G-FINDER 2012
Global Funding of Innovation for Neglected Diseases

POLICYCURES

NEGLECTED DISEASE RESEARCH AND DEVELOPMENT: **A FIVE YEAR REVIEW**

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ACRONYMS

ACTs	Artemisinin-based combination therapies
Aeras	Aeras Global TB Vaccine Foundation
Aggregate industry	Aggregate pharmaceutical and biotechnology company respondents
AIDS	Acquired Immunodeficiency Syndrome
ALM	American Leprosy Missions
AMC	Advance market commitment
APOC	African Programme for Onchocerciasis Control
Argentinean MSTPI	Argentinean Ministry of Science, Technology and Productive Innovation
ARRA	American Recovery and Reinvestment Act
ARV	Antiretroviral
Australian DIISRTE/ARC	Australian Department of Industry, Innovation, Science, Research and Tertiary Education and/or Australian Research Council
Australian NHMRC	Australian National Health and Medical Research Council
Belgian DGDC	Belgian Ministry of Foreign Affairs and/or Belgian Development Cooperation
Belgian FWO	Belgian National Fund for Scientific Research
Brazilian DECIT	Brazilian Ministry of Health: Department of Science and Technology
Brazilian FINEP	Brazilian Innovation Agency
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
Danish DANIDA	Danish Ministry of Foreign Affairs and/or Danish International Development Agency
DCs	Developing countries
Dell Foundation	Michael & Susan Dell Foundation
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
French MAEE	French Ministry of Foreign and European Affairs

ACRONYMS

FTE	Full time equivalent
Gates Foundation	Bill & Melinda Gates Foundation
GAVI	Global Alliance for Vaccines and Immunizations
GDP	Gross domestic product
GERD	Gross expenditure on research & development
German BMBF	German Federal Ministry of Education and Research
German BMZ	German Federal Ministry for Economic Cooperation and Development
German DFG	German Research Foundation
GFC	Global financial crisis
G-FINDER	Global Funding of Innovation for Neglected Diseases
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
ILEP	International Federation of Anti-Leprosy Associations
Indian DBT	Indian Department of Biotechnology
Indian ICMR	Indian Council of Medical Research
Inserm	Inserm - Institute of Infectious Diseases
IPM	International Partnership for Microbicides
IVCC	Innovative Vector Control Consortium
IVI	International Vaccine Institute
LMIC	Low- and middle-income country
MDP	Microbicides Development Program
MDR-TB	Multidrug-resistant tuberculosis
MDT	Multidrug therapy
MESA	Malaria Eradication Scientific Alliance
Mexican CONACYT	Mexico National Council of Science and Technology
MIC	Middle-income country
MMV	Medicines for Malaria Venture
MNC	Multinational pharmaceutical company
MSF	Médicins 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
ODA	Official Development Assistance
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
RePORTER	US NIH's Research Portfolio Online Reporting Tools
Russian MHSD	Russian Ministry for Health and Social Development
S&T	Science & technology
SME	Small pharmaceutical and biotechnology firm

ACRONYMS

Spanish MAEC/AECID	Spanish Ministry of Foreign Affairs and Cooperation for Development and/or Agency of International Cooperation for Development
SSI	Statens Serum Institute
Swedish SIDA	Swedish International Development Agency
Swiss SDC	Swiss Agency for Development and Cooperation
Swiss SNF	Swiss National Science Foundation
TB	Tuberculosis
TB Alliance	Global Alliance for TB Drug Development
TBVI	TuBerculosis Vaccine Initiative
TLMI	The Leprosy Mission International
UK	United Kingdom
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/TDR	World Health Organization Special Programme for Research and Training in Tropical Diseases
XDR-TB	Extensively drug-resistant tuberculosis
YOY	Year-on-year

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EXECUTIVE SUMMARY

The survey

The fifth G-FINDER survey reports on 2011 global investment into research and development (R&D) of new products for neglected diseases, and identifies trends and patterns across the five 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, 204 organisations completed the survey in 2011.

Findings

In 2011, total reported funding for neglected disease R&D was $3,045m (*$3,318m in unadjusted 2011 US$*). Overall funding levels changed little from 2010 with repeat survey participants – year-on-year (YOY) funders – reducing their investment by only $3.6m (-0.1%). An additional $142.9m was reported by organisations that have participated in some, but not all, years of the survey. Up until 2009 global investment in neglected disease R&D had been increasing steadily, but has been in gradual decline thereafter as the impact of the global financial crisis became evident. Despite this, annual YOY funding for neglected disease R&D was still $443.7m higher in 2011 than in 2007 ($2,902m compared to $2,459m). Both public and philanthropic funding have dropped away since the global financial crisis, but industry funding has increased dramatically over the survey period, predominantly due to increased multinational pharmaceutical company (MNC) investments.

DISEASE FINDINGS

As in previous years, the three 'top tier' diseases – HIV/AIDS, malaria and tuberculosis (TB) – again received approximately one-third to one-fifth of total global neglected disease R&D funding each, with HIV/AIDS receiving 33.8%, malaria 18.4% and TB 17.3%. However, the share of global funding for these three diseases ($2,113m, 69.4%) continued to decline with cuts for TB (down $45.7m, -8.3%) and HIV/AIDS (down $41.1m, -4.0%) and only a modest increase for malaria (up $14.4m, 2.8%). The 'second tier' diseases – dengue, diarrhoeal diseases, kinetoplastids, bacterial pneumonia & meningitis, helminth infections and salmonella infections – increased their collective share to almost a quarter of global funding (24.1%) in 2011, receiving between 1% and 8% of total funding each. YOY funding for dengue increased significantly in 2011 (up $54.0m, 31.8%), mainly driven by industry investment in dengue vaccine development. Changes for the remaining 'second tier' diseases were mixed – funding decreased moderately for kinetoplastids (down $18.9m, -14.1%) and diarrhoeal diseases (down $11.9m, -7.8%) but increased for bacterial pneumonia & meningitis (up $10.7m, 13.1%) and helminth infections (up $2.2m, 3.3%). The 'third tier' diseases – trachoma, leprosy, Buruli ulcer and rheumatic fever – each received less than 0.5% of global R&D funding.

Five-year disease trends

Between 2007 and 2011, funding shifted away from the top tier diseases (HIV/AIDS, malaria and TB), which saw their share of global funding fall from 76.6% in 2007 to 69.4% in 2011, to the second tier diseases which increased their share from 16.2% to 24.1%. The third tier diseases remained poorly-funded, collectively receiving less than 1% of global funding each year. Some diseases – including malaria, TB, dengue, bacterial pneumonia & meningitis and helminth infections – have seen a strong upward trend in funding despite the global financial crisis, in some cases (e.g. dengue) driven by increased industry investment as products reach late stage development. Other diseases – including HIV/AIDS, diarrhoeal diseases, kinetoplastids and rheumatic fever – have been in steady decline since the global financial crisis due to government budget cuts (HIV/AIDS), declining philanthropic funding (diarrhoeal diseases and kinetoplastids) or the withdrawal of industry funding (rheumatic fever).

FUNDERS

The public sector continued to play a key role in neglected disease R&D, providing almost two-thirds ($1.9bn, 64.0%) of global funding, predominantly from high-income country (HIC) governments ($1.9bn, 95.9%). As in 2010, the philanthropic sector contributions ($570.6m, 18.7%) were closely matched by investments from industry ($525.1m, 17.2%).

Eleven of the top 20 government funders cut their neglected disease R&D funding in 2011. The US maintained its position as the pre-eminent funder of neglected disease R&D, accounting for just under 70% of all public funding ($1.4bn, 69.5%), but US public funding dropped again in 2011 (down $30.6m, -2.2%). After notable increases in 2009 and 2010, UK public funding decreased significantly in 2011 (down $29.2m, -18.0%), driven by a $21.5m drop in funding from the UK Department for International Development (DFID). Several public funders increased funding in 2011: the European Commission (EC, up $12.7m, 13.7%), Australia (up $6.7m, 27.1%) and Netherlands (up $6.1m, 35.5%).

Philanthropic funding was up $6.5m (1.2%) in 2011, mostly due to a $14.3m increase in funding from the Wellcome Trust masking a decrease from the Gates Foundation (down $7.9m, -1.7%). As in 2010, the pharmaceutical industry accounted for the biggest sectoral increase (up $20.0m, 4.2%) – mostly from MNCs (up $25.6m, 5.8%) – although this was far smaller than the 2010 increase of $107.3m (up 28.2%).

Five-year funder trends

The five years of the G-FINDER survey have coincided with a turbulent period for public funders with YOY public funding peaking at $2.0bn in 2009 but in slow decline since. Despite cuts in recent years, many of the top public funders including the US, UK, France and Australia were still funding at higher levels in 2011 than in 2007. However, this was not the case for all, with Ireland, the EC, Belgium, Netherlands, Brazil and Canada funding at lower levels in 2011 than in 2007. Aid agencies, in particular, have slashed funding for neglected disease R&D (YOY funding down from $268.9m in 2007 to $224.0m in 2011), with some international aid budgets (Ireland, Netherlands, Sweden) just a fraction of what they were in 2007. In the same period, India overtook Brazil as the leading innovative developing country (IDC) funder of neglected disease R&D.

Philanthropic funding has declined sharply since the global financial crisis – mostly reflecting changes in funding from the Gates Foundation – with 2011 YOY funding now close to 2007 levels: $551.4m in 2011 compared to $523.3m in 2007, after peaking in 2009 at $691.5m. Industry funding has increased dramatically over the survey period, with MNC investments rising steadily from $273.3m in 2008 to $466.9m in 2011. However, the majority of this increase was due to very large investments in a single product area – dengue vaccines (up from $40.2m in 2008 to $141.6m in 2011) – where expensive late-stage trials are underway.

FUNDING FLOWS

Slightly more than two-thirds of 2011 R&D funding was in the form of external grants (71.4% or $2,174m), while intramural funding (self-funding) by public research institutions and private companies accounted for 28.6% ($870.9m). Product development partnership (PDP) funding declined in 2011 (down $31.8m, -6.6%) with the largest drop from the Gates Foundation (down $31.4m, -12.4%). Eight out of twelve aid agencies also cut their funding to PDPs, with a collective reduction of $30.6m in 2011.

Five-year funding flow trends

Self-funding has increased for YOY funders from $505.9m in 2007 to $825.2m in 2011, with much of this due to growing MNC industry investment in neglected disease R&D. Grant funding to researchers and product developers also increased from $1.4bn in 2007 to $1.5bn in 2011, although it is still $94.9m below its 2009 peak.

PDP funding has decreased over the five years of the G-FINDER survey, with 2011 funding of $451.4m being well below the 2008 peak of $580.1m. PDPs have seen cuts in the order of $30m to $50m per year for each of the past three survey years – a total drop of $130m in annual funding. The steady decrease is driven largely by a drop in funding from the philanthropic sector, and more specifically, the Gates Foundation, that has cut funding for PDPs by over a third from its peak in 2008 (down $129.1m, -36.7%). During this same period, public funding has remained steady, due to widespread cuts in aid agency funding being largely offset by increased funding from science and technology agencies.

DISCUSSION

Over the past five years, we have seen changes – albeit modest – in the type of research that is funded and developed for patients in developing countries. These changes stem from changing funding patterns of the public and philanthropic sectors, and the impact of increased industry investment.

Public funding

- Public funding remains the mainstay of neglected disease R&D, accounting for 65.6% of total funding across the five years.
- Public funding has shifted substantially from product development to basic research, which now accounts for 31.2% of total public funding in 2011 compared to 26.0% in 2007, with an additional $124.2m invested in basic research.
- Public funding for PDPs has remained steady but there have been significant changes in public funding sources, with cuts to aid agency funding offset by increased funding from science & technology (S&T) agencies.

Philanthropic funding

- Philanthropic funding has dropped significantly since the global financial crisis, driven by large drops in Gates Foundation funding since 2008 (down $169.1m, -27.4%). This has had a pronounced impact on PDPs in particular since the Gates Foundation provides over half (53.6%) of global PDP funding.
- Philanthropic funding plays a contributing rather than dominant role overall – unlike the public sector or industry – with the philanthropic share of funding for each disease ranging from 6.4% of total funding for dengue, through to salmonella and HIV/AIDS (12.1% and 12.4% respectively), up to 23.5% for TB, and around 30% of total funding for most other diseases: diarrhoeal diseases (30.1%), helminths (30.7%), kinetoplastids (31.7%), malaria (32.4%), bacterial pneumonia & meningitis (35.0%).

- Philanthropic funding has shifted even more towards product development, with product development funding up from 74.4% of total philanthropic funding in 2007 to 79.1% in 2011.

Industry funding

- R&D funding for diseases with strong industry support has been very resilient, with funding for dengue and bacterial pneumonia & meningitis – which received nearly half their total five-year funding from industry – substantially outperforming all other diseases over the survey period, particularly in the post-financial crisis years.
- Industry funding has had the most significant impact on dengue R&D, which has seen enormous growth between 2008 and 2011 (up $115.8m, 107.4%), almost entirely due to MNC funding for clinical development of vaccines.

Overall impact

- Despite initial fears, the global financial crisis has not had a dramatic impact on overall neglected disease R&D funding, with public funding essentially stable and decreases from the philanthropic sector largely offset by increased industry funding.
- There has been a moderate shift toward semi-commercial diseases (dengue, TB and bacterial pneumonia & meningitis) which increased their share of global neglected disease R&D funding from 22.4% of total funding in 2008 to 28.0% in 2011.
- Differing investment patterns between sectors can also affect the type of research that is funded for a given disease, with an average of over 70% of total funding invested into product development for the semi-commercial diseases, compared to an average 60% for diseases with a significant philanthropic stake, and an average 45% for diseases that rely heavily on the public sector. For high-funded diseases this is less of an issue, but if a disease has both low funding and a low focus on product development, outcomes are likely to be poor.
- PDPs appear to be diversifying their funding sources towards science and technology agencies, but remain highly dependent on the Gates Foundation and aid agencies.

INTRODUCTION

Background to the G-FINDER survey

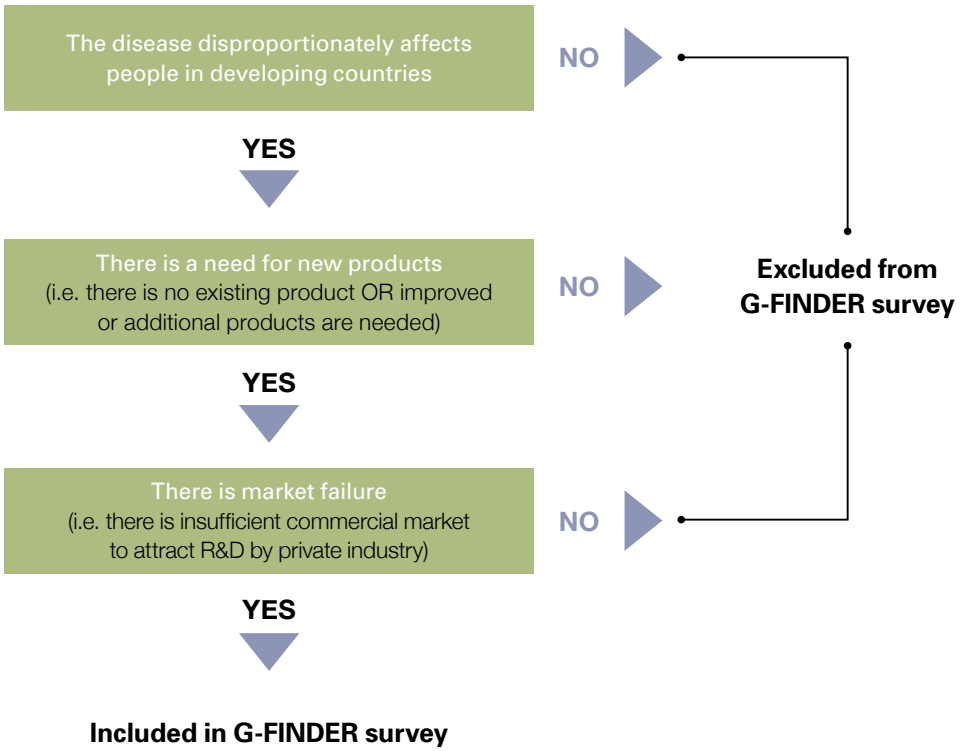
The first four G-FINDER reports shed light on 2007, 2008, 2009 and 2010 global investment into research and development (R&D) of new products to prevent, diagnose, manage or cure neglected diseases of the developing world. The fifth survey reports on 2011 investments.

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 were 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	Y	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 2011 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 fifth G-FINDER survey was open for an 8-week period from April to June 2012, during which intensive follow-up and support for key recipients led to a total of 8,141 entries being recorded in the database for financial year 2011 (similar number to 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 fifth year, the survey was sent to 520 funders in 52 countries around the world. These included:

- Public, private and philanthropic funders in:
  - High-income countries (HICs) that were part of the Organisation for Economic Co-operation and Development (OECD)
  - European Union (EU) Member States and the European Commission (EC)
  - HICs and MICs outside the OECD but with a significant research base (Singapore and the Russian Federation)
- Public funders in three innovative developing countries (IDCs) (South Africa, Brazil and India)
- Public funders in 18 low- and middle-income countries (LMICs) (Argentina, Chile, Colombia, Ghana, Guatemala, Honduras, Iran, Malaysia, Mexico, Mozambique, Nicaragua, Nigeria, Papua New Guinea, Senegal, Tanzania, Thailand, Turkey and Uganda)
- Private sector funders in four LMICs (Brazil, India, Indonesia and Thailand)

We note that public funders in Guatemala, Honduras, Mozambique, Nicaragua, Papua New Guinea, Senegal and Tanzania were included in the survey for the first time this year as part of the expansion related to a project conducted on behalf of the Malaria Eradication Scientific Alliance (MESA) — see more details in Annexe 1.

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 2011 survey was sent to 903 organisations identified as being involved in neglected disease product development as either funders or recipients, a 2% increase on the number of organisations surveyed in 2010 (889 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 remained unchanged, including 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 103 organisations included known significant funders ($5–10m per year); potential research funders in high-Gross Expenditure on R&D (GERD) countries; 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 drop of 40% in the number of organisations in the high priority group compared to 2010 (172 organisations). This decrease was due to the de-prioritization of a significant number of organisations which were moved from the ‘high priority group’ to the ‘low priority group’ due to a budget cut
- The remaining survey recipients were known smaller funders (less than $5m per year) and other known grant recipients

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

The G-FINDER process focused on the 128 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 2011.

Survey participation decreased moderately (15%) in 2011, with 204 organisations providing data (including 32 with no investment to report), compared to 240 in 2010, 218 in 2009, 208 in 2008 and 150 in 2007. Furthermore, there was some loss-to-follow-up, with 41 organisations reporting data for 2010, but not submitting data for 2011. In the maximum priority group, 24 recipients (96%) provided funding information for 2011. In the high priority group, 82 organisations (80%) provided full funding information for 2011, a drop from 93% last year. See Annexe 4 for a full list of survey participants.

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. Increases reported by new survey participants, which do not indicate a true increase in neglected disease funding but rather an improvement in G-FINDER's data capture
3. Decreases due to non-participation by organisations that provided data to G-FINDER in previous years but were lost-to-follow-up in the 2011 survey. These do not represent true decreases in funding but rather a decrease in data capture.

Reading the findings

All reported funding is for investments made in the 2011 financial year (Year Five). Comparison is made, where relevant, to investments made in the 2010 (Year Four) 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

For consistency, 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 2011 figures are also occasionally included. When this occurs, the unadjusted (nominal) figure is shown in italicised text in parenthesis after the adjusted figure. For example, "Reported funding for R&D of neglected diseases reached $3,024m (*$3,295m*) in 2011". In this example, $3,295m represents the unadjusted nominal 2011 figure. In tables, unadjusted figures are also labelled as '2011 Nominal (US$)'. 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).

This 2012 report also highlights changes across the five-year survey period (2007-2011) for diseases, funders and funding flows. As with the annual reports, these five-year trends distinguish between real changes in funding from organisations who report their data to G-FINDER every year (YOY funders) and apparent changes that are in reality due to organisations reporting in some years but not others.

