 2012, there was no formal expansion of the G-FINDER survey, and the survey was sent to a total of 880 organisations in 62 countries.

RESTRICTIONS ON SPECIFIC DISEASE-PRODUCT AREAS

Following the methodology used in previous years of the G-FINDER survey, only investments specifically targeted at developing country needs were eligible for inclusion in R&D areas where commercial overlap was significant. For instance, a vaccine for *N. meningitidis*, should provide coverage against *N. meningitidis* serotype A, be a conjugate rather than a polysaccharide vaccine, be designed for use in infants less than two years of age, and be designed to cost less than a dollar per dose. (See Table 1 for full inclusions for G-FINDER and the G-FINDER 2008 report for a full description of the original methodology to identify 'developing country-specific' investment.)

HANDLING OF FINANCIAL DATA

The following key financial data collection principles were used:

- Survey recipients were asked to enter grant-by-grant expenditures incurred during their financial year (as opposed to the 2012 calendar year) that had the largest overlap with 2012. Intermediaries and product developers were also asked to enter grant-by-grant revenue during the same period
- Only expenditures were included, as opposed to commitments made but not yet disbursed or 'soft' figures such as in-kind contributions, costs of capital, or funding estimates
- All survey recipients entered data in their local currency. At the end of the survey period, all currencies were adjusted for inflation using Consumer Price Index estimates from the OECD and the International Monetary Fund (IMF).[72,73] Foreign currencies were then converted to US dollars based on the 2007 average annual exchange rate as reported by the IMF[74]
- For consistency, 2012, 2011, 2010, 2009 and 2008 funding data is adjusted for inflation and reported in 2007 US dollars (US$), unless indicated otherwise. This is important to avoid conflating real year-on-year changes in funding with changes due to exchange rate fluctuations. For reference purposes, unadjusted 2012 figures are also occasionally included; converted using the average annual exchange rate for 2012 as reported by the IMF.[74] When this occurs, the unadjusted (nominal US dollar) figure is shown in bracketed italicised text after the adjusted figure.

SURVEY TOOL AND PROCESS

As in previous years, the following core principles guided the G-FINDER survey:

1. Only primary data reported by the funders, PDPs, and product developers themselves were included in the survey. No secondary data or estimates were included

2. All primary grant data were collected using the same online/offline reporting tool and inclusion/exclusion framework for all survey recipients.

The only exception to the second principle above was once again the US NIH, where grants were collected using the Research Portfolio Online Reporting Tools (RePORTER) and the Research, Condition, and Disease Categorization (RCDC) systems. The information mined from this publicly available database was then supplemented and cross-referenced with information received from the Office of AIDS Research (OAR) and the National Institute of Allergy and Infectious Diseases (NIAID).

Survey tool

Following the methodology used in previous years of G-FINDER, survey participants were asked to enter every neglected disease investment they had disbursed or received in their financial year 2012 into a password-protected online database, including the grant amount, grant identification number, a brief description of the grant, and the name of the funder or recipient of the grant. New survey recipients were also asked to confirm their organisation details such as role in funding (e.g. funder, fund manager, product developer), financial year, currency used, type of organisation (e.g. private sector firm, academic institution, PDP, multilateral organisation), and country where they were located. Each grant was entered using a three-step process where the survey recipient had to choose (1) a specific disease or sub-disease; (2) a product type (e.g. drugs, vaccines, microbicides); and (3) a research type within the product (e.g. discovery and preclinical, clinical development); according to pre-determined categories as described in Table 1. Where survey recipients could not provide data to this level of detail, they were asked to provide the finest level of granularity they could. If survey recipients were not able to allocate the grant to a single disease in step 1, three options were available:

- 'Core funding of a multi-disease organisation' (e.g. funding to an organisation working in multiple diseases, where the expenditure per disease was not known to the funder)
- 'Platform technologies', further allocated as investment into diagnostic platforms; adjuvants and immunomodulators; or delivery device platforms. These categories aimed to capture investments into technologies which were not yet directed towards a specific disease or product
- 'Unspecific R&D' for any grants that still could not be allocated.

Data sharing with other surveys

Primary grant data for HIV/AIDS were shared with and between the HIV Vaccines and Microbicides Resource Tracking Working Group to avoid re-surveying funders when possible. Any primary grant data received by other groups were reviewed and reclassified according to G-FINDER guidelines prior to entry into the database.

DATA CLEANING

Survey closure was followed by a three-month period of intensive cleaning, cross-checking, and organising of the complex dataset collected. All grants over $0.5m (i.e. any grant over 0.02% of total funding), except for the US NIH grants obtained through their databases where the threshold was increased to $2m, were then verified through a three-step process:

1. Each grant was reviewed against our inclusion criteria. Over 9,000 grants were manually checked for correct allocation to disease, product type and research type

2. Automated reconciliation reports were used to cross-check 'disbursed' funding reported by funders against 'received' funding reported by recipients (i.e. intermediaries and product developers)

3. Uncovered discrepancies were solved through direct contact with the funder and recipient to identify the correct figure. In the few cases where discrepancies remained, the funder's figures were used.

Industry figures were reviewed against industry portfolio information held by Policy Cures and against Full-Time Equivalent (FTE) and direct costs provided by other companies. Costs that fell outside the expected range, for example, above average FTE costs for clinical staff, were queried and corrected with the company.

LIMITATIONS TO INTERPRETATION

Potential limitations with any survey, including G-FINDER, are:

Survey non-completion

The number of survey recipients decreased this year (from 903 in 2011 to 880 in 2012), though the overall response rate remained stable (201 in 2012 compared to 204 in 2011). Furthermore, some neglected disease R&D funding might not have been captured because organisations were not identified as active in this field and invited to participate.

Time lags in the funding process

Time lags exist between disbursement and receipt of funding as well as between receipt of funds and the moment they are actually spent. Thus, grants by funders will not always be recorded as received by recipients in the same financial year and there may be a delay between R&D investments as reported by G-FINDER and actual expenditure on R&D programmes by product developers and researchers. Nevertheless, as this report analyses trends over a 6-year period, the impact of time lags is minimal.

Inability to disaggregate investments

Funding allocated to some diseases and products may be slightly underestimated due to:

- Multi-disease organisations: Core funding grants to organisations working on multiple diseases such as the European & Developing Countries Clinical Trials Partnership (EDCTP) are not counted within the funding figures for specific diseases
- Multi-disease grants: When funders were unable to disaggregate multi-disease grants, these investments were included in the 'Unspecified R&D' category. This is likely to particularly affect US NIH figures for individual diseases. This methodology was followed to prevent double counting investments from the US NIH and is also the reason why the G-FINDER figures do not match the RCDC figures (e.g. categories used in the RCDC system are not mutually exclusive and multi-disease grants are reported fully under all relevant diseases, with risk of double-counting).

Non comparable data

Due to a significant increase in the size of the survey in 2008, data from 2007 is the least comparable to other years. To avoid reporting on artefactual changes related to survey participation, this report only highlights increases or decreases reported by repeat survey participants (YOY funders), which represent real funding changes. Furthermore, the current public official databases for the US NIH data, the RCDC and RePORTER, used for data collection between 2009 and 2013, use a different structure than the US NIH database used in 2008. This means reports obtained from RCDC and RePORTER in Years Two to Six are not directly comparable to those used in Year One.

Missing data

G-FINDER can only report the data as it is given to us. Although strenuous efforts were made to check the classification, accuracy and completeness of grants, in a survey this size it is likely that some data will still have been incorrectly entered or that funders may have accidentally omitted some grants. We believe, however, that the checks and balances built into the G-FINDER process mean that such mistakes, if present, will have a minor overall impact.

Updated methods

In Year Four of the G-FINDER survey we updated the methodology we use to calculate constant 2007 US dollar amounts, in order to be more consistent with the approach recommended by the World Bank.[75] The impact of the altered methodology was minimal; the new approach meant that the total reported R&D funding figure in 2010 was around 0.3% higher when adjusted for inflation and reported in 2007 US dollars than it would have been if using the methodology from previous years. The same new methodology has been used in Years Five and Six of the survey.

VARIATION BETWEEN SURVEYS

Other groups are responsible for publishing annual surveys of global R&D investment into selected neglected diseases, such as HIV/AIDS and TB. Although G-FINDER worked in close collaboration with some of these groups, both to ease survey fatigue on the part of funders and to clarify any major variance in our findings, each survey nevertheless has slightly different figures. This is chiefly due to differences in scope, in particular inclusion in other surveys of funding for advocacy, capacity-building and operational studies – all excluded from G-FINDER. Methodological differences also lead to variations, in particular that G-FINDER figures are adjusted for inflation and exchange rates, which is not always the case for other surveys. As mentioned above, classification of some funding as ‘unspecified’ in G-FINDER (e.g. multi-disease programmes) may in some cases lead to different figures than those for disease-specific surveys.