There are some areas where full five-year trends have not been analysed. Trends in overall industry investment are only analysed for four years (2008-2011) as we did not have full MNC survey participation in 2007 (MNCs represent the majority of industry funding). The subset of industry funding that comes from SMEs is only analysed for three years (2009-2011) as the survey did not include significant numbers of SMEs until 2009. Funding for salmonella R&D is only analysed for four years (2008-2011) because of a significant expansion in scope between the first and second year of the survey. For very low-funded diseases such as trachoma, leprosy, Buruli ulcer and rheumatic fever we have only analysed 2011 data, as their tiny funding levels and small number of funders mean that even one grant can cause large but essentially meaningless swings in funding from year to year.

Unless noted otherwise, all DALY (Disability Adjusted Life Year) figures in the report are 2004 DALYs for LMICs, as reported by the World Health Organization (WHO) in their 2004 update of the Global Burden of Disease,[1] these being the most comprehensive and recent figures available. In some cases, WHO 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.[2] '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 2.1% ($63.5m) 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 3.0% ($91.3m) was given as core funding to R&D organisations that work in multiple disease areas, for example, OneWorld Health (OWH) and the Special Programme for Research and Training in Tropical Diseases (WHO/TDR). 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).

FINDINGS - FUNDING BY DISEASE

In 2011, reported funding for neglected disease R&D was $3,045m (*$3,318m*). Funding was essentially stable compared to 2010, with a drop in YOY funding (excluding variations due to irregular survey participants) of $3.6m (-0.1%) in 2011 to $2,902m. A further $142.9m was reported by irregular survey participants (those who have participated in the survey in some years, but not in others).

Following the trend of previous years, diseases fell into three distinct tranches when analysed by funding levels. The 'top tier' diseases – HIV/AIDS, malaria and tuberculosis (TB) – again received approximately one-third to one-fifth of total global neglected disease R&D funding each, with HIV/AIDS receiving 33.8%, malaria 18.4% and TB 17.3%. YOY funding decreased significantly for TB (down $45.7m, -8.3%) and HIV/AIDS (down $41.1m, -4.0%), and increased modestly for malaria (up $14.4m, 2.8%).

The 'second tier' diseases received between 1% and 8% of total funding each, and include dengue, diarrhoeal diseases, kinetoplastids, bacterial pneumonia & meningitis, helminth infections and salmonella infections. Of these, dengue saw the largest increase in 2011 with YOY funding increasing by almost a third (up $54.0m, 31.8%), mainly driven by industry investment in dengue vaccine development. As a result, dengue increased its share of total funding from 5.8% in 2010 to 7.5% in 2011. Changes for the remaining 'second tier' diseases were mixed – funding decreased moderately for kinetoplastids (down $18.9m, -14.1%) and diarrhoeal diseases (down $11.9m, -7.8%), but increased for bacterial pneumonia & meningitis (up $10.7m, 13.1%) and helminth infections (up $2.2m, 3.3%). Funding for salmonella infections essentially remained steady (down $50,141, -0.1%).

The most poorly-funded diseases constitute the 'third tier', each receiving less than 0.5% of global funding. The 'third tier' diseases include trachoma, leprosy, Buruli ulcer and rheumatic fever. Funding for trachoma R&D more than doubled for the second year in a row (up $4.9m, 109.6%), while funding for rheumatic fever nearly halved for the second year in a row (down $0.7m, -45.0%). However, these changes are tiny in absolute terms, and cannot be interpreted as trends.

As in previous years, there was a further modest rebalancing of funding distribution. In 2011, this was due to increased funding for the second and third tier diseases overall (as seen in 2009), but also to a funding cut for the top tier of diseases overall (as seen in 2010). As a result, funding concentration for the top tier diseases decreased from 71.7% of total funding in 2010 to 69.4% in 2011, with YOY funders decreasing investments by $72.5m (-3.4%). The second tier diseases increased their share to almost a quarter of global funding (24.1%) in 2011 – their highest level in the history of the survey – with YOY funders increasing funding by $36.0m (5.6%). Third tier diseases slightly increased their share of funding from 0.7% in 2010 to 0.8% in 2011 (primarily driven by increases in trachoma funding), with YOY funders increasing overall investment by a very modest $4.9m (36.1%).

Table 2. Total R&D funding by disease 2007-2011[iii]

Disease	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^	2011 Nominal (US$)*	2007%	2008%	2009%	2010%	2011%
HIV/AIDS	1,083,018,193	1,164,882,551	1,138,511,159	1,073,033,520	1,028,723,121	1,117,384,546	42.3	39.4	35.9	35.0	33.8
Malaria	468,449,438	541,746,356	593,860,744	547,042,394	558,816,072	596,107,054	18.3	18.3	18.7	17.9	18.4
Tuberculosis	410,428,697	445,927,582	550,853,747	575,361,902	525,777,371	583,991,231	16.0	15.1	17.4	18.8	17.3
Dengue	82,013,895	126,752,203	165,812,311	177,643,516	228,969,607	248,878,109	3.2	4.3	5.2	5.8	7.5
Diarrhoeal diseases	113,889,118	132,198,981	180,426,679	158,918,128	152,243,283	169,047,654	4.4	4.5	5.7	5.2	5.0
Kinetoplastids	125,122,839	139,207,962	162,258,968	147,867,513	131,711,564	141,763,271	4.9	4.7	5.1	4.8	4.3
Bacterial pneumonia & meningitis	32,517,311	90,844,284	68,988,629	92,866,038	96,632,683	107,074,338	1.3	3.1	2.2	3.0	3.2
Helminths (worms & flukes)	51,591,838	66,837,827	79,414,264	73,685,406	81,130,337	89,556,460	2.0	2.3	2.5	2.4	2.7
Salmonella infections	9,117,212	39,486,243	39,378,570	43,982,149	44,414,630	47,696,550	0.4	1.3	1.2	1.4	1.5
Trachoma	1,679,711	2,073,659	1,798,463	4,507,718	9,594,358	10,400,004	0.1	0.1	0.1	0.1	0.3
Leprosy	5,619,475	9,769,250	10,984,756	8,840,532	7,413,791	8,492,467	0.2	0.3	0.3	0.3	0.2
Buruli ulcer	2,412,950	1,954,465	1,793,718	5,456,026	5,812,575	6,477,175	0.1	0.1	0.1	0.2	0.2
Rheumatic fever	1,670,089	2,179,609	3,009,737	1,736,877	817,179	987,486	0.1	0.1	0.1	0.1	0.0
Platform technologies	9,997,190	16,298,026	22,086,907	27,358,501	17,155,314	18,730,496	0.4	0.6	0.7	0.9	0.6
General diagnostic platforms	4,791,152	5,253,880	8,612,816	9,374,424	10,287,001	11,217,730	0.2	0.2	0.3	0.3	0.3
Adjuvants and immunomodulators	2,685,148	2,215,853	5,587,607	9,168,639	5,144,198	5,612,422	0.1	0.1	0.2	0.3	0.2
Delivery technologies and devices	2,520,889	8,828,293	7,886,484	8,815,438	1,724,115	1,900,344	0.1	0.3	0.2	0.3	0.1
Core funding of a multi-disease R&D organisation	110,921,673	101,097,348	74,094,564	76,884,279	91,310,707	100,697,533	4.3	3.4	2.3	2.5	3.0
Unspecified disease	51,619,120	74,707,997	75,667,744	47,485,474	64,703,354	70,930,922	2.0	2.5	2.4	1.6	2.1
Disease Total	2,560,068,749	2,955,964,344	3,168,940,958	3,062,669,973	3,045,225,945	3,318,215,295	100.0	100.0	100.0	100.0	100.0

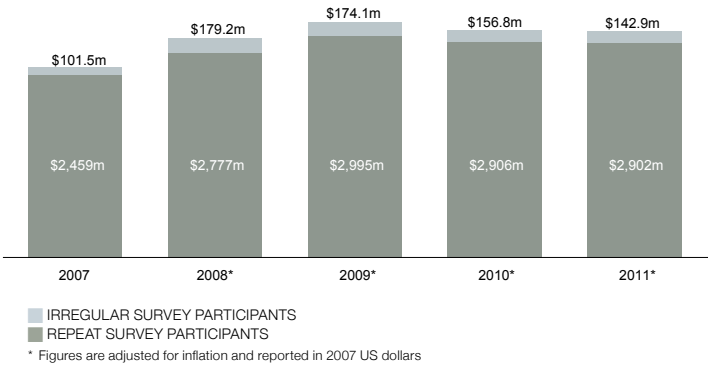
^ Figures are adjusted for inflation and reported in 2007 US dollars
* Figures are in current (2011) US dollars

[iii] 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

Five-year trends

Neglected disease R&D funding was trending healthily upwards until the global financial crisis impacted, but has been in gradual decline since. Despite this, annual YOY funding for neglected disease R&D was still $443.7m higher in 2011 than in 2007 ($2,902m compared to $2,459m).

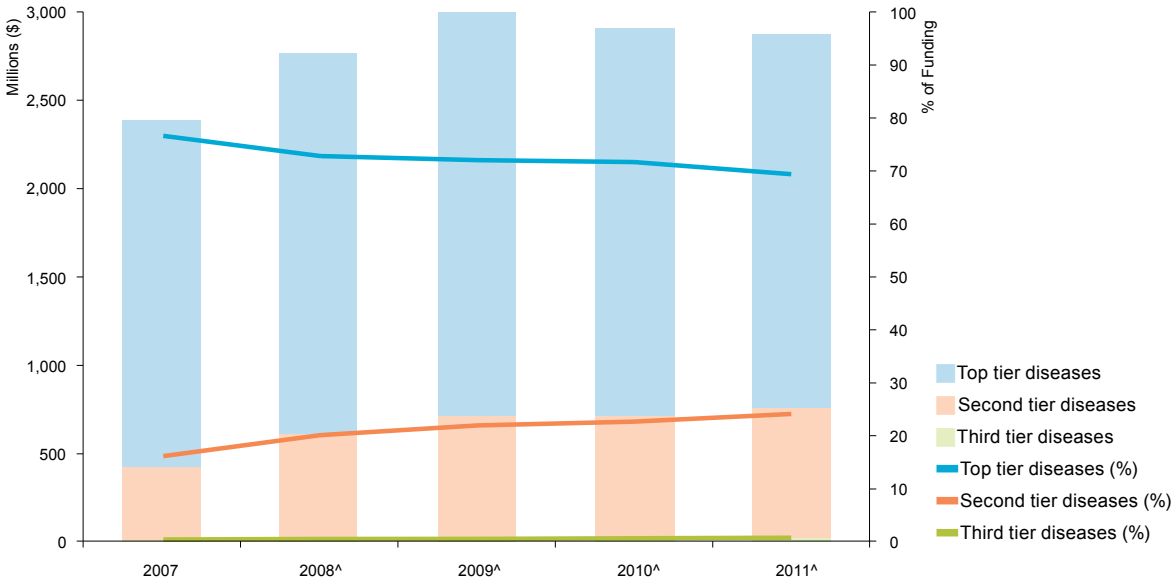
Figure 2. Total R&D funding 2007-2011



However, the most marked change has been in terms of funding focus. Over the five years of the survey, funding concentration (as opposed to absolute funding) has consistently decreased for the top tier diseases collectively (HIV/AIDS, malaria and TB), primarily driven by cuts in HIV/AIDS funding, while funding concentration for second and third tier diseases has consistently increased. The top tier diseases' share of global funding dropped from 76.6% in 2007 to 69.4% in 2011, with the most significant change seen in HIV/AIDS funding, which dropped from 42.3% of total funding in 2007 to 33.8% in 2011: a remarkable decrease. Over the same period, the share of total funding for second tier diseases increased from 16.2% to 24.1%, while third tier diseases doubled their share, from 0.4% in 2007 to 0.8% in 2011, although they still receive a very small proportion of overall funding.

In terms of absolute funding, trends have been slightly different. YOY funding for the top tier diseases increased in the first three years of the survey (from $1,892m in 2007 to $2,188m in 2009), but has been in decline since, amounting to $2,043m in 2011. In contrast, second tier diseases have seen strong and consistent growth in absolute funding, from $391.4m in 2007 to $681.6m in 2011, mainly driven by increased investment in dengue and bacterial pneumonia & meningitis. Third tier diseases have also seen increases in absolute funding (despite a modest dip in 2010), almost doubling from $9.7m in 2007 to $18.5m in 2011.

Figure 3. Funding concentration 2007-2011*



* 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

Within these tiers, funding for individual diseases has shown markedly different trends, with most diseases falling into one of two categories – those that have seen a strong upward trend in funding despite the global financial crisis, and those that have been in steady decline since the global financial crisis (i.e. since 2009). A surprising number of diseases – including malaria, TB, dengue, bacterial pneumonia & meningitis and helminths – fall into the first category. In some instances, such as funding for dengue vaccine development (which more than doubled from $66.8m in 2008 to $157.2m in 2011), this has been driven by increased industry investment as products reach a later, more expensive stage of development. In others, such as funding for bacterial pneumonia & meningitis and helminths, increases have come from the public and philanthropic sectors.

Diseases in the second category (including HIV/AIDS, diarrhoeal diseases, kinetoplastids have experienced declining funding following the global financial crisis (i.e. since 2009). Although remaining the top funded disease throughout the survey, YOY funding for HIV/AIDS R&D has steadily decreased from a peak of $1,114m in 2009 to $999m in 2011. This is likely due to a combination of government budget cuts following the global financial crisis and disappointing clinical trial results (for example, the PRO 2000, BufferGel and VivaGel microbicides). For other diseases, decreases have either been driven by declining philanthropic funding (diarrhoeal diseases and kinetoplastids) or the withdrawal of industry funding (rheumatic fever).

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.

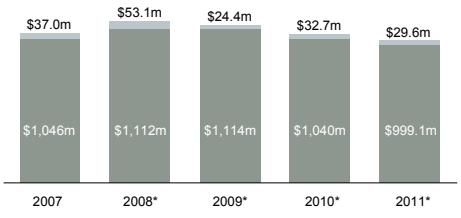
HIV/AIDS was responsible for 57.8 million DALYs and 2 million deaths in 2004, making it the third highest cause of morbidity and mortality from neglected diseases in the developing world.

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.[3] Antiretroviral drugs are available, but most are not adapted for DC use; for instance, paediatric formulations and fixed-dose combinations 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.[4]

Several microbicide candidates are under study and testing. Following several failures in Phase II/III trials (PRO 2000, BufferGel and VivaGel), new candidates using active ingredients from ARVs have shown promising results in Phase II trials. These include dapivirine gel and a long acting dapivirine-based microbicide ring which has recently moved into Phase III trials.[5] Unfortunately, tenofovir gel was proven to be ineffective, despite initial promising results in the CAPRISA 004 trial.[6] 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.[4]

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

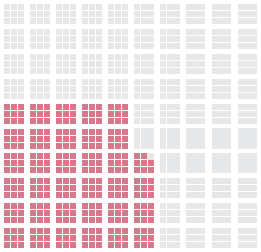
- Basic research
- Drugs specific to DC needs
- Preventive vaccines
- Diagnostics
- Microbicides



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

$1.03 BILLION

TOTAL SPEND ON HIV/AIDS R&D IN 2011



33.8%

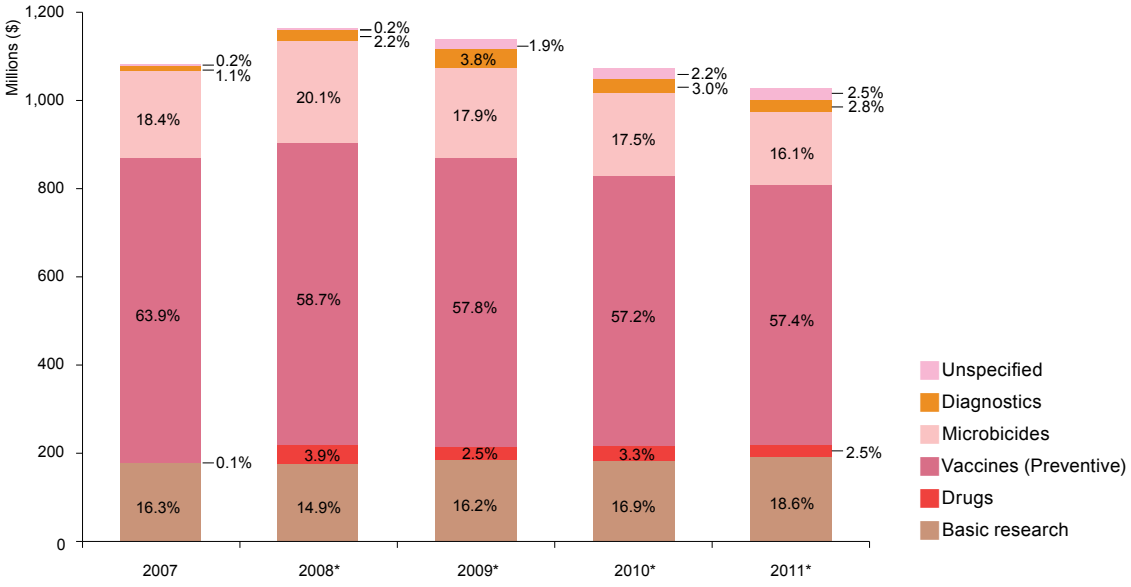
OF GLOBAL R&D FUNDING

HIV/AIDS received $1,029m (*$1,117m*) in R&D funding in 2011. This was a substantial decrease from 2010, with YOY funders decreasing their investment by $41.1m (-4.0%) to $999.1m. The remaining $29.6m in funding was provided by irregular survey participants. In terms of share of total funding, HIV/AIDS dropped from 35.0% in 2010 to 33.8% in 2011.

As in previous years, over half of total HIV/AIDS funding in 2011 was directed to vaccine development ($590.8m, 57.4%). This was followed by basic research ($191.4m, 18.6%), which for the first time received more funding than microbicides. Of the remaining funding, $165.1m (16.1%) was directed to microbicides, $29.3m (2.8%) to diagnostics and $26.2m (2.5%) to drug development.

Data from YOY funders showed that basic research was the only area to increase funding in 2011 (up $9.7m, 5.6%). All other areas saw drops – with the largest drop for vaccines (down $23.1m, -3.9%), followed by microbicides (down $20.2m, -11.0%, mostly driven by rescheduling of a grant from the Gates Foundation), drug development (down $7.8m, -24.6%) and diagnostics (down $2.5m, -8.7%).

Figure 4. HIV/AIDS R&D funding by product type 2007-2011



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

Decreases in HIV funding in 2011 were widespread, with nine of the top 12 funders reducing funding. Although the US National Institutes of Health (NIH) remained by far the largest funder, contributing 61.4% ($631.4m) of the global total, it also registered the biggest drop in funding in 2011 (down $26.0m, -3.9%). Other more modest decreases came from the Gates Foundation (down $7.7m, -6.5%) – as mentioned above, this was largely due to the rescheduling of a microbicide grant – and industry (down $7.1m, -23.7%). The only top-funding organisations that went against this trend were the US Department of Defense (DOD) and the Wellcome Trust, with increases of $10.5m (33.2%) and $5.4m (47.2%) respectively in 2011 (generally driven by increases in basic research funding). Funding concentration also reached its highest level during the past five years, with the top 12 funders collectively accounting for 93.6% of total HIV/AIDS funding.