ANNEXE 2

Advisory Committee members & additional experts

ADVISORY COMMITTEE MEMBER	ORGANISATION	TITLE
Ripley Ballou	GlaxoSmithKline Biologicals	Vice President & Head, Clinical Research and Translational Science
Lewellys F. Barker	Aeras	Senior Medical Adviser
Ted Bianco	Wellcome Trust	Director of Technology Transfer
Simon Croft	London School of Hygiene & Tropical Medicine (LSHTM)	Professor of Parasitology and Dean of the Faculty of Infectious and Tropical Diseases
Michael J. Free	Program for Appropriate Technology in Health (PATH)	Senior Advisor Emeritus
Nirmal K. Ganguly	Jawaharlal Institute of Postgraduate Medical Education & Research Translation Health Science and Technology Institute, India	Distinguished Biotechnology Research Professor, DBT President, Jawaharlal Institute of Postgraduate Medical Education & Research Advisor, Policy Centre of Biomedical Research, Translation Health Science and Technology Institute Former Director General of the Indian Council of Medical Research
Carole Heilman	National Institute of Allergy and Infectious Diseases (NIAID), United States	Director of Division of Microbiology and Infectious Diseases
Janet Hemingway	Liverpool School of Tropical Medicine	Director Former Chief Executive Officer, Innovative Vector Control Consortium (IVCC)
Peter Hotez	Baylor College of Medicine and Sabin Vaccine Institute	President, Sabin Vaccine Institute Professor of Pediatrics and Molecular Virology and Microbiology, chief of Pediatric Tropical Medicine and founding Dean of the National School of Tropical Medicine
Marie-Paule Kieny	World Health Organization (WHO)	WHO Assistant Director-General for Health Systems and Innovation
Wayne Koff	International AIDS Vaccine Initiative (IAVI)	Senior Vice President and Chief Scientific Officer

ADVISORY COMMITTEE MEMBER	ORGANISATION	TITLE
Regina Rabinovich	Harvard School of Public Health	ExxonMobil Malaria Scholar in Residence, Department of Immunology and Infectious Diseases Former Director of Infectious Diseases, Bill & Melinda Gates Foundation
Robert Ridley	University of Malawi	Pro-Vice Chancellor Former Director of the WHO-based Special Programme for Research and Training in Tropical Diseases (TDR)
Joseph Romano	NWJ Group, LLC	President
Giorgio Roscigno	African Society for Laboratory Medicine (ASLM)	Chief Operating Officer
Melvin K. Spigelman	The Global Alliance for TB Drug Development	President and Chief Executive Officer
Timothy Wells	Medicines for Malaria Venture (MMV)	Chief Scientific Officer

ANNEXE 3

Stakeholder Network members

ORGANISATION	COUNTRY
AstraZeneca	UK
Becton, Dickinson and Company	USA
Bill & Melinda Gates Foundation	USA
Brazilian Ministry of Health, Department of Science and Technology	Brazil
Crucell	The Netherlands
UK Department for International Development (DFID)	UK
Eli Lilly and Company	USA
European Commission: Research Directorate-General	Belgium
GlaxoSmithKline (GSK)	UK
Irish Aid	Ireland
MSD	USA
Dutch Ministry of Foreign Affairs	The Netherlands
Novartis	Switzerland
Otsuka Pharmaceutical Co. Ltd.	Japan
Pfizer	USA
Public Health Agency of Canada (PHAC)	Canada
Sanofi	France
South African Department of Science and Technology (DST)	South Africa
Swiss Agency for Development and Cooperation (SDC)	Switzerland
UK Medical Research Council (MRC)	UK
United States Agency for International Development (USAID)	USA
US Centers for Disease Control (CDC)	USA
US Department of Defense (DOD)	USA
US National Institutes of Health (NIH)	USA
Wellcome Trust	UK

ANNEXE 4

Survey respondent list

ORGANISATION NAME

- Abbott Laboratories
- AbbVie
- Aché Laboratories
- Aeras
- American Leprosy Missions (ALM)
- amfAR, The Foundation for AIDS Research*
- Anacor Pharmaceuticals
- Argentinean Ministry of Science, Technology and Productive Innovation
- Argentinean National Council for Scientific and Technical Research (CONICET)
- AstraZeneca
- Australian Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCSRTE)
  - including data from Australian Research Council (ARC)
- Australian Agency for International Development (AusAID)
- Australian National Health and Medical Research Council (NHMRC)
- Bavarian Nordic
- Bayer CropScience
- Baylor College of Medicine
- Belgian Ministry of Foreign Affairs
  - including data from Belgian Development Cooperation (DGDC)
- Belgian National Fund for Scientific Research (FWO)*
- Bill & Melinda Gates Foundation
- Bio Manguinhos
- Biological E Limited
- Bionaturis
- Brazilian Innovation Agency (FINEP)
- Brazilian Ministry of Health: Department of Science and Technology (DECIT)
- Brooklyn College
- Burnet Institute (previously the Macfarlane Burnet Institute for Medical Research and Public Health)
- Canadian Department of Foreign Affairs, Trade and Development (previously the Canadian International Development Agency (CIDA))
- Canadian Institutes of Health Research (CIHR)
- Carlos III Health Institute
- Cebu Leprosy and Tuberculosis Research Foundation (CLTRF); previously the American Leprosy Foundation/Leonard Wood Memorial
- Center for Genetic Engineering and Biotechnology, Centro de Ingeniería Genética y Biotecnología*
- Cepheid
- Chilean Ministry for the Economy, Development and Tourism (Millennium Science Initiative -ICM- program)
- Chilean National Commission for Scientific and Technological Research (CONICYT) (Associative Research Program- PIA)
- Chilean National Fund for Scientific and Technological Development (FONDECYT)
- Colombian Department for Science, Technology and Innovation (Colciencias)
- Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- Crucell
- Dafra Pharma International Ltd
- Daktari Diagnostics, Inc
- Danish Ministry of Foreign Affairs
  - including data from Danish International Development Agency (DANIDA)
- Dengue Vaccine Initiative (DVI)
- DesignMedix, Inc.
- Doris Duke Foundation*
- Drugs for Neglected Diseases initiative (DNDi)
- Dutch Ministry of Foreign Affairs - Directorate General of Development Cooperation (DGIS)
- Dutch Organisation for Scientific Research (NWO)
- Eisai Co., Ltd.
- Elizabeth Glaser Pediatric AIDS Foundation (EGPA)*
- Emergent Biosolutions
  - including data from Microscience and Antex biologicals Inc
- EpiChem Pty Ltd
- EpiVax

* Denotes organisations where data was only received via the HIV Vaccines and Microbicides Resource Tracking Working Group

ORGANISATION NAME

- Estonian Research Council*
- European and Developing Countries Clinical Trials Partnership (EDCTP)
- European Commission: Directorate-General for Research and Innovation
- European Vaccine Initiative (EVI)
- FAIRMED - Health for the Poorest
- Family Health International
- Female Health Company*
- Finnish Funding Agency for Technology and Innovation (TEKES)*
- Fio Corporation
- FK Biotecnológia
- Fondation de France*
- Fondation Mérieux
- Fondation Raoul Follereau (FRF)
- Fontilles
- Foundation for Innovative New Diagnostics (FIND)
- French National Agency for Research on AIDS and Viral Hepatitis (ANRS)
- French National Research Agency (ANR)
- Fundacio La Caixa
- German Federal Ministry for Economic Cooperation and Development (BMZ)
- German Federal Ministry of Education and Research (BMBF)
- German Federal Ministry of Health (BMG)
- German Leprosy and TB Relief Association (DAHW)
- German Research Foundation (DFG)
- Ghana Health Service
- Ghent University, Universiteit Gent*
- GlaxoSmithKline (GSK)
  - including data from GSK Bio
- Global Alliance for TB Drug Development (TB Alliance)
- Global Alliance for Vaccines and Immunizations (GAVI)
- Global Solutions for Infectious Diseases
- Global Vaccines Inc
- Griffith University (including the Institute for Glycomics)
- Hawaii Biotech, Inc
- Health Research Council of New Zealand (HRC)
- HIVACAT*
- Hospital Vall d'Hebron. Servei Malalties Infeccioses
- Indian Council of Medical Research (ICMR)
- Indian Council of Scientific and Industrial Research (CSIR)
- Indian Department of Biotechnology, Ministry of Science and Technology (DBT)
- Indian Department of Science & Technology
- Infectious Disease Research Institute (IDRI)
- Innovative Vector Control Consortium (IVCC)
- Inovio Pharmaceuticals, Inc.
- Inserm - Institute of Infectious Diseases
- Institut Pasteur
- Institute for Immunology and Infectious Diseases, Murdoch University
- Integral Molecular
- International AIDS Vaccine Initiative (IAVI)
- International Centre for Genetic Engineering and Biotechnology (ICGEB), India
- International Federation of Anti-Leprosy Associations (ILEP)
- International Partnership for Microbicides (IPM)*
- International Union Against Tuberculosis and Lung Disease
- International Vaccine Institute (IVI)
- Inviragen, Inc.
- Irish Aid
- ISGlobal
  - including data from Fundacio Clinic per a la Recerca Biomedica (FCRB) and Barcelona Centre for International Health Research (CRESIB)
- Italian Association Amici di Raoul Follerau (AIFO)
- Italian National Institute for Infectious Diseases
- Italian National Institute of Health, Istituto Superiore di Sanita (ISS)*
- Johnson & Johnson
- KNCV Tuberculosis Foundation