Table 3. Top 12 HIV/AIDS R&D funders 2007-2011

Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
US NIH	660,058,109	60.1	678,816,000	643,838,823	688,900,175	657,340,665	631,394,882
Gates Foundation	120,306,811	11.0	91,975,642	160,531,263	119,431,387	118,655,020	110,940,741
USAID	67,365,950	6.1	67,457,000	67,813,102	68,169,518	68,385,015	65,005,117
US DOD	32,068,933	2.9	27,800,000	24,448,940	34,236,010	31,671,138	42,188,575
Aggregate industry	31,100,075	2.8	19,635,626	47,449,865	35,342,218	30,103,341	22,969,327
UK DFID	27,172,788	2.5	31,151,182	28,718,490	38,305,345	21,050,427	16,638,498
European Commission	23,167,849	2.1	24,794,890	26,305,301	27,100,813	19,073,421	18,564,822
Russian MHSD	16,361,271	1.5	16,666,666	16,055,877			
French ANRS	11,552,651	1.1	10,511,570	14,700,289	11,919,251	11,141,961	9,490,184
UK MRC	11,036,851	1.0	13,101,548	11,635,919	11,737,927	11,940,880	6,767,982
Wellcome Trust	10,779,309	1.0	6,932,786	9,429,787	9,296,776	11,423,726	16,813,469
Inserm	8,358,696	0.8	342,620	1,180,483	12,497,386	13,931,413	13,841,576
Subtotal of top 12†			1,010,087,806	1,068,173,703	1,064,377,030	1,003,363,819	962,653,410
Disease Total			1,083,018,193	1,164,882,551	1,138,511,159	1,073,033,520	1,028,723,121

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete

In 2011, the public and philanthropic sectors collectively provided 97.8% of HIV/AIDS R&D funding, with the public sector providing 84.6% ($870.5m) of total funding and the philanthropic sector providing 13.1% ($135.2m). Data from YOY funders showed that all sectors cut funding in 2011, with the largest decreases from the public sector (down $32.9m, -8.6%) and industry (down $6.8m, -27.7%). Funding from YOY philanthropic funders decreased only marginally (down $2.2m, -1.8%).

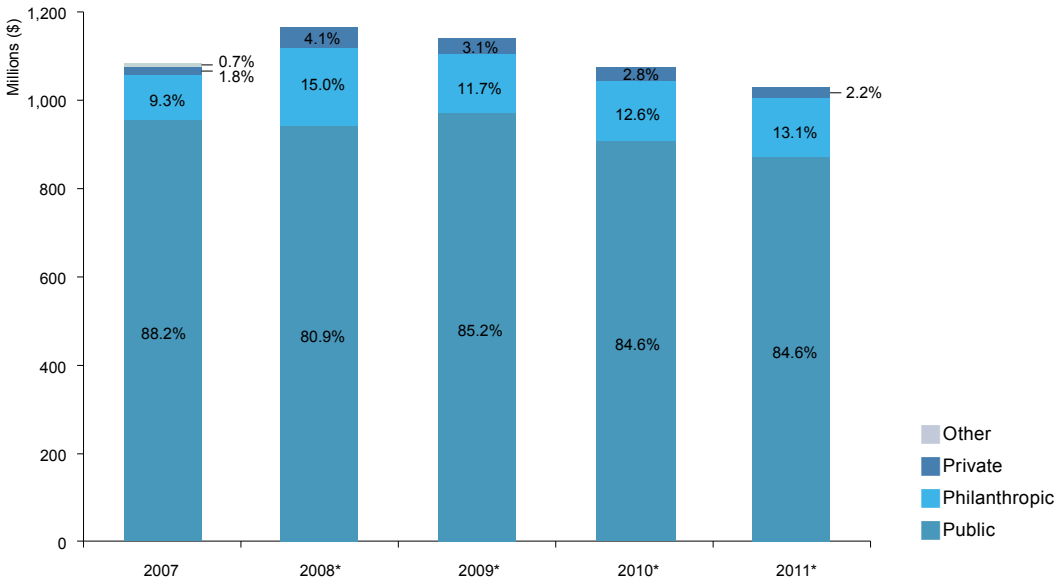
Five-year trends

HIV/AIDS still remains by far the most highly-funded disease area, receiving approximately twice as much funding as the next disease (either malaria or TB) between 2007 and 2011.

However, YOY funding for HIV/AIDS has declined steadily since its peak of $1,114m in 2009, with 2011 funding ($999.1m) at lower levels than when the survey began in 2007 ($1,046m). As a result, HIV/AIDS' share of global funding has also steadily and consistently decreased, from 42.3% in 2007 to 33.8% in 2011.

Public funding accounts for the majority of HIV/AIDS R&D funding, therefore public sector budget cuts following the global financial crisis have had a large impact, possibly compounded by a loss of confidence in HIV/AIDS R&D following several prominent clinical trial failures (for example, the PRO 2000, BufferGel and VivaGel microbicides). Although accounting for a relatively small share of HIV/AIDS funding, industry investment has also declined, with multinational pharmaceutical company (MNC) funding of $12.9m in 2011 substantially lower than the $19.9m seen in 2008. A significant part of this drop was due to cuts in small pharmaceutical and biotechnology firm (SME) vaccine investments, down from $4.8m in 2009 to just $0.9m in 2011. Philanthropic funding peaked at $173.7m in 2008, due to a large increase from the Gates Foundation across microbicide, drug and vaccine development, and has since stabilised at around $130m each year between 2009 and 2011.

Figure 5. HIV/AIDS R&D funding by funder type 2007-2011



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

Vaccine development, which has consistently accounted for the bulk of HIV/AIDS R&D funding, has generally decreased over the past five years, from $662.7m in 2007 to $576.7m in 2011. Most of the decrease was due to cuts in US NIH funding, although several aid agencies (including Irish Aid, the Swedish International Development Agency (SIDA) and the Royal Norwegian Ministry of Foreign Affairs (NORAD)) and public research institutions (including the French National Agency for Research on AIDS and Viral Hepatitis (ANRS)) also modestly decreased their vaccine funding.

Trends for other HIV product areas have been mixed, with declining funding for microbicides but diagnostics showing strong growth. YOY funding for microbicides generally decreased, with 2011 funding ($163.5m) substantially lower than in 2007 ($197.4m). As noted above, this reflects funding cuts from public and philanthropic funders following the global financial crisis and possibly also disappointing clinical trial results. Funding for diagnostics increased from $8.7m in 2007 to a peak of $34.4m in 2009, after which it stabilised at around $27m, with these changes primarily driven by increased funding from industry, the Gates Foundation and the US NIH.

Funding for HIV/AIDS continues to be highly concentrated, with the top three funders (US NIH, Gates Foundation and US Agency for International Development (USAID)) accounting for 75% to 80% of total funding throughout the survey period. The US NIH has consistently been the top funder, providing an average 60.1% of total funding – the highest share of funding by a single organisation for any disease. In general, HIV/AIDS funding is highly reliant on the public sector, which provides on average 85.5% of total funding, and was thus particularly susceptible to public budget cuts following the global financial crisis.

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).[7]

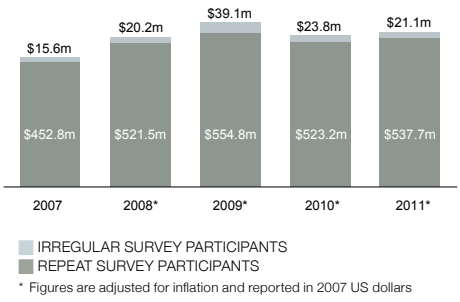
Malaria caused 33.9 million DALYs and at least 890,000 deaths in the developing world in 2004, making it the fifth highest cause of morbidity and mortality from neglected diseases. *P. falciparum* is by far the most deadly, and accounts for 98% of malaria cases in sub-Saharan Africa. However, *P. vivax* is estimated to account for 25-40% of the global malaria burden[8] and is particularly common in South-East Asia and South America.[9]

The emergence of resistance to artemisinin-based combination therapies (ACTs) and insecticides means new therapies are needed.[10] 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.[4]

Progress has continued since 2008. In October 2011, initial results from Phase III trials of the RTS,S malaria vaccine candidate showed it halved the risk of malaria in African children aged 5-17 months, with full results expected in 2014.[11] If all goes well, the World Health Organization (WHO) could recommend that countries implement RTS,S in their Expanded Program on Immunization as early as 2015.[12] Several promising synthetic artemisinins are also in clinical trials, including the ozonides arterolane/PQP (Phase IIb/III) and OZ439 (Phase IIa).[13]

Malaria R&D is needed in many areas including:

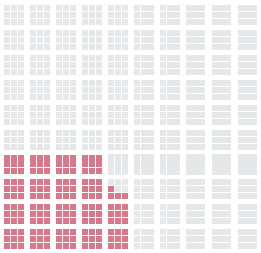
- Basic research
- Drugs
- Preventive vaccines
- Diagnostics
- Vector control products



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

$558.8 MILLION

TOTAL SPEND ON MALARIA R&D IN 2011



18.4%

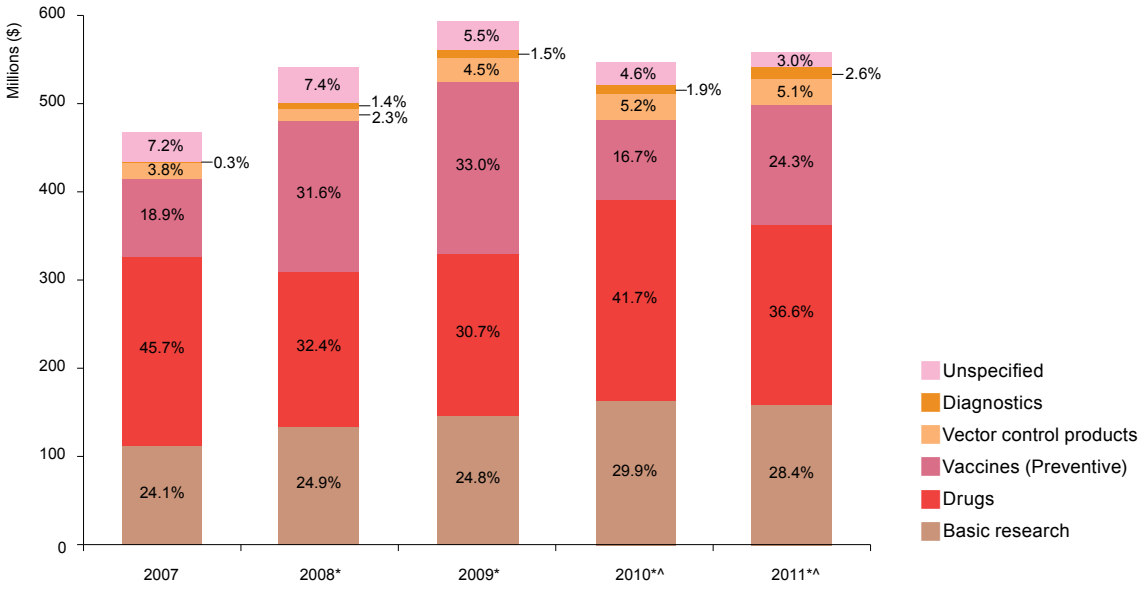
OF GLOBAL R&D FUNDING

Global funding for malaria R&D in 2011 was $558.8m (*$596.1m*). This was a moderate increase from 2010, with YOY funders increasing their investment by $14.4m (2.8%) to $537.7m. The remaining $21.1m was reported by irregular survey participants. Following a decrease in its share of total funding in 2010, malaria increased its share from 17.9% in 2010 to 18.4% in 2011, making it the second most highly-funded disease.

Drug development accounted for more than a third of total funding ($204.7m, 36.6%), followed by basic research ($158.5m, 28.4%) and preventive vaccines ($135.9m, 24.3%). Vector control products received $28.6m (5.1%) in funding, and $14.5m (2.6%) went to diagnostics.

Following a large drop in 2010 (reflecting the winding down of RTS,S vaccine funding), vaccine development increased by $45.2m (50.3%) in 2011 – although this was largely due to disbursement of a multi-year Gates Foundation grant. Diagnostics was the only other area to see increased funding (up $3.9m, 39.0%). Funding fell for drug development (down $20.6m, -9.3%), basic research (down $7.6m, -4.8%) and vector control products (down $0.3m, -1.4%).

Figure 6. Malaria R&D funding by product type 2007-2011



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

The Gates Foundation regained its position as the top malaria R&D funder in 2011, increasing funding by $57.7m (66.1%), mainly due to the cyclical nature of large multi-year grants. This masked significant decreases from most other top 12 funders, with the largest reductions from industry (down $24.0m, -19.1%) and the US NIH (down $10.7m, -8.0%). Besides the Gates Foundation, the only other top funder to increase its contributions in 2011 was the Australian National Health and Medical Research Council (NHMRC) (Inserm – Institute of Infectious Diseases (Inserm) reported funding was also higher than in 2010, but it is unclear whether this increase is real, or simply due to Inserm's improved reporting in 2011). Funding concentration remained high, with the top 12 funders accounting for 91.7% of all malaria R&D funding in 2011, and the top five funding organisations (the Gates Foundation, the US NIH, industry, the Wellcome Trust and the European Commission (EC)) accounting for three-quarters (75.6%) of total funding.

Table 4. Top 12 malaria R&D funders 2007-2011

Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
Gates Foundation	142,564,387	26.3	124,464,185	173,722,323	182,444,291	87,251,307	144,939,829
US NIH	112,064,996	20.7	84,422,644	104,810,620	116,013,245	132,882,335	122,196,138
Aggregate industry	101,591,389	18.7	90,793,583	90,611,134	99,303,179	125,621,275	101,627,772
Wellcome Trust	29,571,422	5.5	28,255,207	26,732,141	27,204,542	34,020,635	31,644,584
US DOD	28,394,805	5.2	33,126,578	30,518,142	37,585,617	22,666,297	18,077,389
European Commission	23,780,984	4.4	21,673,026	25,296,589	24,949,051	25,156,063	21,830,189
UK MRC	20,115,118	3.7	18,594,597	18,985,044	20,012,611	22,432,699	20,550,640
UK DFID	11,227,792	2.1	4,003,611	3,733,433	3,588,731	23,796,135	21,017,050
Australian NHMRC	9,624,836	1.8	7,692,288	9,012,351	10,201,615	9,623,199	11,594,726
Institut Pasteur	8,657,259	1.6	13,142,888	7,739,784	7,067,036	9,060,676	6,275,913
USAID	8,426,020	1.6	9,249,900	8,164,740	8,166,618	8,758,051	7,790,793
Indian ICMR	5,618,252	1.0		8,342,271	6,500,473	3,787,349	3,842,914
Subtotal of top 12†			442,390,786	507,870,081	544,613,555	505,828,729	512,543,268
Disease Total			468,449,438	541,746,356	593,860,744	547,042,394	558,816,072

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete

Reflecting increases by the Gates Foundation, the philanthropic sector accounted for a greater share of total funding in 2011 ($180.4m, 32.3%), with their YOY funding increasing by 44.8% (up $54.8m). The public sector provided just under half of total funding ($276.7m, 49.5%), and industry just under a fifth ($101.6m, 18.2%).

Five-year trends

Funding for malaria has generally increased over the past five years, with strong support from the public, philanthropic and private sectors. YOY funding in 2011 was $537.7m, compared to $452.8m in 2007.

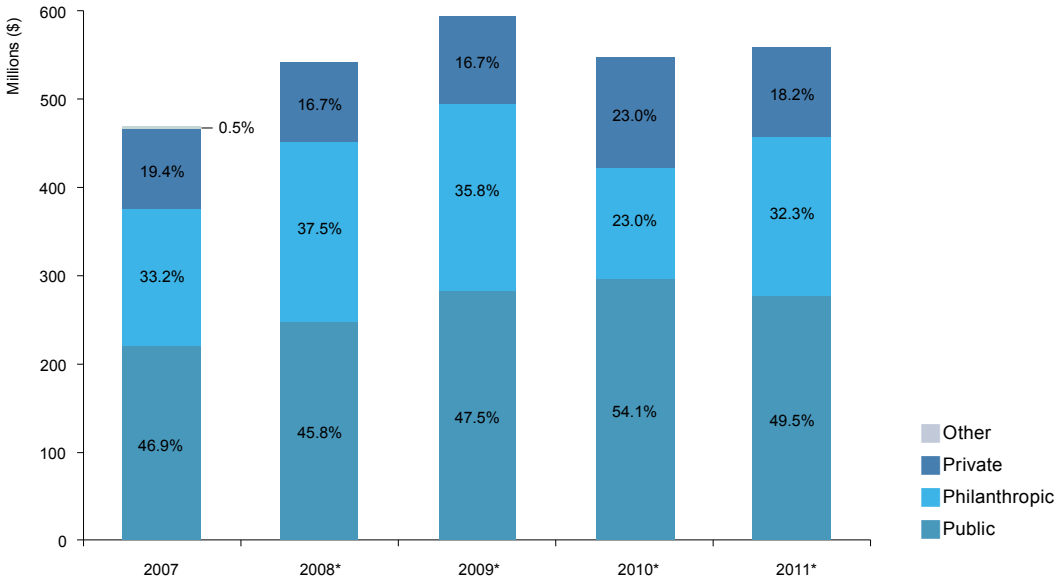
Increased funding has primarily benefited vaccine, diagnostic and vector control R&D, with funding for drug development fairly consistent over the five-year period ($201.4m in 2011, compared to $206.9m in 2007). Funding for basic research also increased steadily, with 2011 funding ($149.2m) significantly higher than 2007 funding ($107.8m), mainly driven by increases from the US NIH and the Wellcome Trust.

We compared five-year product R&D funding with the malaria R&D funding needs projected in the 2011 "Staying the Course" report.[14] Investments in drug R&D were generally in line with the report's recommendation for stable drug funding in the short-term, however funding increases for diagnostic and vector control R&D fell well short of the report recommendations, and vaccine funding has also recently fallen below the recommended levels.

Funding for diagnostics showed an overall upward trend (increasing from $1.6m in 2007 to $13.9m in 2011) but this was well below the recommended rapid increase of $40m between 2009 and 2011, and 2011 funding thus remained well below the recommended $50m per year. Similarly, although funding for vector control R&D trended slightly upwards (from $17.6m in 2007 to $22.9m in 2011), it still fell substantially short of the recommended annual increase of around $10m per year until at least 2015, in order to reach a peak of around $90m in 2016-17. Funding for vector control R&D is clearly not on track to meet this target. Vaccine R&D funding fluctuated substantially over the five-year period, consistent with front-loading of large grants for the Phase III trials of RTS,S, and the subsequent conclusion of those grants leading to a funding drop in 2010, however funding has not picked up since then to the levels suggested in the "Staying the Course" report: vaccine funding in 2011 was $135.1m, significantly below the recommended $150m to $160m per year needed to sustain the malaria vaccine pipeline.

Increases in malaria R&D funding between 2007 and 2011 have come from all sectors – public, philanthropic and industry – providing a more sustainable funding base than for diseases such as HIV/AIDS. YOY funding trends for the public sector and industry (specifically MNCs) were similar, both peaking in 2010 (at $281.2m and $114.5m respectively) before moderate reductions in 2011 (to $263.6m and $94.4m respectively). Philanthropic funding showed an overall upwards trend over the five years (from $153.5m in 2007 to $176.9m in 2011) despite the RTS,S-associated fluctuations described above.

Figure 7. Malaria R&D funding by funder type 2007-2011



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

Funding concentration has remained consistently high, with the top 12 funders providing 92.6% of total funding on average, and the top three funders (the Gates Foundation, the US NIH and industry) providing on average almost two-thirds (65.7%) of funding.

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 34 million DALYs and 1.4 million deaths in 2004, when it was the fourth highest cause of morbidity and mortality from neglected diseases.

The only available TB vaccine is the BCG, an 80 year-old vaccine that is highly effective only against disseminated TB in children.[15] 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 anti-tubercular 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;[16] there is need for cheap, rapid, easy-to-use diagnostics that can distinguish between active and latent disease, with or without HIV co-infection.

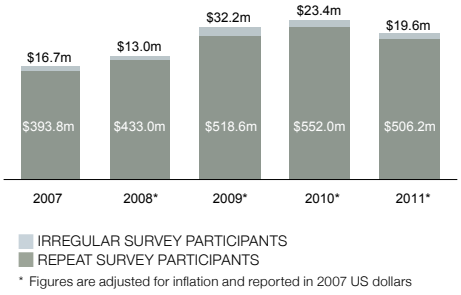
There are multiple drug candidates in development, including a novel three-drug combination (PA-824, moxifl oxacin and pyrazinamide) that has shown promising results against both drugsensitive and MDR-TB, and which could shorten the treatment of drug-resistant TB from two years to four months.[17] Encouragingly, bedaquiline (TMC207) for pulmonary MDR-TB was granted priority review by the US Food and Drug Administration (FDA) in September 2012[18] and delamanid (OPC-67683), which has also shown promising results in MDR-TB,[19] has been submitted to the European Medicines Agency (EMA) for regulatory approval.