ORGANISATION NAME

- Korean Institute of Tuberculosis
- Lepra
- LEPRA India - Blue Peter Public Health & Research Centre (BPHRC)
- Leprosy Relief, Secours aux Lepreux (SLC)
- Liverpool School of Tropical Medicine (LSTM)
- Ludwig Maximilians University of Munich (LMU)
- Magee-Womens Research Institute & Foundation*
- Malaysian Ministry of Science and Technology (MOSTI)
  - including data from the National Biotechnology Division (BIOTEK)
- Mapp Biopharmaceuticals*
- Max Planck Society - Max Planck Institute for Infection Biology (MPIIB)
- Medicines for Malaria Venture (MMV)
- MSD
- Mexican National Institute of Public Health, Instituto Nacional de Salud Publica (INSP)
- Mexico National Council of Science and Technology (CONACYT)
- Microbicides Development Programmes (MDP)
- Mologen AG
- Mymetics
- Netherlands Leprosy Relief (NLR)
- Norwegian Institute of Public Health
- Novartis
- OneWorld Health (OWH)
- Ortho-Clinical Diagnostics, Inc
- Otsuka Pharmaceutical Co. Ltd
- Ouro Fino
- Oxford-Emergent Tuberculosis Consortium (OETC)
- Pfizer
- Program for Appropriate Technology in Health (PATH)
  - including data from the Meningitis Vaccine Project (MVP), Malaria Vaccine Initiative (MVI), Technology Solutions, Vaccine Development, Vaccine Access and Delivery
- Ranbaxy
- Research Centre Borstel
- Research Council of Norway
- Ribeirão Preto College of Nursing - University of Sao Paulo
- Roche
- Royal Norwegian Ministry of Foreign Affairs
  - including data from Norwegian Agency for Development Cooperation (NORAD)
- Sabin Vaccine Institute
- Sangamo BioSciences Inc*
- Sanofi
- Sanofi Pasteur
- Sasakawa Memorial Health Foundation (SMHF)
- Science Foundation Ireland
- Sequella
- Serum Institute of India
- Shantha Biotechnics
- Sigma-Tau
- South Africa Medical Research Council (MRC)
- South African Department of Science and Technology (DST)
  - including data from the Technology Innovation Agency
- Spanish Ministry of Foreign Affairs and Cooperation for Development (MAEC)
  - including data from Spanish Agency of International Cooperation for Development (AECID)
- Spanish National Research Council, Consejo Superior de Investigaciones Cientificas (CSIC)
- Statens Serum Institute (SSI)
- Stichting Aids Fonds*
- Swedish International Development Agency (SIDA)
- Swedish Research Council
- Swiss Agency for Development and Cooperation (SDC)
- Swiss National Science Foundation (SNSF)
- Swiss State Secretariat for Education and Research (SER)
- Swiss Tropical & Public Health Institute
- Syngenta Crop Protection AG
- Synstar Japan Co., Ltd.

* Denotes organisations where data was only received via the HIV Vaccines and Microbicides Resource Tracking Working Group

ORGANISATION NAME

- Taiwan National Science Council*
- Thailand Government Pharmaceutical Organisation (GPO)
- Thailand National Science and Technology Development Agency (NSTDA)
- The Leprosy Mission International (TLMI)
- The Walter and Eliza Hall Institute of Medical Research
- The Wellcome Trust
- The William and Flora Hewlett Foundation*
- Tibotec
- Topo Target
- TuBerculosis Vaccine Initiative (TBVI)
- Turing Foundation
- UBS Optimus Foundation
- UK Department for International Development (DFID)
- UK Medical Research Council (MRC)
- United States Agency for International Development (USAID)
- University of Bologna
- University of Bristol
- University of California Berkeley
- University of Dundee
- University of Georgia (UGA)
- University of North Carolina
- University of Siena
- US Centers for Disease Control (CDC)
- US Department of Defense (DOD)
  - including data from the DOD Defense Advanced Research Projects Agency (DARPA)
- US National Institutes of Health (NIH)
- Vertex Pharmaceuticals Incorporated
- Vilnius University: Faculty of Medicine
- World Bank
- World Health Organization: Neglected Tropical Diseases (WHO/NTD)
- World Health Organization: Special Programme for Research and Training in Tropical Diseases (WHO/TDR)

ANNEXE 5

Summary of R&D reference document

The full R&D reference document is lengthy (21 pages) and detailed, therefore only a summary is presented here.