There are also several vaccine candidates in clinical trials, with the most advanced being the *Mycobacterium indicus pranii* (MIP) candidate developed by the Indian Department of Biotechnology (DBT) and Cadila Pharmaceuticals Ltd, which is in Phase III trials.[20] A number of other candidates, including MVA85A/AERAS-485, GSK M72 and AERAS-402/Crucell Ad35, are in Phase II trials, and the ID93 + GLA-SE candidate (under co-development by Aeras Global TB Vaccine Foundation (Aeras) and the Infectious Disease Research Institute (IDRI)) entered Phase I clinical trials in August 2012.[21]

Progress has been made in diagnostic development, with Cepheid's nucleic acid detection device (Xpert® MTB/RIF) rolled out in 26 countries by July 2011 and showing excellent results. Negotiated price reductions are increasing the affordability of this test for developing countries, but the cost of both the unit and the test cartridges remains a barrier to access.[22]

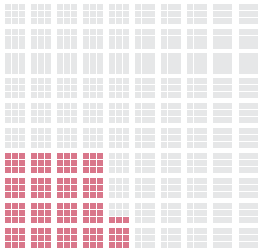
R&D needs for TB include:

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



$525.8 MILLION

TOTAL SPEND ON ON TB R&D IN 2011



17.3%

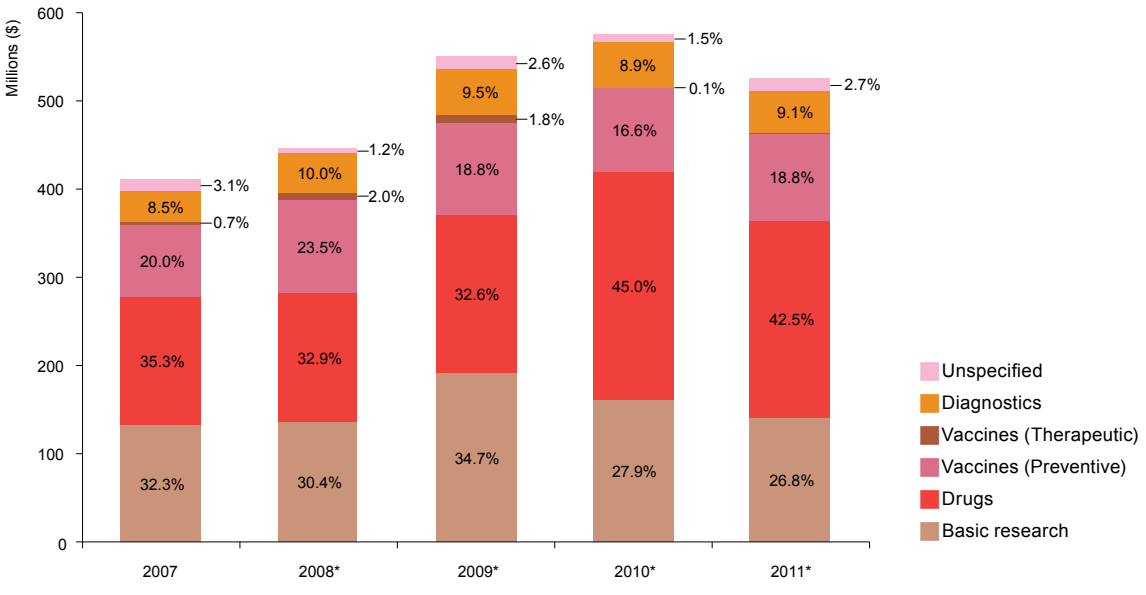
OF GLOBAL R&D FUNDING

TB received $525.8m (*$584.0m*) in R&D funding in 2011. This was a significant drop from 2010, with YOY funders decreasing their investment by $45.7m (-8.3%) to $506.2m, although we note that most of this drop reflected uneven grant disbursement and completion of several large multi-year grants. The remaining $19.6m in funding was provided by irregular participants. As a result of this decrease, TB dropped its share of global funding from 18.8% in 2010 to 17.3% in 2011.

As in 2010, the majority of TB funding went to drugs ($223.7m, 42.5%), followed by basic research ($140.8m, 26.8%) and preventive vaccines ($99.1m, 18.8%). A further $47.9m (9.1%) was directed to diagnostics and just $0.07m (0.01%) to therapeutic vaccines.

The decrease in TB funding in 2011 was spread across most product areas, with data from YOY funders showing drops in funding for drugs (down $34.7m, -13.7%; partially driven by the completion of a large multi-year grant from the Gates Foundation), basic research (down $15.9m, -10.6%), diagnostics (down $5.8m, -11.8%) and therapeutic vaccines (down -$0.5m, -99.6%,). Only preventive vaccines showed a modest increase (up $4.3m, 4.7%).

Figure 8. TB R&D funding by product type 2007-2011



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

The top 12 funders accounted for 90.9% of total TB R&D funding in 2011, with almost three-quarters of funding ($389.8m, 74.1%) coming from the US NIH, industry and the Gates Foundation.

Nine of the 12 top funding groups reduced their TB funding in 2011, although many of the largest drops were due to the uneven disbursement or completion of multi-year grants. Funding from the Gates Foundation was down $16.2m (-15.9%), mainly due to completion of large multi-year grants to the Global Alliance for TB Drug Development (TB Alliance, down $11.4m) and the Foundation for Innovative New Diagnostics (FIND, down $7.9m). Other modest decreases came from the UK Department for International Development (DFID, down $9.8m, -43.3%, due to uneven disbursement across their funding cycle); industry (down $8.7m, -5.4%); the EC (down $4.6m, -20.8%; the US NIH (down $4.6m, -2.9%); and the Statens Serum Institute (SSI, down $2.6m, -50.0%), which consequently dropped out of the top 12 TB funders in 2011. The Institut Pasteur also dropped out of the top 12 in 2011 due to lower reported funding (down $8.7m, -70.5%), however it is unclear if this decrease was real or artefactual as they did not submit complete data for 2011.

The only top 12 organisations to increase their funding, albeit modestly, were the Indian DBT (up $2.3m, 91.0%), and the UK Medical Research Council (MRC) (up $0.5m, 3.9%).

Table 5. Top 12 TB R&D funders 2007-2011

Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
US NIH	141,445,783	28.2	121,741,199	112,844,319	163,328,162	156,954,021	152,361,217
Aggregate industry	117,500,255	23.4	65,954,715	87,029,053	123,151,353	160,022,103	151,344,049
Gates Foundation	106,618,004	21.3	115,864,538	131,983,857	96,890,583	102,285,965	86,065,080
European Commission	23,561,224	4.7	21,455,029	27,870,907	28,730,986	22,180,461	17,568,736
UK MRC	13,789,667	2.7	12,710,433	12,832,477	12,595,664	15,108,715	15,701,044
UK DFID	11,573,546	2.3	1,801,625	3,360,090	17,380,915	22,539,728	12,785,372
US CDC	10,408,086	2.1	11,617,000	8,813,953	14,422,770	8,698,233	8,488,473
Wellcome Trust	8,585,030	1.7	2,599,875	5,485,274	8,211,120	13,477,887	13,150,997
USAID	7,026,614	1.4	3,893,436	6,551,060	8,147,289	8,371,289	8,169,998
Dutch DGIS	6,032,384	1.2	12,187,935	4,584,714	7,451,930	2,828,608	3,108,734
Institut Pasteur	5,822,362	1.2	7,996,742	3,014,062	2,089,479	12,361,921	3,649,607
SSI	4,764,883	0.9	3,672,882	3,166,531	9,174,072	5,207,031	2,603,898
Subtotal of top 12†			385,827,417	408,545,193	495,347,363	531,532,918	478,095,133
Disease Total			410,428,697	445,927,582	550,853,747	575,361,902	525,777,371

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12

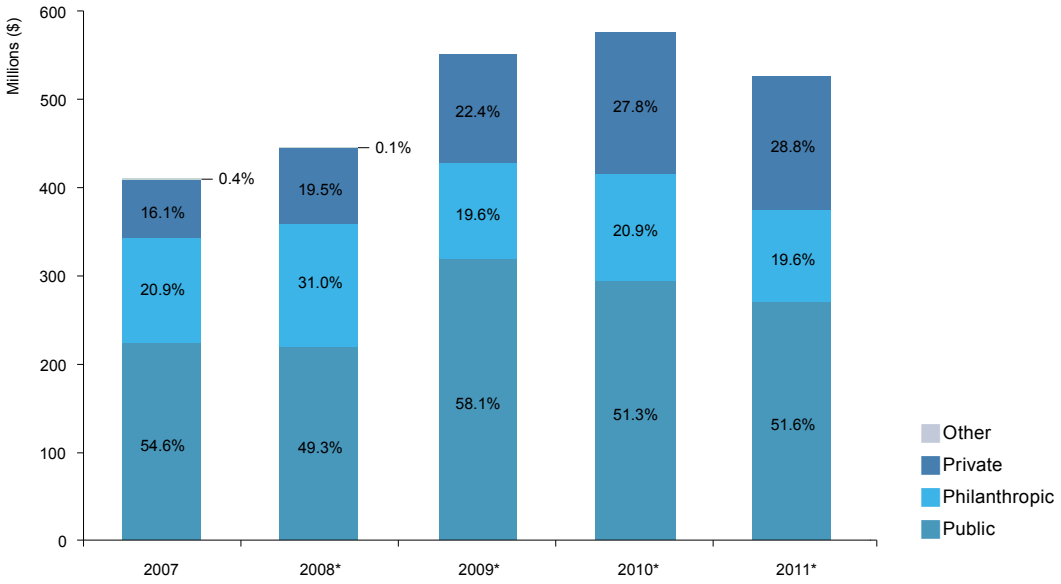
Public funders accounted for just over half of total TB funding ($271.2m, 51.6%), with industry contributing over a quarter ($151.3m, 28.8%) and philanthropic funders accounting for a fifth ($103.2m, 19.6%). All sectors saw a drop in funding. YOY public funding was down $21.0m (-7.6%) and YOY philanthropic funding was down $16.3m (-14.1%), although this was linked to completion of multi-year Gates Foundation grants. YOY industry funding fell for the first time in the five years of this report, decreasing by $8.4m (-5.3%), although their share of total TB funding increased slightly due to larger drops from other sectors.

Five-year trends

Funding for TB R&D has seen a strong upward trend over the last five years, despite the global financial crisis and some annual fluctuations, with funding increasing from $393.8m in 2007 to $506.2m in 2011. A significant part of this increase was driven by industry investment in TB drug development, although increases in funding for vaccine and diagnostic development (driven by a mix of philanthropic, public and industry increases) have also played a role.

There has been a significant move towards industry funding, and away from philanthropic funding, over the course of the survey. MNCs have driven the overall industry increase, with their YOY funding almost doubling from $71.6m in 2008 to $136.9m in 2011 and their share of total TB funding consequently rising from 16.5% to 27.0% over that time. In contrast, YOY philanthropic funding has swung significantly from year to year but with a general downward trend: funding for 2009-2011 was in the range of $86m-$102m per year, compared to $116m-$132m per year in 2007 and 2008. The Gates Foundation, the primary driver of philanthropic funding, attributes this decrease to funding cycles and the completion of large multi-year grants.

Figure 9. TB R&D funding by funder type 2007-2011



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

Overall, there has been a trend towards increased funding for TB drug development, linked to maturing product portfolios. YOY funding for drug development was $219.6m in 2011 compared to $141.5m in 2007, with significant increases in funding from industry, the US NIH and the Gates Foundation in 2010. Funding for preventive vaccine development also saw an upward trend over the course of the survey, receiving $97.0m in 2011 compared to $78.1m in 2007. In contrast, YOY funding for basic research ended the survey period at a very similar level to 2007 ($134.1m in 2011, compared to $130.5m in 2007), after peaking at $180.1m in 2009. Steep drops in basic research funding in 2010 (down $30.0m, -16.7%) and 2011 (down $15.9m, -10.6%) reflected large reductions from the US NIH and the Gates Foundation, however incomplete reporting from The Institut Pasteur may have artificially inflated the overall 2011 drop in basic research funding.

In terms of funding concentration, TB R&D (unlike HIV/AIDS) has a broader and more sustainable funding base spread across the private, philanthropic and public sectors. The top three funders – the US NIH, industry and the Gates Foundation – each provided on average around a quarter of total funding, with a general upward trend in funding from industry and the US NIH. A number of other significant funders, including UK DFID, the Wellcome Trust and USAID, have also shown a trend towards increased funding over the survey period. Each of these organisations steadily increased their funding between 2007 and 2010, with their 2011 reductions being either relatively small (the Wellcome Trust and USAID) or attributable to funding cycles (UK DFID).

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 parts 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 larger commercial market, driven by demand from travellers, the military and a high prevalence in several wealthier developing countries in South-East Asia and Latin America.

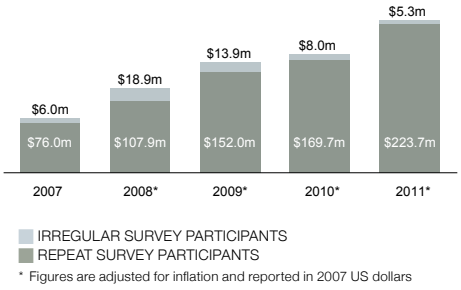
Dengue was responsible for 663,000 DALYs and 18,000 deaths in 2004. It ranked as the 11th highest cause of morbidity and 10th highest cause of mortality from neglected diseases.

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.[4] Current diagnostic kits also need to be evaluated.[23]

Several new dengue vaccines are in development, with one live attenuated tetravalent vaccine candidate in Phase III and four other candidates in Phase I and II clinical trials. Unexpectedly, initial Phase III results for the most advanced candidate showed protection only against three of the four serotypes, albeit with a strong safety profile.[24] Results from additional sites are yet to come. A small number of early stage drug candidates are also in development.[4]

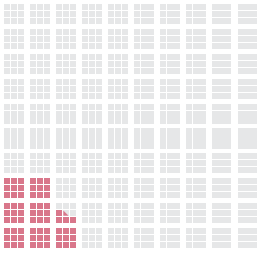
R&D needed for dengue includes:

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



$229.0 MILLION

TOTAL SPEND ON DENGUE R&D IN 2011



7.5%

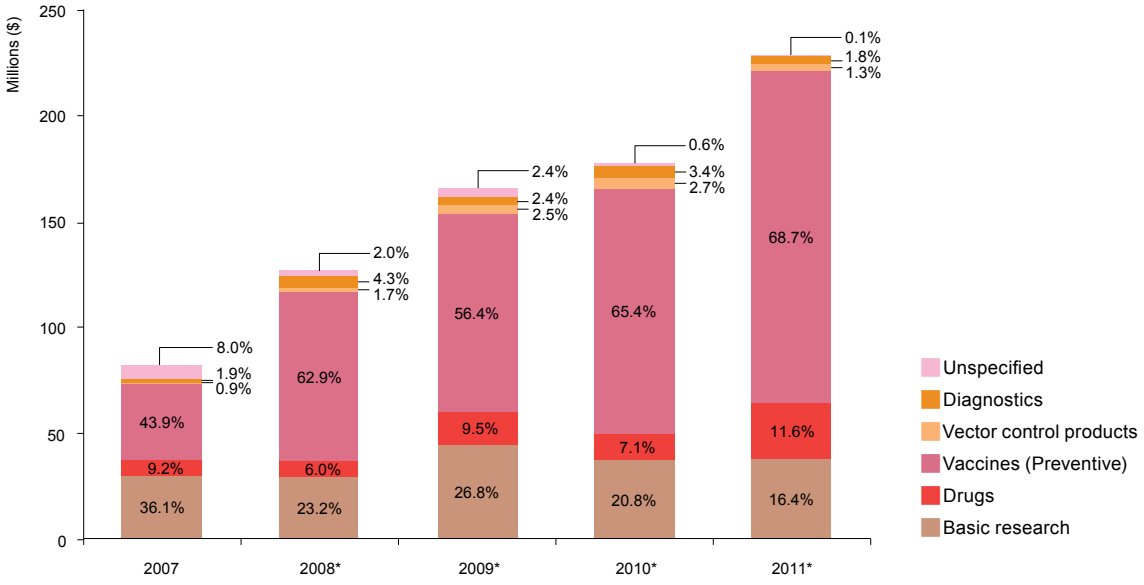
OF GLOBAL R&D FUNDING

Global funding for dengue R&D was $229.0m (*$249.0m*) in 2011. This was a large increase from 2010, with YOY funders increasing their investment by $54.0m (31.8%) to $223.7m – the largest absolute increase among all neglected diseases in 2011. The remaining $5.3m was provided by irregular survey participants. As a result of this increase, dengue increased its share of global funding from 5.8% in 2010 to 7.5% in 2011, its highest share in the five years of this report.

Over two-thirds of dengue R&D funding went to vaccine development ($157.4m, 68.7%). Basic research received $37.5m (16.4%), drug development $26.6m (11.6%), diagnostics $4.1m (1.8%) and vector control products received $3.0m (1.3%).

The increase in dengue funding was driven by a large increase in YOY vaccine funding (up $43.3m, 38.0%) and a more modest increase for drugs (up $14.1m, 115.8%). The increase in vaccine funding was driven by industry (up $53.5m, offset by decreases from other sectors), mostly due to investment in late-stage trials, whereas the increase in drug funding was primarily from the US NIH (up $7.3m), together with modest increases from the Wellcome Trust (up $3.5m) and industry (up $3.0m). In contrast, basic research funding remained steady, and funding for diagnostics decreased modestly (down $2.1m, -36.1%).

Figure 10. Dengue R&D funding by product type 2007-2011



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

Industry remained by far the largest funder in 2011, providing more than two-thirds of total funding ($154.1m, 67.3%), an increase of $54.9m (up 55.3%) on 2010. The second largest funder, the US NIH, also increased its investment (up $5.1m, 11.1%) with combined funding from these two groups accounting for 89.8% of total dengue R&D funding in 2011. Other funding changes were relatively minor: the Wellcome Trust increased funding by $4.7m (199.0%), while the Gates Foundation (the third-highest funder in 2010, with an investment of $6.5m) dropped out of the top 12 funders in 2011, primarily due to the uneven disbursement of a dengue vaccine grant.

Table 6. Top 12 dengue R&D funders 2007-2011

Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
Aggregate industry	75,919,715	48.6	19,394,756	43,793,998	63,113,152	99,209,885	154,086,782
US NIH	42,593,432	27.3	34,639,236	26,603,478	54,025,137	46,281,288	51,418,020
US DOD	8,365,477	5.4	14,384,000	7,517,148	10,477,173	5,490,539	3,958,525
Gates Foundation	7,109,619	4.6	1,013,807	16,305,526	11,711,906	6,450,949	65,908
Institut Pasteur	3,100,982	2.0	3,946,978	2,727,968	2,480,946	3,561,362	2,787,657
Wellcome Trust	2,662,766	1.7	1,073,869	1,203,426	1,584,764	2,368,748	7,083,020
Brazilian DECIT	2,231,019	1.4	1,623,000	1,334,847	6,716,881	1,242,158	238,209
Australian DIISRTE/ARC	1,301,947	0.8		2,866,725	299,207	1,793,524	248,333
European Commission	1,157,249	0.7	2,021,456	1,748,863	1,050,923	497,922	467,081
Australian NHMRC	1,130,879	0.7	647,598	1,039,031	1,035,249	1,219,028	1,713,488
Mexican CONACYT	949,806	0.6				1,168,934	730,678
Indian ICMR	886,506	0.6		527,822	947,966	1,044,489	1,025,748
Subtotal of top 12†			81,594,560	119,625,671	157,336,711	171,401,497	226,059,527
Disease Total			82,013,895	126,752,203	165,812,311	177,643,516	228,969,607

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete

Reflecting trends from 2010, industry funding again increased sharply, while funding from the public and philanthropic sectors continued to drop. Industry's share moved from 60.0% of total funding in 2010 to 68.5% in 2011, almost entirely due to a large increase in YOY MNC investment (up $56.0m, 59.2%). There were slight decreases in YOY funding from the public sector (down $0.8m, -1.3%) and philanthropic sector (down $1.6m, -18.9%), with a cyclical reduction from the Gates Foundation (down $6.4m) offset by a similar increase from the Wellcome Trust (up $4.7m).

Five-year trends

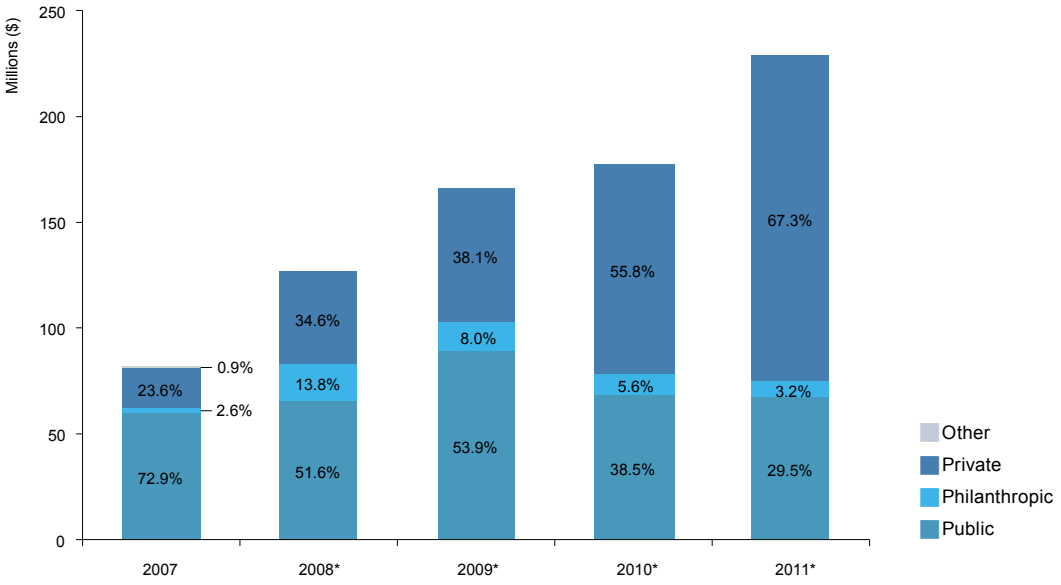
Dengue R&D has a unique funding profile among the neglected diseases. Overall funding has consistently and significantly increased across all five years of the report, with a substantial acceleration in industry funding, primarily driven by the clinical vaccine development.

Funding for dengue R&D more than doubled between 2008 and 2011, with YOY funders increasing their investment from $107.9m in 2008 to $223.7m in 2011 (an increase of 107.4% over the four years). This meant that dengue's disease share increased from just 4.3% in 2008 to 7.5% in 2011.

Almost all of this increase can be attributed to funding for clinical development of dengue vaccine candidates by MNCs, who provided 97.9% of industry vaccine funding in 2011. Funding by MNCs for dengue vaccine development has more than tripled over the last four years, from $40.2m in 2008 to $141.6m in 2011 (a remarkable increase of 252.3% over the four years).

Overall, this has resulted in a significant shift in funding sources. In 2008, YOY public funders provided 43.3% of dengue R&D funding, with MNCs providing a further 40.0%. By 2011, YOY MNC funders provided the lion's share of funding (67.3%) while public funders contributed just over a quarter (28.4%) of funding. YOY philanthropic funding has also steadily decreased from $17.5m in 2008 to $7.2m in 2011. The Gates Foundation, the main driver of these decreases, attributes them to cyclical funding and completion of multi-year grants.

Figure 11. Dengue R&D funding by funder type 2007-2011



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

Funding concentration has generally increased throughout the five years, with industry and the US NIH accounting for 89.8% of total funding in 2011, compared to just 55.5% in 2008. Some agencies appear to have moved away from dengue in response to industry's increased funding – for example, US DOD funding has dropped from $14.4m in 2007 to $4.0m in 2011.

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.

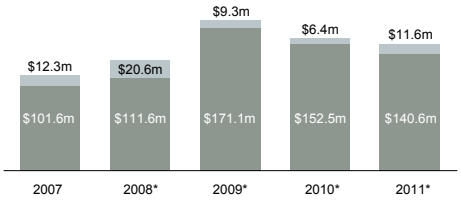
Diarrhoeal illnesses were collectively responsible for 72.3 million DALYs and just over 2 million deaths in the developing world in 2004, making them the second highest cause of neglected disease mortality and morbidity.

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.[25] New rapid diagnostic tests capable of distinguishing between diarrhoeal diseases are also required.[4]

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 for rotavirus.[26] 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.[4]

R&D needs for the diarrhoeal illnesses include:

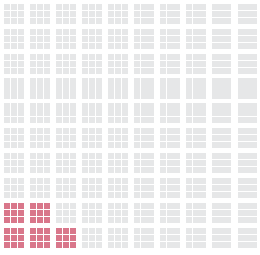
- Basic research for cholera, shigella and *cryptosporidium*
- Drugs for cholera, shigella and *cryptosporidium*
- Vaccines for rotavirus, *E. coli*, cholera, shigella and *cryptosporidium*
- Diagnostics



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

$152.2 MILLION

TOTAL SPEND ON DIARRHOEAL DISEASE R&D IN 2011



5.0%

OF GLOBAL R&D FUNDING

Diarrhoeal diseases received $152.2m (*$169.0m*) in R&D funding in 2011. This was a moderate decrease from 2010, with YOY funders decreasing their investment by $11.9m (-7.8%) to $140.6m. The remaining $11.6m in funding was provided by irregular survey participants. As a result of the reduction in funding, there was a minor decrease in diarrhoeal diseases' share of overall funding, from 5.2% in 2010 to 5.0% in 2011.

Rotavirus, cholera and shigella remained the top-funded diarrhoeal diseases, accounting for two-thirds ($101.5m, 66.7%) of total funding. These diseases saw small funding changes in 2011, with rotavirus up $0.2m (0.3%), shigella up $0.4m (1.7%) and cholera down $1.7m (-6.9%). Among the less well-funded diarrhoeal diseases, fluctuations were mixed – funding for *cryptosporidium* was down $2.0m (-21.3%), enterotoxigenic *E. coli* was down $1.5m (-22.5%), giardia was up $0.2m (65.0%) and enteroaggregative *E.coli* was up $0.2m (570.3%).

For diseases where data was collected for all product types (cholera, shigella and *cryptosporidium*), funding profiles varied across product areas. For cholera, more than two-thirds of funding ($18.3m, 70.4%) went to basic research, followed by preventive vaccines ($4.0m, 15.6%). For shigella, vaccine development received almost half of total funding ($11.3m, 47.4%) and basic research just over a third ($8.3m, 34.6%). For *cryptosporidium*, funding was more evenly spread between drug development ($2.7m, 36.5%), diagnostics ($2.5m, 33.6%) and basic research ($2.1m, 28%). Taken as a whole, YOY funding for diarrhoeal diseases dropped across all product areas, with the largest drops in funding for basic research (down $7.4m, -18.6%) and drug development (down $5.8m, -34.0%).

Table 7. Funding for diarrhoeal disease R&D 2011 (US$)*[A]

Disease	Basic Research	Drugs	Vaccines (Preventive)	Diagnostics	Unspecified	Total	%
Rotavirus			51,089,270		563,092	**51,652,362**	33.9
Cholera	18,290,244	1,561,524	4,039,969	582,225	1,494,300	**25,968,262**	17.1
Shigella	8,253,968	2,010,484	11,306,762	881,564	1,420,091	**23,872,869**	15.7
Cryptosporidium	2,053,126	2,683,607	153,866	2,472,519	-	**7,363,119**	4.8
Enterotoxigenic *E.coli* (ETEC)			4,080,019	2,272,355	340,376	**6,692,751**	4.4
Giardia				508,333		**508,333**	0.3
Enteroaggregative *E.coli* (EAggEC)			-	185,605	-	**185,605**	0.1
Multiple diarrhoeal diseases	5,057,930	5,034,453	13,583,609	4,962,447	7,361,543	**35,999,983**	23.6
Total	33,655,268	11,290,068	84,253,496	11,865,049	11,179,403	**152,243,283**	100.0

* All figures are FY2011, adjusted for inflation and reported in 2007 US dollars

[A] 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

Five of the top 12 funding groups increased their funding for diarrhoeal disease R&D in 2011, while five others decreased their funding (changes in funding by The Institut Pasteur and Inserm have not been treated as real funding changes, as both organisations changed their reporting practices for 2011). Of the top three funders (the US NIH, the Gates Foundation and industry), which collectively provided 71.9% of total funding in 2011, only the US NIH increased funding (up $2.2m, 4.3%). The Gates Foundation and industry reduced funding, down $14.1m (-31.4%) and $5.5m (-17.5%) respectively, with reductions from the Gates Foundation due to uneven disbursement of large multi-year grants. There was a modest increase in 2011 funding from the EC (up $2.0m, 249.1%).

Table 8. Top 12 diarrhoeal disease R&D funders 2007-2011

Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
US NIH	46,893,313	31.8	31,024,336	39,516,218	60,942,274	50,399,408	52,584,331
Gates Foundation	38,705,815	26.2	44,303,185	26,725,850	46,757,622	44,915,768	30,826,647
Aggregate industry	26,517,925	18.0	13,676,428	24,102,845	37,196,423	31,569,739	26,044,189
US DOD	6,604,259	4.5	5,436,000	5,898,574	10,999,053	5,894,604	4,793,065
GAVI	4,979,259	3.4	10,083,609	14,812,687	-	-	-
Institut Pasteur	4,184,714	2.8	3,426,196	3,774,871	5,180,998	4,294,706	4,246,796
Indian ICMR	3,239,979	2.2		3,663,668	3,514,923	3,611,560	2,169,766
Inserm	2,453,882	1.7	274,096	327,912	1,454,522	1,697,492	8,515,390
UK DFID	2,243,906	1.5	-	-	2,691,549	5,440,441	3,087,543
Undisclosed participant	1,829,825	1.2	-	949,135	506,774	1,788,506	5,904,708
Argentinean MSTPI	1,588,670	1.1				-	3,177,341
Swedish SIDA	1,277,063	0.9	-	2,455,171	3,240,107	261,858	428,178
Subtotal of top 12†			112,607,339	125,257,549	175,250,001	153,013,323	145,676,323
Disease Total			113,889,118	132,198,981	180,426,679	158,918,128	152,243,283

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete
- No reported funding

In 2011, the public sector provided 62.1% ($94.6m) of total diarrhoeal disease R&D funding, with the philanthropic sector providing a fifth ($31.6m, 20.8%) and industry accounting for 17.1% ($26.0m).

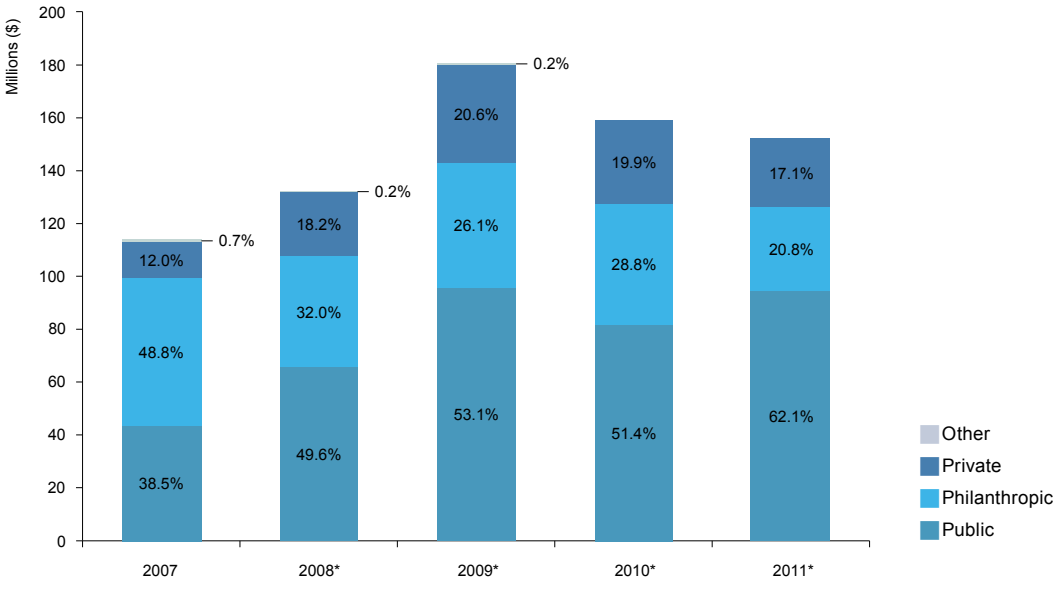
Data from YOY funders shows a moderate increase in public sector funding in 2011 (up $11.5m, 15.2%), contrasted with decreased funding from the philanthropic sector (down $14.1m, -31.0%, mainly driven by the uneven disbursement of multi-year Gates Foundation grants) and from industry (down $9.4m, -30.2%). YOY low- and middle-income country (LMIC) public sector funders increased their contributions from $1.9m in 2010 to $6.4m in 2011 (an increase of $4.5m, 235.8%).

Five-year trends

Funding for diarrhoeal disease R&D has been on a downward trend since 2009, after promising increases in the early years of the survey. Despite this, 2011 funding of $140.6m was still higher than 2007 funding of $101.6m.

Drops in philanthropic and industry funding have been the main drivers of funding decreases in the last two years. YOY philanthropic funding dropped from $47.1m in 2009 to $31.3m in 2011, and YOY MNC funding (MNCs account for almost all industry funding) from $32.5m to $21.7m over the same period. Decreases from the philanthropic sector have been driven by the Gates Foundation, which attributed declining funding to uneven disbursement of large multi-year grants (particularly for cholera vaccine development), and cautioned against interpreting these funding patterns as a long-term directional trend away from diarrhoeal disease R&D. The decrease in MNC investment has been driven by reductions in funding for rotavirus vaccines, down from $30.8m in 2009 to $16.6m in 2011 (partially offset by increased US NIH funding for rotavirus vaccines). In contrast, YOY public funding has grown rapidly, doubling between 2007 ($43.1m) and 2011 ($87.6m), resulting in the public sector very significantly increasing its share of diarrhoeal disease R&D funding over the five years.

Figure 12. Diarrhoeal disease R&D funding by funder type 2007-2011



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

Cuts in basic research funding also contributed to the decline in funding since 2009. YOY funding for basic research decreased from $52.6m in 2009 to $32.4m in 2011, driven by decreases in US NIH funding for shigella and *cryptosporidium* research. In contrast, funding for cholera (consistently the most highly-funded diarrhoeal disease for basic research) has tended to remain steady.

Overall, the top-funded diarrhoeal diseases have been rotavirus, cholera and shigella, collectively accounting for around one-half to two-thirds of total funding between 2007 and 2011. Despite reductions in 2010 and 2011, vaccines still represent the most well-funded product area, accounting for over half of total funding in each year of the survey.

Funding concentration has remained high throughout the five years, with the top three funders (the US NIH, Gates Foundation and industry) providing on average three-quarters (76.0%) of total funding from 2007 to 2011. The US NIH has generally increased its share of total funding across the five years, accounting for 34.5% of total funding in 2011, compared to 27.2% of total funding in 2007.

KINETOPLASTIDS

Kinetoplastid infections include three diseases: Chagas' disease, leishmaniasis and Human African Trypanosomiasis (HAT), also known as African sleeping sickness. HAT 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 2004, kinetoplastid diseases were responsible for 4.1 million DALYs and 110,000 recorded deaths in the developing world. They ranked as the eighth highest cause of mortality and ninth highest cause of morbidity from neglected diseases.

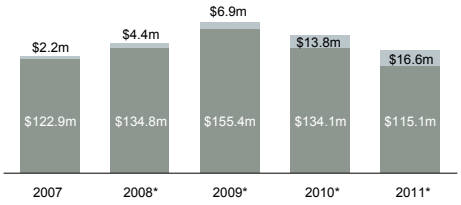
Treatment of kinetoplastid infections is hampered by outdated drugs, and a lack of vaccines and effective standard diagnostic tools. The two drugs currently used for treatment of Chagas' disease are toxic, lack specificity and require multiple dosing for several months, increasing the likelihood of non-compliance and drug resistance.[27] 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,[28] and there are a number of other promising drug candidates in preclinical and clinical stages.[29]

HAT 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, where there are no candidates in clinical trials.[4] There are some promising HAT drug candidates, with fexinidazole currently in preparations to enter a Phase II / III study and a number of other candidates in the preclinical stage.[30]

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 re-formulations of existing drugs in late stage clinical trials, novel compounds in earlier stages, and several candidates in preclinical stages.[4]

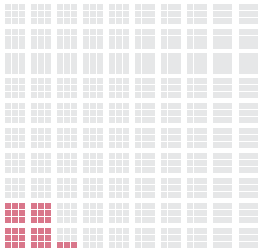
R&D is needed in every area, including:

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



$131.7 MILLION

TOTAL SPEND ON KINETOPLASTID R&D IN 2001



4.3%

OF GLOBAL R&D FUNDING

Kinetoplastids received $131.7m (*$141.8m*) in R&D funding in 2011. This was a moderate decrease from 2010, with YOY funders decreasing their investment by $18.9m (-14.1%) to $115.1m. A further $16.6m was reported by irregular survey participants. Reflecting the decrease in funding, kinetoplastids' share of global neglected disease R&D funding decreased slightly from 4.8% in 2010 to 4.3% in 2011.

Leishmaniasis remained the top funded disease within the kinetoplastid family ($58.1m, 35.2%), followed by sleeping sickness ($38.8m, 26.0%) and Chagas' disease ($17.4m, 18.7%). For the second year in a row, YOY funding for both leishmaniasis and sleeping sickness decreased and funding for Chagas' disease increased modestly (up $2.2m, 12.3%). The drop in YOY funding was quite substantial for leishmaniasis (down $19.6m, -34.3%) but relatively small for sleeping sickness (down $2.1m, -6.1%).

Moderate reductions in funding for preventive vaccines (down $8.2m, -61.5%), drug development (down $4.7m, -8.8%) and basic research (down $3.3m, -5.8%) were the primary drivers of the overall decrease in funding for kinetoplastids. Diagnostics also received less funding on a YOY basis (down $2.8m, -29.6%) and funding for therapeutic vaccines decreased by $0.2m (-20.9%), meaning that all product areas received less overall funding in 2011 (although we note that not all product types are relevant for each disease).

Table 9. Funding for kinetoplastid R&D 2011 (US$)*

Disease	Basic Research	Drugs	Vaccines (Preventive)	Vaccines (Therapeutic)	Vector control products	Diagnostics	Unspecified	Total	%
Leishmaniasis	24,567,459	13,750,224	5,007,569	824,696		1,397,815	765,467	**46,313,229**	35.2
Sleeping sickness	21,431,526	8,360,623	101,027		-	4,185,270	135,940	**34,214,387**	26.0
Chagas' disease	10,521,444	10,203,263	287,549	12,156	-	3,553,409	13,357	**24,591,180**	18.7
Multiple kinetoplastids	4,360,516	22,196,148	-	-	-	36,104	-	**26,592,768**	20.2
Total	60,880,946	54,510,258	5,396,146	836,852	-	9,172,599	914,764	131,711,564	100.0

* All figures are FY2011, 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 2011, despite a decrease of $8.8m (-15.6%). The Gates Foundation almost halved its kinetoplastid R&D funding (down $9.1m, -45.6%), due to uneven disbursement and completion of several large multi-year grants. Three organisations increased their funding in 2011: the Dutch Ministry of Foreign Affairs - Directorate General of Development Cooperation (DGIS) (up $2.6m, 199.9%); the Argentinean Ministry of Science, Technology and Productive Innovation (MSTPI up $1.4m, 210.6%); and the Swiss National Science Foundation (SNF) (up $1.3m, 264.9%), easing all three into the top 12 funders for the first time.