1 BASIC RESEARCH

Studies that increase scientific knowledge and understanding about the disease, disease processes, pathogen or vector, but which are not yet directed towards a specific product

- Natural history and epidemiology
- Immunology of disease
- Biology of disease
- Biochemistry of the pathogen
- Genetics of the pathogen
- Bioinformatics and proteomics
- Pathophysiology and disease symptoms
- Vector biology, biochemistry and genetics

2 DRUGS

Research activities and processes necessary to develop and improve new compounds specifically designed to cure or treat neglected diseases; including drug discovery or design, preclinical and clinical development and other activities essential for successful drug development and uptake

- Discovery and preclinical
- Clinical development
- Phase IV/ pharmacovigilance studies associated with newly approved drugs only
- Baseline epidemiology directly linked to trials of products in development

3 PREVENTIVE VACCINES

Research activities and processes necessary to develop and improve investigational vaccines specifically intended to prevent infection; including vaccine design, preclinical and clinical development and other activities essential for successful vaccine development and uptake

- Discovery and preclinical
- Clinical development
- Phase IV/ pharmacovigilance studies associated with newly approved vaccines only
- Baseline epidemiology directly linked to trials of products in development

4 DIAGNOSTICS

Research activities and processes necessary to develop, optimise, and validate diagnostic tests for use in resource-limited settings (cheaper, faster, more reliable, ease of use in the field); including discovery and design, preclinical and clinical evaluation, and other activities essential for successful deployment for public health use

- Discovery and preclinical
- Clinical evaluation
- Operational research necessary to support WHO recommendation for global public health use

5 MICROBICIDES

Research activities and processes necessary to develop and improve topical microbicides specifically intended to prevent HIV transmission; including microbicide discovery or design, preclinical and clinical development, and other activities essential for successful microbicide development and uptake

- Discovery and preclinical
- Clinical development
- Phase IV/ pharmacovigilance studies associated with newly approved microbicides only
- Baseline epidemiology directly linked to trials of products in development

6 THERAPEUTIC VACCINES

Research activities and processes necessary to develop and improve investigational vaccines specifically intended to treat infection; including vaccine design, preclinical and clinical development, and other activities essential for successful vaccine development and uptake

- Discovery and preclinical
- Clinical development
- Phase IV/ pharmacovigilance studies associated with newly approved vaccines only
- Baseline epidemiology directly linked to trials of products in development

7 VECTOR CONTROL PRODUCTS

A) PESTICIDES

ONLY includes chemical pesticides intended for global public health use and which specifically aim to inhibit and kill vectors associated with transmitting poverty-related diseases, including:

- Primary screening and optimisation
- Secondary screening and optimisation
- Development
- WHO Pesticide Evaluation Scheme (WHOPES)

B) BIOLOGICAL CONTROL PRODUCTS

ONLY includes research and development of innovative biological control interventions that specifically aim to kill or control vectors associated with transmitting poverty-related diseases, including:

- Microbial/ bacteriological larvicides
- Sterilisation techniques
- Genetic modification measures

C) VACCINES TARGETING ANIMAL RESERVOIRS

ONLY includes research and development of veterinary vaccines specifically designed to prevent animal to human transmission of neglected diseases

8 CANNOT BE ALLOCATED TO ONE DISEASE

A) CORE FUNDING OF A MULTI-DISEASE R&D ORGANISATION

B) PLATFORM TECHNOLOGIES

- Adjuvants and immunomodulators
- Delivery technologies and devices
- General diagnostic platforms

*This category has **strict limitations**. It ONLY includes funding for R&D for the above, which also meets the following conditions:*