Table 10. Top 12 kinetoplastid R&D funders 2007-2011

Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
US NIH	46,641,123	33.0	28,206,281	48,561,566	52,803,542	56,203,616	47,430,612
Gates Foundation	28,154,803	19.9	45,114,108	28,973,211	36,026,595	19,855,236	10,804,864
Wellcome Trust	11,832,303	8.4	15,057,627	12,360,489	11,493,648	9,643,106	10,606,645
Aggregate industry	7,500,371	5.3	5,149,518	2,912,298	5,112,855	11,864,151	12,463,035
UK DFID	7,333,555	5.2	3,603,250	3,733,433	8,971,828	9,850,738	10,508,525
European Commission	6,798,402	4.8	2,888,667	4,628,687	10,145,797	9,061,409	7,267,449
MSF	3,805,412	2.7	7,187,885	7,275,268	4,563,905	-	-
Institut Pasteur	3,384,427	2.4	-	2,932,088	3,154,303	5,927,974	4,907,772
US DOD	3,023,253	2.1	4,727,000	4,059,615	4,548,062	950,743	830,847
UK MRC	2,784,032	2.0	2,868,065	3,464,747	2,405,299	2,799,630	2,382,418
Brazilian DECIT	2,402,495	1.7	4,906,145	3,758,220	1,818,723	1,089,363	440,023
French MAEE	1,910,471	1.4	2,286,040	2,407,563	3,033,450	1,099,929	725,372
Subtotal of top 12†			123,159,493	125,938,739	146,360,237	135,187,986	116,901,974
Disease Total			125,122,839	139,207,962	162,258,968	147,867,513	131,711,564

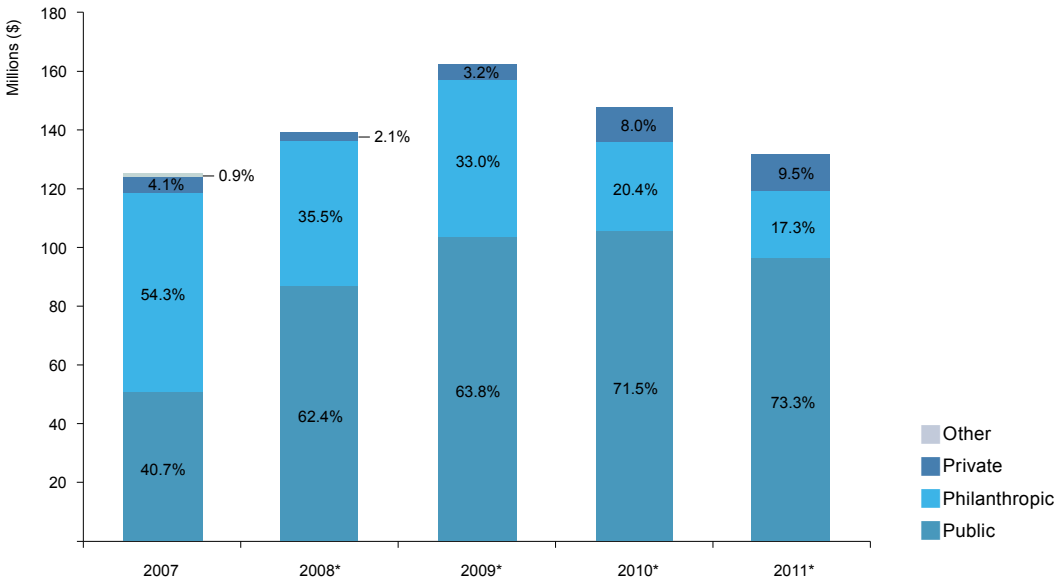
* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete
- No reported funding

In 2011, the public sector provided almost three-quarters ($96.5m, 73.3%) of kinetoplastid R&D funding, with the philanthropic sector providing 17.3% ($22.8m) and industry providing 9.5% ($12.5m). All sectors reduced their YOY funding, with the public sector down $9.5m (-10.1%), the philanthropic sector down $8.1m (-27.4%), and industry down $1.3m (-12.8%).

Five-year trends

As with diarrhoeal diseases, kinetoplastid R&D funding has declined since 2009, after steady increases in the first three years of the survey. As a result, funding was lower in 2011 than in 2007 ($115.1m compared to $122.9m). Declining philanthropic funding, even before the global financial crisis, has been the main driver of this decrease. Gates Foundation funding dropped from $45.1m in 2007 to $10.8m in 2011, which they attribute to the uneven grant disbursement and completion of large multi-year grants. As a result, the Gates Foundation's share of global kinetoplastid R&D funding dropped from 36.1% in 2007 to only 8.2% in 2011.

Figure 13. Kinetoplastid R&D funding by funder type 2007-2011



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

The public sector has cut its kinetoplastid funding since the global financial crisis, although steeper cuts by others mean its relative share of kinetoplastid funding has nevertheless increased since 2009. YOY public funding dropped by $4.9m (-5.0%) in 2010 and $9.5m (-10.1%) in 2011. There were moderate drops across funders such as the US DOD and the EC, in particular for leishmaniasis and sleeping sickness.

Although leishmaniasis and sleeping sickness have consistently been the top two funded kinetoplastid diseases, Chagas' disease is slowly closing the gap, buoyed by increases from the US NIH and industry for drug development, and by the EC for basic research. In 2010 and 2011, YOY funding for Chagas' disease increased moderately, while funding for both leishmaniasis and sleeping sickness decreased. As a result, Chagas' disease increased its share of total kinetoplastid funding from 8.1% in 2007 to 18.7% of total funding in 2011, while leishmaniasis saw a drop from 41.0% to 35.2%, and sleeping sickness from 33.1% to 26.0%, over the same time.

Among the top 12 funders of kinetoplastid R&D, the US NIH and industry have increased their funding and share of total funding over the past five years. The US NIH's share of funding increased from 22.5% in 2007 to 36.0% in 2011; while industry went from a mere 2.1% in 2008 to 9.5% in 2011. In contrast, the Gates Foundation has steadily decreased funding over the course of the survey, partially driven by cyclical funding.

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 commonest cause of pneumonia in the developing world.

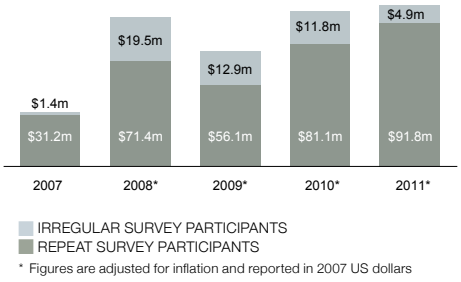
Bacterial meningitis is an infection of the fluid that surrounds the brain and spinal cord and is mostly caused by *S. pneumonia* and *Neisseria meningitidis*. Meningitis is transmitted from person to person through droplets of respiratory or throat secretions. Symptoms include severe headache, fever, 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.[31] 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.[32] However, vaccines are still needed for other meningitis serotypes.

Lower respiratory infections, mostly pneumonia, were responsible for 93.3 million DALYs and 3.9 million deaths in the developing world in 2004. Pneumonia ranked as the number one cause of morbidity and mortality of any neglected disease and was responsible for nearly one in five deaths in children under five years of age. Meningitis was responsible for 11.3 million DALYs and 340,000 deaths in 2004.

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 WHO-prequalified conjugate vaccines Synflorix (a 10-valent vaccine) and Prevnar (13-valent) were confirmed in early 2010 as the first vaccines in the Global Alliance for Vaccines and Immunization's (GAVI) pilot pneumococcal Advance Market Commitment (AMC) scheme. Rapid introduction of these heavily subsidised vaccines is underway but its reach is currently limited to 18 countries.[33]

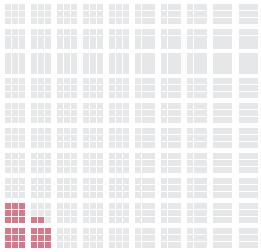
New products needed for pneumonia and meningitis are:

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



$96.6 MILLION

TOTAL SPEND ON BACTERIAL PNEUMONIA & MENINGITIS R&D IN 2011



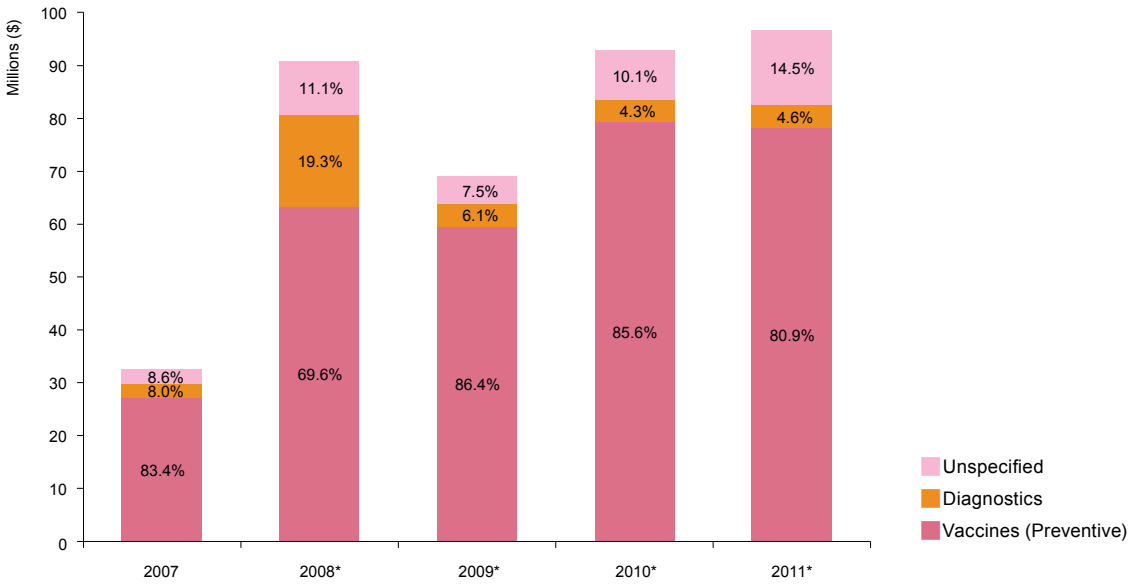
3.2%

OF GLOBAL R&D FUNDING

Bacterial pneumonia & meningitis received $96.6m (*$107.1m*) in R&D funding in 2011. This was a modest increase on 2010 funding, with YOY funders increasing their investment by $10.7m (13.1%) to $91.8m. The remaining $4.9m in funding was reported by irregular survey participants. Bacterial pneumonia & meningitis increased its share of global neglected disease R&D funding for the second year in a row, from 3.0% in 2010 to 3.2% in 2011.

As in previous years, vaccine development received far more funding ($78.2m, 80.9%) than diagnostics. Of this, 81.5% ($63.7m) was directed towards pneumococcal vaccines, and the remaining 18.5% ($14.5m) towards meningitis vaccines. Diagnostics received $4.4m in 2011, or 4.6% of total funding. YOY vaccine funding increased by $4.0m (5.7%) in 2011, and YOY diagnostics funding increased by $1.2m (39.7%).

Figure 14. Bacterial pneumonia & meningitis R&D funding by product type 2007-2011



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

Funding for bacterial pneumonia & meningitis R&D continued to be highly concentrated in 2011, with the top three funders (industry, the Gates Foundation and the US NIH) accounting for 86.8% ($83.9m) of total funding. Industry increased its investment by $5.9m (22.4%) in 2011, regaining its position as the top funder in this disease area after being edged out for the first time by the Gates Foundation in 2010. Other increases came from the US NIH (up $4.8m, 55.1%) and the US DOD (up $1.5m, 124.1%). In fact, nine of the top 12 funders increased their funding in 2011, the exceptions being the Gates Foundation (down $5.9m, -14.9%) and the UK MRC (down $0.4m, -33.7%). It is unclear whether the increase in Inserm's reported funding in 2011 is real or artefactual, due to their improved reporting practices in 2011.

Table 11. Top 12 bacterial pneumonia & meningitis R&D funders 2007-2011

Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
Aggregate industry	33,770,283	44.2	15,747,037	50,494,753	33,794,257	32,114,414	36,700,956
Gates Foundation	25,177,452	33.0	5,598,040	26,282,476	21,000,867	39,448,775	33,557,104
US NIH	6,860,167	9.0	4,194,589	4,030,496	3,685,083	8,776,440	13,614,227
UK MRC	1,513,698	2.0	1,776,977	1,985,766	2,034,450	1,065,294	706,005
US CDC	1,130,009	1.5	1,455,973	1,402,671	1,407,145	1,384,256	-
US DOD	1,089,291	1.4	1,441,000	-	-	1,235,965	2,769,491
GAVI	1,070,764	1.4			-	2,141,529	
Inserm	903,241	1.2	-	131,165	-	-	4,385,038
Australian NHMRC	836,105	1.1	315,006	504,622	1,407,279	930,557	1,023,060
Research Council of Norway	570,548	0.7		589,942	758,565	318,045	615,640
Fondation Mérieux	558,684	0.7				943,774	173,593
Dell Foundation	442,188	0.6	-	289,017	1,256,403	665,520	-
Subtotal of top 12†			32,317,719	89,494,134	67,857,349	89,995,655	96,356,548
Disease Total			32,517,311	90,844,284	68,988,629	92,866,038	96,632,683

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete
\- No reported funding

Industry was the top funding sector for bacterial pneumonia & meningitis R&D in 2011, contributing 38.0% ($36.7m) of total funding. YOY industry funding increased by $5.9m (22.4%) in 2011. The philanthropic sector reduced its funding (down $5.4m, -13.5%), but nevertheless remained the second-highest funding sector (providing $34.5m, 35.8%). The public sector provided just over a quarter of total funding ($25.4m, 26.3%), and was the main driver of increased bacterial pneumonia & meningitis R&D in 2011, with a significant funding increase of $10.1m (67.2%).

Five-year trends

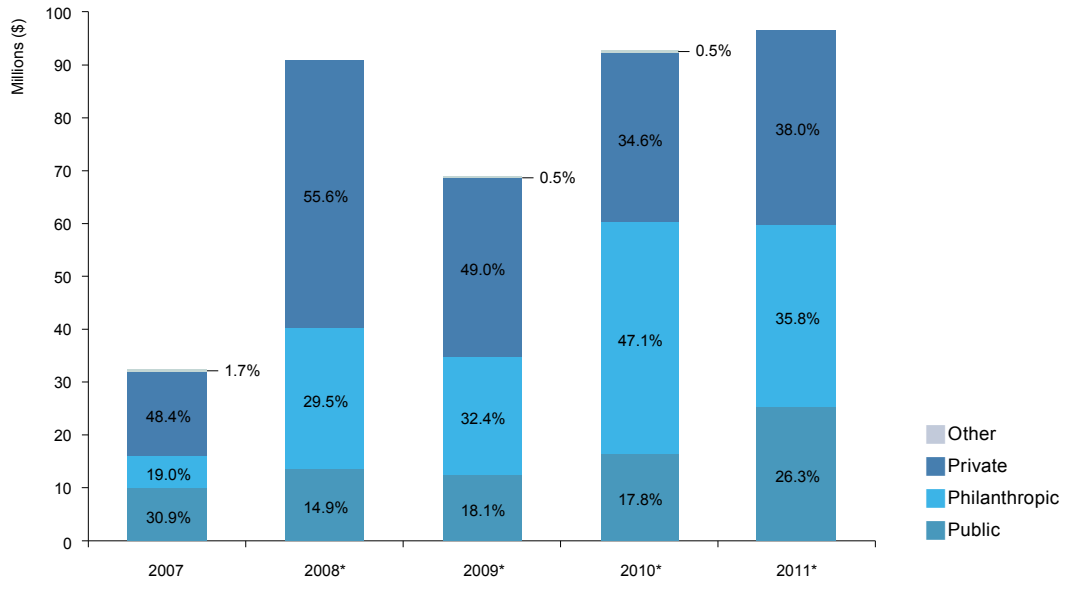
Funding for bacterial pneumonia & meningitis R&D trended strongly upward during the five years of the survey, backed by significant increases from the public and philanthropic sectors. As a result, YOY funding for bacterial pneumonia & meningitis R&D more than doubled from $31.2m in 2007 to $91.8m in 2011.

Increases in vaccine funding drove much of this growth, mainly due to increased pneumococcal vaccine investment. Vaccine development received on average 84.4% of total funding between 2007 and 2011, with more than three-quarters (78.8%) of this going to pneumococcal vaccine R&D. Diagnostics received a small share of funding (on average, 5.3% between 2007 and 2011). This increased modestly over the time of the survey, from $2.3m in 2007 to $4.2m in 2011, with the majority of funding (81.7% on average) directed towards pneumococcal diagnostics.

Large increases from the public and philanthropic sectors have driven overall increases in funding for bacterial pneumonia & meningitis. YOY public funding has steadily increased, from $9.6m in 2007 to $25.2m in 2011, boosted by moderate increases in funding for pneumococcal vaccines by the US NIH in 2010 and 2011. YOY philanthropic funding increased even more, from $6.2m in 2007 to $34.4m in 2011, driven almost entirely by increased funding from the Gates Foundation, mainly for pneumococcal vaccines and to a lesser extent, for meningitis vaccines.

Industry funding for bacterial pneumonia & meningitis R&D has remained fairly steady between 2008 and 2011, despite some cyclical funding patterns from individual companies. The vast majority of YOY industry funding (on average, 92.8%) was for pneumococcal vaccines, with a significant amount of this going to clinical development.

Figure 15. Bacterial pneumonia & meningitis R&D funding by funder type 2007-2011



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

Encouragingly, a number of top funders of bacterial pneumonia & meningitis R&D – including the Gates Foundation and the US NIH – have demonstrated a trend towards increased funding over the past five years. In particular, Gates Foundation funding has trended strongly upwards, with a resulting increase in their share of total funding (34.7% in 2011, compared to 17.2% in 2007).

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.

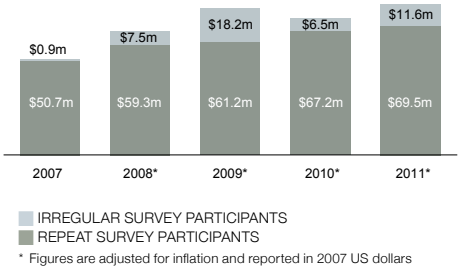
Helminth infections are the sixth highest cause of morbidity globally, with WHO figures suggesting they were responsible for 12 million DALYs in 2004 (around one-third that of malaria), although only 47,000 deaths. However, other estimates are much higher, suggesting helminth infections could be responsible for 49 million DALYs and up to 415,000 deaths per year.[34]

There is no vaccine against any of the above helminth infections; and 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.[35] 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,[4] and one vaccine candidate against human hookworm infection (NaGST-1) has entered Phase I clinical trials.[36]

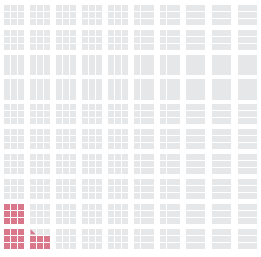
Helminth infections require a range of R&D including:

- 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



$81.1 MILLLION

TOTAL SPEND ON HELMINTH R&D IN 2011



2.7%

OF GLOBAL R&D FUNDING

In 2011, helminths received $81.1m (*$89.6m*) in R&D funding. This was a slight increase on 2010 funding levels, with YOY funders increasing their investment by $2.2m (3.3%) to $69.5m. Irregular survey participants provided the remaining $11.6m in funding. Reflecting the small increase in funding, helminths' share of total R&D funding increased from 2.4% in 2010 to 2.7% in 2011.

Four diseases accounted for nearly two-thirds (64.9%) of total helminth funding: schistosomiasis, lymphatic filariasis, hookworm and onchocerciasis. Data from YOY funders shows the largest decrease was in funding for schistosomiasis (down $6.8m, -24.5%), followed by lymphatic filariasis (down $2.2m, -18.0%). Funding for hookworm increased by $3.0m (47.3%) in 2011, while funding for onchocerciasis essentially remained steady (down $0.2m, -2.6%). Funding for all other helminths decreased on a YOY basis.

Table 12. Funding for helminth R&D 2011 (US$)*

Disease	Basic Research	Drugs	Vaccines (Preventive)	Vector control products	Diagnostics	Unspecified	Total	%
Schistosomiasis (bilharziasis)	12,742,715	1,652,686	3,803,531	154,865	1,257,677	1,881,287	**21,492,762**	26.5
Lymphatic filariasis (elephantiasis)	5,485,954	5,999,416		542,142	273,776	571,795	**12,873,083**	15.9
Hookworm (ancylostomiasis & nectoriasis)	2,238,867	-	7,230,358	-		-	**9,469,225**	11.7
Onchocerciasis (river blindness)	620,772	6,598,205	689,006	-	920,958	13,357	**8,842,299**	10.9
Roundworm (ascariasis)	1,451,573	293,352				-	**1,744,925**	2.2
Tapeworm (cysticercosis/taeniasis)	1,578,221	47,991		103,226		-	**1,729,439**	2.1
Strongyloidiasis & other intestinal roundworms	902,270	40,423	40,423		136,367	-	**1,119,484**	1.4
Whipworm (trichuriasis)	967,180	-				-	**967,180**	1.2
Multiple helminths	12,406,689	4,855,805	5,038,688	-	568,544	22,214	**22,891,941**	28.2
Total	38,394,241	19,487,879	16,802,008	800,233	3,157,322	2,488,654	81,130,337	100.0

* All figures are FY2011, adjusted for inflation and reported in 2007 US dollars
\- No reported funding
Category not included in G-FINDER

Seven of the top 12 funders in 2011 increased their funding from 2010, including increases from the Gates Foundation (up $4.0m, 27.9%) and the Wellcome Trust (up $3.0m, 51.3%). The US NIH remained the top funder of helminth R&D in 2011 despite a $5.8m (-9.7%) drop in funding. Besides the US NIH, the only other top funders to decrease funding in 2011 were the EC (down $1.4m, -17.1%) and the Australian NHMRC (down $1.2m, -50.9%). Improved reporting practices by Inserm mean it is unclear whether Inserm's 2011 increase in funding is real or artefactual.

Table 13. Top 12 helminth R&D funders 2007-2011

Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
US NIH	26,483,612	37.5	27,854,142	23,308,515	28,133,258	29,466,628	23,655,518
Gates Foundation	15,460,590	21.9	7,204,305	21,116,365	16,029,672	14,458,661	18,493,945
Aggregate industry	5,681,378	8.1	814,963	4,950,621	8,541,024	6,431,061	7,669,218
Wellcome Trust	5,313,218	7.5	3,162,843	3,959,257	4,967,904	5,760,936	8,715,149
European Commission	4,979,651	7.1	4,271,324	3,137,023	2,956,743	7,947,504	6,585,662
German DFG	2,014,948	2.9	-		6,831,168	563,140	665,482
UK MRC	1,652,096	2.3	1,096,017	1,396,827	1,093,338	1,158,367	3,515,932
Australian NHMRC	1,608,841	2.3	1,053,789	1,666,179	1,873,883	2,313,541	1,136,813
Inserm	934,906	1.3	274,096	524,659	2,002,692	1,673	1,871,409
Danish DANIDA	739,327	1.0	1,506,193	-	2,110,709	79,735	-
APOC	671,649	1.0	695,610	674,374	676,525	665,520	646,215
Indian ICMR	621,509	0.9		354,617	398,070	793,873	939,478
Subtotal of top 12†			50,966,641	62,565,617	75,772,065	70,851,551	76,154,448
Disease Total			51,591,838	66,837,827	79,414,264	73,685,406	81,130,337

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete
- No reported funding

The public sector provided over half of total funding ($45.5m, 56.1%) in 2011, with the philanthropic sector providing just over a third ($28.0m, 34.5%) and industry the remaining 9.5% ($7.7m). Over two-thirds of the industry contribution ($5.4m, 70.0%) came from SMEs. Both the public sector and industry reduced their YOY contributions (down $2.8m, -6.5%; and $1.9m, -60.8% respectively), whereas YOY philanthropic funders increased funding by $7.0m (34.5%), mainly due to increases from the Gates Foundation and the Wellcome Trust.

Five-year trends

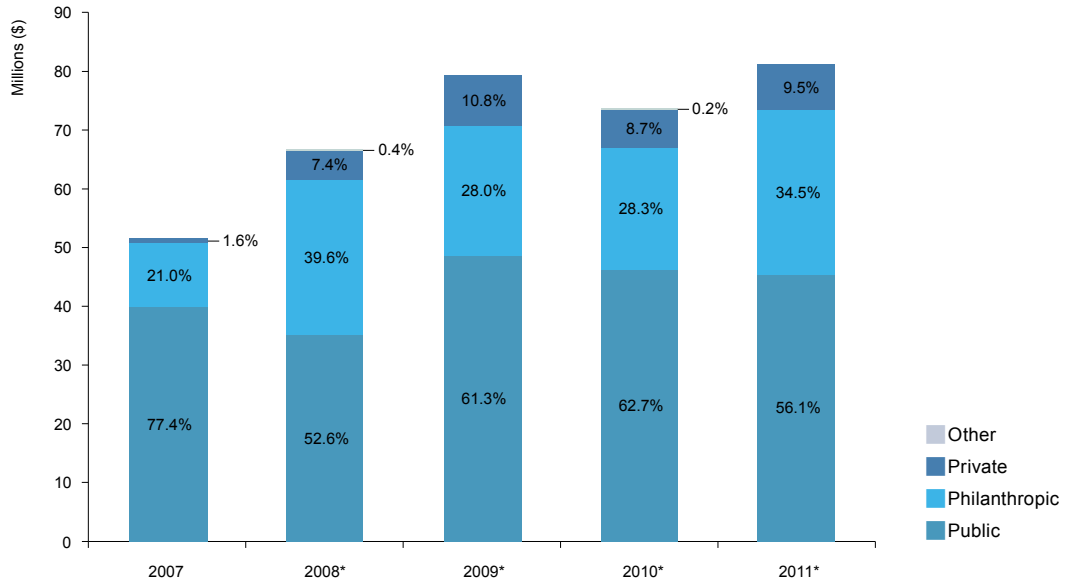
Funding for helminth R&D has seen a solid upward trend over the past five years, increasing steadily from $50.7m in 2007 to $69.5m in 2011 (an increase of 37.0% over the five years). Increased investment in drug development, particularly for lymphatic filariasis and onchocerciasis, has been an important driver of overall increases.

Although schistosomiaisis has consistently remained the top-funded helminth disease, receiving over a third (36.1%) of total funding, funding increases have mainly gone to lymphatic filariasis and onchocerciasis. Funding for lymphatic filariasis was $10.0m in 2011, compared to just $5.4m in 2007. Similarly, funding for onchocerciasis was $7.7m in 2011, up from $1.8m in 2007.

Specifically, drug development for lymphatic filariasis and onchocerciasis have seen the most growth over the past five years, up from $1.3m (2.5% of overall YOY funding) in 2007 to $16.3m (23.4%) in 2011. For lymphatic filariasis, most of this growth was due to increased funding from the Gates Foundation, whereas for onchocerciasis, the main increases have come from both the Gates Foundation and industry.

The US NIH and the Gates Foundation have consistently remained the top two funders of helminth R&D, with the Gates Foundation moving closer to the funding levels of the US NIH over time: in 2007, the US NIH provided 54.0% of total funding and the Gates Foundation provided 14.0%, whereas in 2011, the US NIH provided 29.2% of total funding and the Gates Foundation provided 22.8%. Other funders have also begun to play an increasingly important role, with moderate increases over the five years from the next three top-funding groups (industry, the Wellcome Trust and the EC). This has meant that the combined share of total funding held by the US NIH and the Gates Foundation has decreased – whereas these two organisations collectively accounted for 68.0% of funding in 2007, they only accounted for 52.0% in 2011.

Figure 16. Helminth R&D funding by funder type 2007-2011



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

On average, the public sector has provided nearly two-thirds of helminth R&D funding (64.6%), with philanthropic funders providing about a third (33.6%). The private sector has traditionally been a minor player in this disease area, with MNCs (who provide the overwhelming bulk of industry funding) contributing an average of 1.5% of YOY funding.

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.[37]

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.

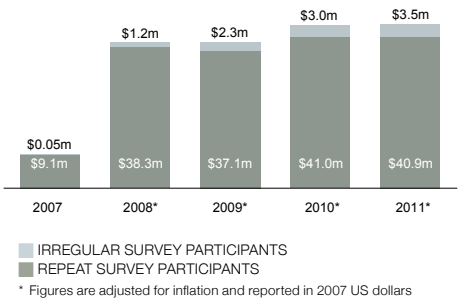
The global burden of typhoid disease has been estimated by the WHO to be more than 22 million cases annually, resulting in 200,000–600,000 deaths per year.[38]

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).[39] 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. Similarly, no typhoid or NTS vaccine is readily available for HIV-infected individuals or children under two years of age.[40] 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 also working on conjugate *S. typhi* vaccines, including a candidate (Vi-CRM 197) currently in phase II trials.[4] Recent research on humoral resistance to NTS has also delivered important clues for development of an NTS vaccine.[39]

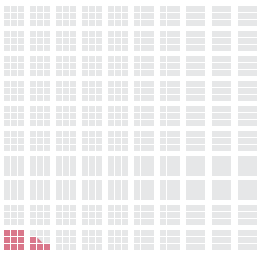
R&D needed for salmonella infections includes:

- Basic research
- Drugs
- Diagnostics
- Vaccines



$44.4 MILLION

TOTAL SPEND ON SALMONELLA R&D IN 2011



1.5%

OF GLOBAL R&D FUNDING

Salmonella infections received $44.4m (*$47.7m*) in R&D funding in 2011. Funding essentially remained steady, with YOY funders decreasing their investment by only $0.05m (-0.1%) to $40.9m in 2011. The remaining $3.5m in funding was provided by irregular survey participants. Salmonella infections' share of total funding increased marginally, from 1.4% in 2010 to 1.5% in 2011.

Investment was fairly evenly shared between NTS ($17.7m, 40.0%), and typhoid and paratyphoid fever ($16.7m, 37.6%). In 2011, YOY funding for the latter increased by $1.5m (11.3%), whereas funding for NTS dropped by $0.8m (-4.6%).

In 2011, over 90% of salmonella R&D funding went to two R&D areas: basic research ($27.7m, 62.4%) and vaccine development ($13.1m, 29.6%). Almost half of basic research funding was directed to NTS ($13.6m, 49.0%), with only 19.0% ($5.3m) directed to typhoid and paratyphoid fever. In contrast, funding for vaccines was heavily weighted towards typhoid and paratyphoid fever ($8.7m, 66.5%), with just 26.2% ($3.4m) for NTS.

Table 14. Funding for salmonella R&D 2011 (US$)*

Disease	Basic Research	Drugs	Vaccines (Preventive)	Diagnostics	Unspecified	Total	%
Non-typhoidal *Salmonella enterica* (NTS)	13,573,899	1,767	3,446,738	727,071	-	**17,749,476**	40.0
Typhoid and Paratyphoid fever (*S. typhi, S. paratyphi A*)	5,256,947	41,752	8,739,163	1,423,999	1,244,791	**16,706,652**	37.6
Multiple salmonella infections	8,875,427	88,741	960,868	33,468	-	**9,958,503**	22.4
Total	27,706,273	132,259	13,146,769	2,184,538	1,244,791	**44,414,630**	100.0

* All figures are FY2011, adjusted for inflation and reported in 2007 US dollars
\- No reported funding

Although remaining the top salmonella R&D funder in 2011, the US NIH provided less than half of total funding ($22.0m, 49.5%) for the first time in the survey's history. This was due to a drop in US NIH funding of $5.0m (-18.5%) combined with increases from the Wellcome Trust (up $2.1m, 72.0%) and industry (up $1.6m, 54.8%).

Table 15. Top 12 salmonella R&D funders 2008-2011#

Funder	Average annual funding (US$)^ 2008-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
US NIH	23,706,394	67.2	8,086,868	20,361,114	25,459,290	27,002,825	22,002,346
Aggregate industry	5,757,762	16.3	-	12,313,110	3,441,047	2,855,467	4,421,424
Wellcome Trust	2,777,869	7.9	-	1,033,056	1,983,546	2,975,984	5,118,890
Gates Foundation	2,174,087	6.2	-	-	1,631,542	3,263,566	3,801,240
Institut Pasteur	1,743,422	4.9	-	1,453,175	1,580,962	1,534,888	2,404,662
UK MRC	1,143,816	3.2	976,150	1,229,604	868,676	746,135	1,730,847
German DFG	1,024,755	2.9	-		546,688	1,297,297	1,230,280
European Commission	735,298	2.1	-	356,682	1,206,626	854,821	523,061
UBS Optimus Foundation	733,938	2.1				848,417	619,459
Swedish Research Council	471,239	1.3		483,607	393,722	492,477	515,152
Australian NHMRC	379,054	1.1	-	456,208	495,603	435,430	128,975
Chilean FONDECYT	356,565	1.0				65,309	647,821
Subtotal of top 12†			9,117,212	39,412,504	39,361,396	43,093,502	43,618,095
Disease Total			9,117,212	39,486,243	39,378,570	43,982,149	44,414,630

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete
- No reported funding
The G-FINDER survey substantially increased in scope for salmonella infections in 2008. Trends will therefore only be analysed between 2008 and 2011

In 2011, the public sector provided just over two-thirds of total funding ($30.5m, 68.6%), followed by philanthropic funders ($9.5m, 21.5%) and industry ($4.4m, 10.0%). YOY philanthropic and industry funders made modest increases to their contributions, by $2.7m (43.0%) and $1.6m (60.6%) respectively, but YOY public funding was down by $4.4m (-13.7%).

Five-year trends

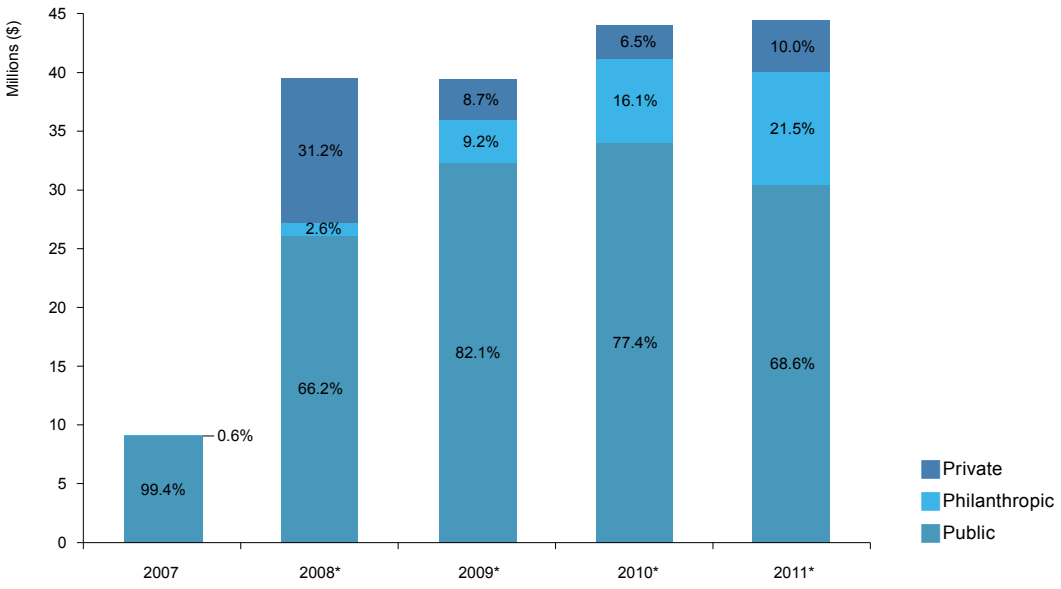
In 2008, the G-FINDER survey substantially increased its scope for salmonella infections, expanding the existing category (for typhoid and paratyphoid fever) to also include non-typhoidal Salmonella enterica (NTS) and multiple salmonella infections. Trends will therefore only be analysed between 2008 and 2011.

Funding for salmonella infections R&D showed a slight upward trend between 2008 and 2011, increasing from $38.3m in 2008 to $40.9m in 2011, and fairly evenly allocated between NTS (40.4% of funding on average) and typhoid and paratyphoid fever (37.7% on average).

Basic research has consistently received the bulk of funding, accounting for 63.8% of total funding (on average) between 2008 and 2011. Combined with vaccine development, which received 30.3% ($11.9m), these accounted for almost all salmonella funding (94.1%).

The philanthropic sector has increased funding moderately in this disease area from $1.0m in 2008 to $8.9m in 2011, with modest but consistent increases from the Wellcome Trust and the Gates Foundation. The Wellcome Trust has increased its contribution from $1.0m (2.6% of total funding) in 2008 to $5.1m (11.5%) in 2011, and the Gates Foundation from $1.6m (4.1%) in 2009 (not having funded salmonella in previous years) to $3.8m (8.6%) in 2011. Increases from the Gates Foundation have tended to focus on vaccines (for both NTS and typhoid and paratyphoid fever), whereas increases from the Wellcome Trust have been spread across basic research and vaccines (again, for both disease subcategories). While YOY philanthropic funding has increased moderately, public funding for salmonella R&D has tended to remain steady at around $25m to $30m per year. Changes in industry funding are largely artefactual due to irregular reporting by SMEs and therefore cannot be sensibly commented on.

Figure 17. Salmonella R&D funding by funder type 2007-2011



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

Salmonella R&D funding remains highly concentrated, with the US NIH alone providing an average 67.2% of total funding between 2008 and 2011. This represents the second-highest share of funding by a single organisation, second only to the US NIH's share of HIV/AIDS R&D funding.

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.[41]

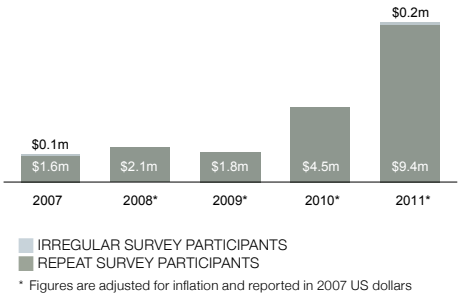
Trachoma is endemic in 57 countries with an estimated 7.6 million people severely visually impaired or blind from the disease, and many more millions in need of treatment.[42] Trachoma was responsible for 1.3 million DALYs in 2004, making it the 10th highest cause of morbidity from neglected diseases. 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).[43]

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 provides free azithromycin in 19 endemic countries,[44] although 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.[45] 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.[46]

New products needed for trachoma include:

- Vaccines
- Diagnostics



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

$9.6 MILLION

TOTAL SPEND ON TRACHOMA R&D IN 2011

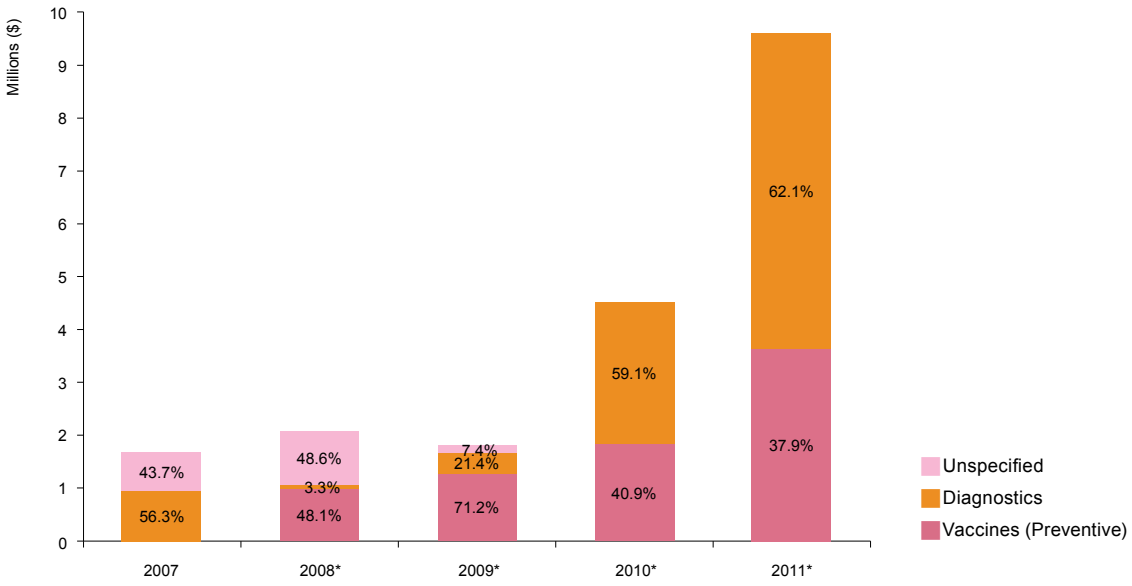
0.3%

OF GLOBAL R&D FUNDING

Global funding for trachoma R&D was $9.6m (*$10.4m*) in 2011. This was a modest increase on 2010 funding levels, with YOY funding increasing by $4.9m (109.6%) to $9.4m, with the remaining $0.2m provided by irregular survey participants. Reflecting this increase, the global share of R&D funding for trachoma increased from 0.1% to 0.3%.