- It is conducted by **public, philanthropic or not-for-profit entities**
- It is **basic research** i.e. it is not yet directed towards a specific disease or product area
- It is aimed at developing safer, cheaper, more effective products suitable for use in developing countries
- The resulting research findings or leads MUST be accessible to organisations developing pharmaceutical or biological products for neglected diseases

c) UNSPECIFIED R&D

Funding that cannot be apportioned to any specific disease categories

9 OUT OF SCOPE (EXCLUDED FROM THE SURVEY)

A) GENERAL EXCLUSIONS

- Non-pharmaceutical tools including: Adult male circumcision, cervical barriers, HSV-2 prevention, bednets, traps, water sanitation tools
- General supportive, nutritional and symptomatic therapies, including: Oral rehydration therapy, micronutrient supplementation, vitamins and anti-pyretics, painkillers
- Products developed and used for veterinary purposes
- In-kind contributions
- Additional exclusions for private sector investment include: Industry overhead costs, capital costs and opportunity costs due to the difficulty of quantifying these and allocating them to the neglected disease investment

B) NON-PRODUCT R&D

*Our intention is to capture investments into **neglected disease product development** as accurately as possible. Therefore, the following R&D activities are excluded from the survey*

- Clinical studies that are not linked to development of a NEW product
- Health services and access research
- Operational programme assessment
- GENERAL Capacity Building (human & infrastructure)

  Capacity building activities are excluded except those that are DIRECTLY linked to development of a new neglected disease product

C) SELECTED DISEASE AND PRODUCT RESTRICTIONS

Commercial diseases where incentives for R&D already exist; or product R&D already occurs in response to the existing Western markets, are EXCLUDED from this survey

Basic research

Basic research is RESTRICTED for the following diseases:

- HIV/AIDS: ONLY includes basic research related to preventive vaccines and microbicides (e.g. immunology responses to potential antigens, mechanism of mucosal transmission)

Drugs

R&D for drugs is RESTRICTED for the following diseases:

- HIV/AIDS: ONLY includes label extensions and reformulations for developing country use (e.g. paediatric or slow-release formulations; fixed dose combinations).
- Diarrhoea caused by cholera, shigella, *cryptosporidium*: ONLY includes pharmacological interventions that target the pathogen, not supportive therapies.

Preventive Vaccines
R&D for preventive vaccines is RESTRICTED for the following diseases:

- *Bacterial pneumonia caused by* S. pneumoniae

  ONLY includes R&D on vaccines specifically for developing-country registration. Such a vaccine must at a minimum: a) be designed for use in infants less than two years of age; and b) provide coverage against *S. pneumoniae* serotypes 1, 5, and 14.

  For multi-valent vaccines covering Western and developing country strains, only developing country-specific costs should be entered; including for trials, registration and Phase IV/ pharmacovigilance studies.
- *Bacterial pneumonia or meningitis caused by* N. meningitidis

  ONLY includes R&D on vaccines specifically for developing-country registration. Such a vaccine must, at a minimum: a) provide coverage against *N. meningitidis* serotype A; b) be a conjugate vaccine; c) be designed for use in infants less than two years of age; and d) be designed to cost less than a dollar per dose.

  For multi-valent vaccines covering Western and developing country strains, only developing country-specific costs should be entered; for example, for trials, registration and Phase IV/ pharmacovigilance studies in the target developing countries.
- *Diarrhoea caused by rotavirus*

  ONLY includes developing country-specific R&D, including clinical trials, registration and Phase IV/pharmacovigilance studies in the target developing countries.

Diagnostics
See above

Vaccines (Therapeutic)
See above

Microbicides
Applications that may have Western markets or be useful for other STDs (e.g. mucosal delivery technology, adjuvants) are EXCLUDED

Vector control products
Baits, traps, predation measures, biological larvicides, habitat control and infrastructure measures are excluded from this product category. Vaccines developed and used solely for veterinary purposes are excluded from this product category

Cannot be allocated to one disease
a) Adjuvants and immunomodulators
b) General diagnostic platforms
c) Delivery devices and technologies

This category has strict limitations (see above)

AUTHORS

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MBBS (Bachelor of Medicine, Bachelor of Surgery, Hons); Grad Dip FAT (Foreign Affairs and Trade)

Dr Moran has over 20 years' experience in health policy and practice, including 10 years specialising in neglected disease policy. She has conducted projects for a wide range of public and multilateral health organisations with a focus on policy solutions for emerging issues related to neglected disease R&D. In 2004, Mary founded the research group that became Policy Cures at the London School of Economics & Political Science, later transferring it to the George Institute for International Health in Sydney.

Prior to forming the group, she worked for over a decade in Emergency Medicine; was a diplomat and policy analyst with the Australian Department of Foreign Affairs & Trade; Director of Médecins Sans Frontières Access to Essential Medicines Campaign in Australia; and a Europe-based policy advocate with MSF on issues relating to access to medicines for neglected patients. Mary is an Honorary Senior Lecturer at the London School of Hygiene and Tropical Medicine, and an Expert Adviser to the World Health Organization, European Commission, European and Developing Countries Clinical Trials Partnership, Global Alliance for Vaccines and Immunisation (GAVI), OECD and the Wellcome Trust.

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Javier Guzman has worked in public health policy and practice for 12 years, specialising in neglected disease policy since 2004. Javier trained as a physician, working for several years in planning and implementation of primary health care projects in Colombia and subsequently as a Post Graduate Clinical Fellow in Paediatrics at the Royal London Hospital.

Javier has been with the Policy Cures team since 2004, and as Director of Research since 2009. He is an Honorary Lecturer at the London School of Hygiene and Tropical Medicine and the University of Sydney, and an expert adviser to the European and Developing Countries Clinical Trials Partnership and the Global Alliance for Vaccines and Immunisation (GAVI). He has an MSc in Health Policy, Planning and Financing from the LSE and the London School of Hygiene and Tropical Medicine and is a graduate with an MBA-Executive at the Australian Graduate School of Management, Sydney.

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Nick Chapman has over 6 years' experience in health policy and practice as a doctor, research associate and analyst. In his role with Policy Cures, Nick has worked on projects for governments, major philanthropic organisations and public-private partnerships. His experience includes work on strategy development, funding gap analysis and innovative financing mechanisms. He has been a guest lecturer at the University of Sydney, and has played an active role in Policy Cures' efforts to raise the profile of global health R&D in Australia.

Nick began his career as a doctor in Tasmania before obtaining a Master's degree in human rights, focusing on international development and international law. Prior to joining Policy Cures, Nick worked with Oxfam Australia and the Australian Human Rights Commission, predominantly on policy solutions to Indigenous health inequality.

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Lisette has several years' experience in public health policy analysis and commercial analysis of the pharmaceutical industry. In her role working for business information company Datamonitor she focused on collecting and analysing market data and formulating strategic insights and recommendations for the pharmaceutical sector, authoring many reports and articles. She received a Bachelor of Health in Occupational Therapy from the Hogeschool van Amsterdam, The Netherlands, and a Master of Public Health from Maastricht University, the Netherlands.

Having a keen interest in public health issues in the developing world, Lisette spent time working for several projects in Kenya and Chile focusing on (sexual) health education. She is currently enrolled in a Masters of International Public Health program at the Sydney School of Public Health and joined the Policy Cures team in October 2010.

Rachel Howard

Analyst

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Rachel has previously worked as a Research Assistant where she focused on market research and product development. In 2011, she was an intern with the Australian Trade Commission in Paris, where she conducted research and assisted in assessing the investment readiness of foreign companies in the Australian Clean Technology sector; updated industry profiles on the Health and Medical Services, Biotechnology, and Financial Services' markets; and was involved in the promotion of Australian education abroad.

She has a Bachelor of International Relations from Bond University on the Gold Coast, focusing on international and regional development issues. She joined the Policy Cures team in January 2013.

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Penny Farrell has more than five years' experience in medicine and public health policy through her work in veterinary clinical practice, research and policy analysis. She completed a Masters in International Public Health at the University of Sydney in 2011 due to her steadily growing desire to apply her medical knowledge to improve quality of life in resource poor and culturally marginalised settings.

Prior to joining the Policy Cures team in July 2013, Penny worked on pandemic influenza policy projects in South East Asia and the Pacific, a high-cut medical capacity building initiative in the Solomon Islands, and a food security and nutrition project in Tanzania and Zambia. Penny is passionate about education and has served as an honorary academic at the Faculty of Veterinary Science, University of Sydney for clinical supervision and mentorship of final year veterinary interns and is a tutor in the Masters of International Public Health program at the Sydney School of Public Health.

Jack Luxford

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Jack has previously worked in an executive and editorial capacity at The Sydney Globalist, an undergraduate international affairs magazine, writing on development in the Sudan, and challenges to African democratic institutions. He is passionate about health issues in the developing world, particularly the structural and institutional obstacles to health equity, as well as issues of human security. Jack graduated in 2013 with a Bachelor of Arts from The University of Sydney, majoring in international relations and psychology, and is commencing the Doctor of Medicine in 2014. He joined the Policy Cures team in June 2013.

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