Diagnostics continued to account for the majority ($6.0m, 62.0%) of trachoma R&D funding, with vaccines receiving the remaining $3.6m (37.9%) in funding. YOY increases were seen in both product areas, with funding for diagnostics increasing by $5.8m (118.2%) and funding for vaccines by $1.8m (109.6%). The increase for diagnostics was driven by increased funding from both industry and the US NIH, whereas the increase in funding for vaccines was solely due to the US NIH.

Figure 18. Trachoma R&D funding by product type 2007-2011



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

Aside from industry, only three organisations reported trachoma R&D funding in 2011. Following the 2010 trend, the US NIH remained the top funder (providing $5.5m, 57.3%), closely followed by industry (providing $3.9m, 40.8%).

Table 16. Trachoma R&D funders 2007-2011

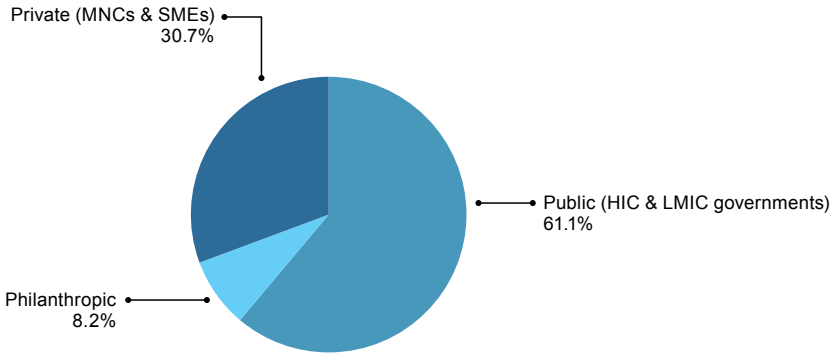
Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
US NIH	2,158,460	54.9	-	1,037,612	1,665,913	2,591,176	5,497,598
Aggregate industry	1,200,254	30.5	104,000	96,339	-	1,882,470	3,918,460
Wellcome Trust	292,222	7.4	1,461,110	-	-	-	-
SSI	140,735	3.6	-	703,674	-	-	-
Swedish Research Council	42,707	1.1		38,276	132,550	-	-
Brazilian DECIT	34,065	0.9	-	170,326	-	-	-
Institut Pasteur	18,946	0.5	-	27,432	-	34,072	33,226
TIPharma	29,015	0.7	-	-	-	-	145,074
Disease Total			1,679,711	2,073,659	1,798,463	4,507,718	9,594,358

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete
- No reported funding

As in 2010, funding was split between public high-income country (HIC) governments (providing $5.5m, 57.6%) and SMEs ($3.9m, 40.8%). The philanthropic sector provided $0.1m (1.5%) in funding in 2011 – the first time in four years that they have funded trachoma R&D. The modest increase in 2011 funding came from both the public and industry sectors, with YOY public funders increasing investments by $2.9m (up 110.7%) and industry by $2.0m (up 108.2%).

We have not conducted a 5-year analysis for trachoma, since the very low levels of annual funding and paucity of funders (sometimes only two organisations) mean that 'trends' are often just changes in single grants by single organisations. With these provisos in mind, we note that the averaged contribution of the public, private and philanthropic sectors over the five years of the survey is as below.

Figure 19. Average trachoma R&D funding by funder type 2007-2011



LEPROSY

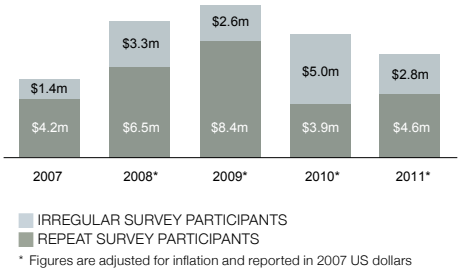
Leprosy is caused by the family of bacteria responsible for tuberculosis, and is also transmitted via droplets from the nose and mouth of untreated patients, but it is far less infectious than TB. Leprosy mainly affects the skin and nerves and, if left untreated, causes nerve damage that leads to muscle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

Leprosy was responsible for 194,000 DALYs and 5,000 deaths in 2004. 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, ranking leprosy as the 11th highest cause of mortality and 12th highest cause of morbidity from neglected diseases.

The move to treating 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 but, although highly effective, requires a 6–12 month course of multi-drug therapy. Further research is needed to provide products for the management of nerve function, and to improve and simplify chemotherapy, develop and improve diagnostics.[48,49]

R&D needed for leprosy includes:

- Basic research
- Drugs
- Diagnostics



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

$7.4 MILLLION

TOTAL SPEND ON LEPROSY R&D IN 2011

0.2%

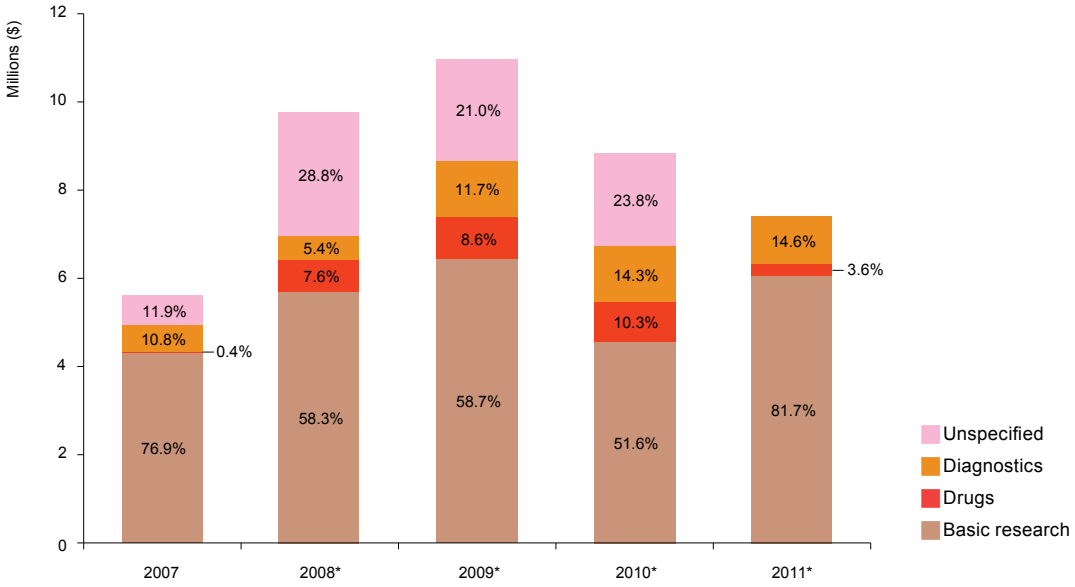
OF GLOBAL R&D FUNDING

In 2011, leprosy received $7.4m (*$8.5m*). YOY funding increased slightly by $0.7m (17.8%) to $4.6m, with the remaining $2.8m provided by irregular survey participants. Overall, leprosy's share of total R&D funding decreased marginally, from 0.3% in 2010 to 0.2% in 2011.

As noted in previous years, the small size of funding for leprosy means that apparent changes in funding should be analysed with caution, as changes in single grants and programmes can have a significant impact.

Basic research received the vast majority of funding in 2011 ($6.1m, 81.7%), followed by diagnostics ($1.1m, 14.6%) and drug development ($0.3m, 3.6%). Analysis of YOY funding shows a slight increase in funding for basic research (up $0.5m, 18.0%) and diagnostics (up $0.2m, 20.2%). YOY funding for drug development dropped by $2,695 (-12.7%), with most of the overall changes coming from irregular survey participants.

Figure 20. Leprosy R&D funding by product type 2007-2011



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

Funding for leprosy R&D remained highly concentrated, with the top two funders – the US NIH and the Indian Council of Medical Research (ICMR) – accounting for three-quarters ($5.7m, 76.4%) of total funding. The next five top funders in 2011, all members of the International Federation of Anti-Leprosy Associations (ILEP), collectively accounted for almost a fifth ($1.4m, 19.3%) of total funding. There were modest decreases in funding from the Indian ICMR (down $0.5m, -20.2%), Netherlands Leprosy Relief (NLR, down $0.3m, -46.0%) and The Institut Pasteur (down $0.1m, -67.4%) which may be due to incomplete reporting by The Institut Pasteur in 2011. Eight of the top 12 funders increased their funding for leprosy in 2011 (albeit by relatively small amounts), with the largest increases coming from the US NIH (up $0.6m, 19.2%) and American Leprosy Missions (ALM, up $0.07m, 17.4%).

Table 17. Top 12 leprosy R&D funders 2007-2011

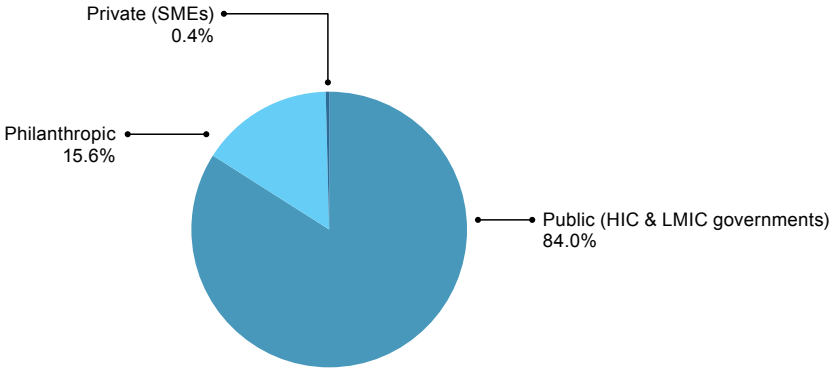
Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
US NIH	3,466,467	40.7	1,993,588	3,138,305	5,081,931	3,247,163	3,871,346
Indian ICMR	2,142,224	25.1		2,704,472	1,821,928	2,248,060	1,794,434
Brazilian DECIT	1,134,327	13.3	1,455,070	2,287,212	1,864,193	-	65,159
ALM	543,526	6.4	658,000	642,100	519,957	412,911	484,661
NLR	485,940	5.7				630,904	340,976
TLMI	298,698	3.5				263,024	334,373
Fondation Raoul Follereau	166,866	2.0				156,429	177,303
Institut Pasteur	152,451	1.8	129,154	221,321	183,487	172,128	56,164
Brazilian FINEP	144,192	1.7			-	432,575	-
French ANR	141,233	1.7		-	564,932	-	-
Hospital and Homes of St Giles	96,956	1.1	-	108,131	214,229	162,421	-
DAHW	86,451	1.0				79,488	93,414
Subtotal of top 12†			5,619,475	9,638,473	10,764,915	8,628,378	7,390,591
Disease Total			5,619,475	9,769,250	10,984,756	8,840,532	7,413,791

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete
\- No reported funding

The public sector accounted for more than three-quarters of funding ($5.9m, 79.1%) in 2011, with LMIC governments contributing nearly half of this (48.5%), and thus a quarter of total leprosy funding. The philanthropic sector provided just under a fifth of funding ($1.5m, 19.6%) and industry (SMEs) provided just $0.09m (1.2%). YOY public funders increased their investment by $0.6m (up 17.9%) overall, with the majority of this increase ($0.5m) coming from HIC public funders. YOY philanthropic funding increased only marginally (up $0.07m, 17.4%).

We have not conducted a 5-year analysis for leprosy, since the very low levels of annual funding mean that 'trends' are often just changes in single grants by single organisations. With these provisos in mind, we note that the averaged contribution of the public, private and philanthropic sectors over the five years of the survey is as below.

Figure 21. Average leprosy R&D funding by funder type 2007-2011



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 risk for Buruli ulcer and render it more aggressive.[50]

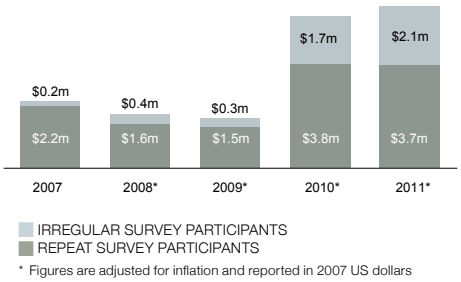
Buruli ulcer occurs in more than 33 countries, predominantly in Western Africa especially in Benin, Côte d'Ivoire and Ghana. No DALY figures are available, although the WHO estimates that Buruli ulcer affects more than 7,000 people each year,[50] with more than 5,000 new cases reported each year from 2006 to 2009.[42]

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.[50]

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.[51]

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

$5.8 MILLION

TOTAL SPEND ON BURULI ULCER R&D IN 2011

0.2%

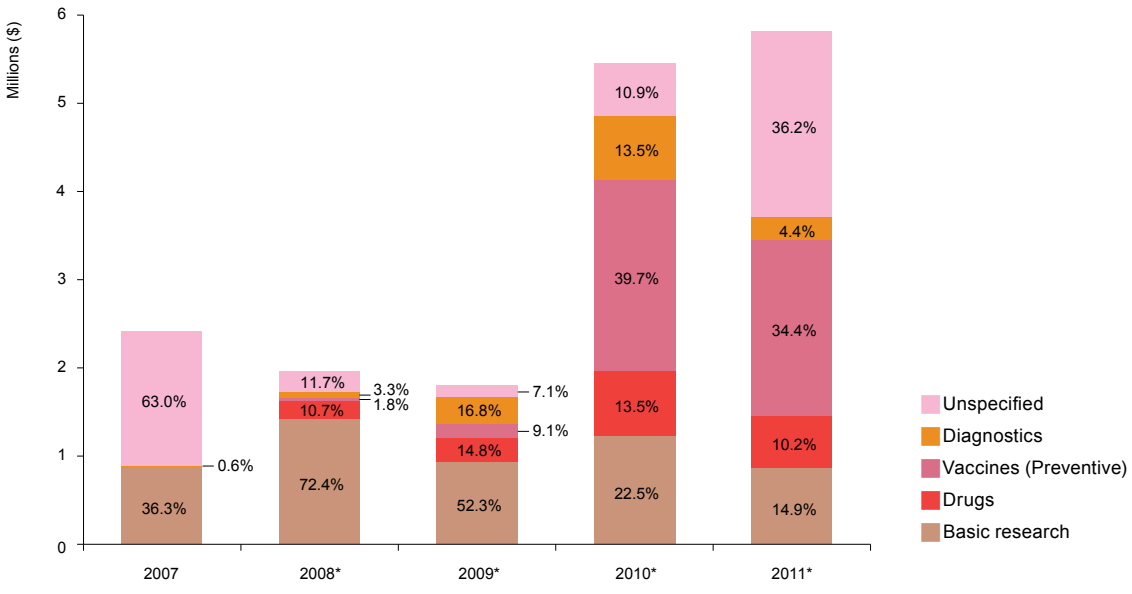
OF GLOBAL R&D FUNDING

Buruli ulcer received $5.8m (*$6.5m*) in global R&D funding 2011. YOY funding was essentially steady at $3.7m, with a very minor decrease of $0.05m (-1.3%) in 2011. Irregular survey participants provided the remaining $2.1m. Overall, Buruli ulcer's share of total R&D funding remained steady at 0.2%.

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

As in 2010, vaccine development received over a third of total funding ($2.0m, 34.4%) (mainly driven by EC investment into its BURULIVAC programme). This was followed by basic research ($0.9m, 14.9%), drug development ($0.6m, 10.2%) and diagnostics ($0.3m, 4.4%). Data from YOY funders showed that funding for vaccines and basic research essentially remained steady, with a drop in funding for diagnostics (down $0.2m, -40.1%).

Figure 22. Buruli ulcer R&D funding by product type 2007-2011



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

Funding for Buruli ulcer R&D remained highly concentrated, with the top three funders – UBS Optimus Foundation, the EC and the US NIH – providing 85.2% of total funding in 2011. The Wellcome Trust slightly increased funding (from $15,045 in 2010 to $340,450 in 2011), to become the fourth-highest funder. Small reductions in funding came from the EC (down $0.1m, -6.5%) and the Medicor Foundation (down $0.2m, -67.2%), while the apparent drop in The Institut Pasteur funding (down $0.3m, -52.4%) may reflect their incomplete reporting in 2011.

Table 18. Buruli ulcer R&D funders 2007-2011

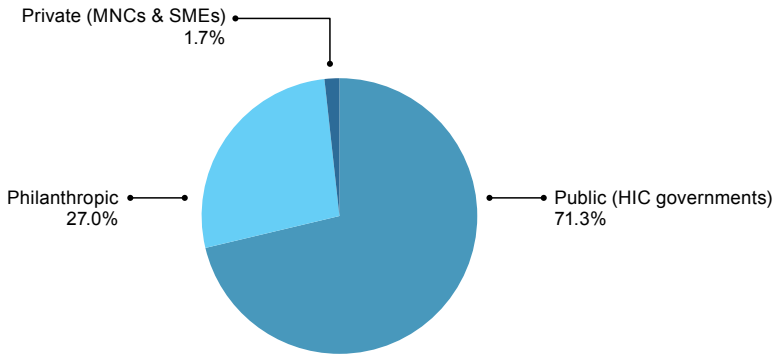
Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
UBS Optimus Foundation	1,517,297	43.5				1,102,810	1,931,784
European Commission	1,087,641	31.2	726,354	625,656	155,842	2,031,487	1,898,866
US NIH	799,552	22.9	656,291	403,924	762,804	1,052,519	1,122,222
Institut Pasteur	398,798	11.4	645,769	285,729	351,674	481,588	229,229
Australian NHMRC	120,778	3.5	220,584	74,844	123,095	118,484	66,879
Medicor Foundation	107,795	3.1		-	-	324,783	106,396
Wellcome Trust	80,581	2.3	-	40,862	6,546	15,045	340,450
Belgian FWO	70,971	2.0		84,402	85,031	61,771	52,679
Carolito Foundation	66,885	1.9		-	-	267,540	-
Fondazione Cariplo	65,010	1.9		13,116	181,913	-	
Aggregate industry	60,177	1.7	15,200	285,685	-	-	-
Volkswagen-Stiftung	16,017	0.5		-	-	-	64,070
Disease Total			2,412,950	1,954,465	1,793,718	5,456,026	5,812,575

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete
- No reported funding

As in previous years, funding for Buruli ulcer R&D was provided exclusively by HIC governments ($3.4m, 58.0%) and the philanthropic sector ($2.4m, 42.0%). Public sector YOY funding decreased by $0.4m (-10.0%) while philanthropic sector funding increased by $0.3m, mainly due to investment by the UBS Optimus Foundation.

We have not conducted a 5-year analysis for Buruli ulcer, since the very low levels of annual funding mean that 'trends' are often just changes in single grants by single organisations. With these provisos in mind, we note that the averaged contribution of the public, private and philanthropic sectors over the five years of the survey is as below.

Figure 23. Average Buruli ulcer R&D funding by funder type 2007-2011



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.

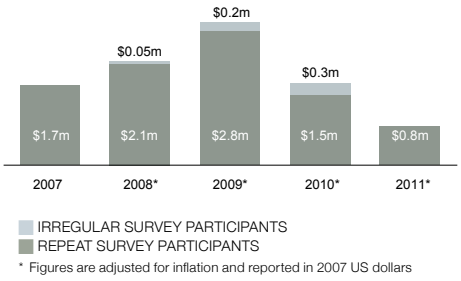
Rheumatic fever was responsible for 5.1 million DALYs and 280,000 deaths in 2004. It was the seventh highest cause of mortality and eighth highest cause of morbidity from neglected diseases.

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.[52] 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 developing countries) decided not to pursue the development of a *Streptococcus A* vaccine, as a vaccine was not sufficiently close to Phase III trials and understanding of the immunopathogenesis of *Streptococcus A* diseases (particularly rheumatic fever) was deemed too limited.[53]

R&D needed for rheumatic fever is:

- Vaccines



$0.8 MILLION

TOTAL SPEND ON RHEUMATIC FEVER R&D IN 2011

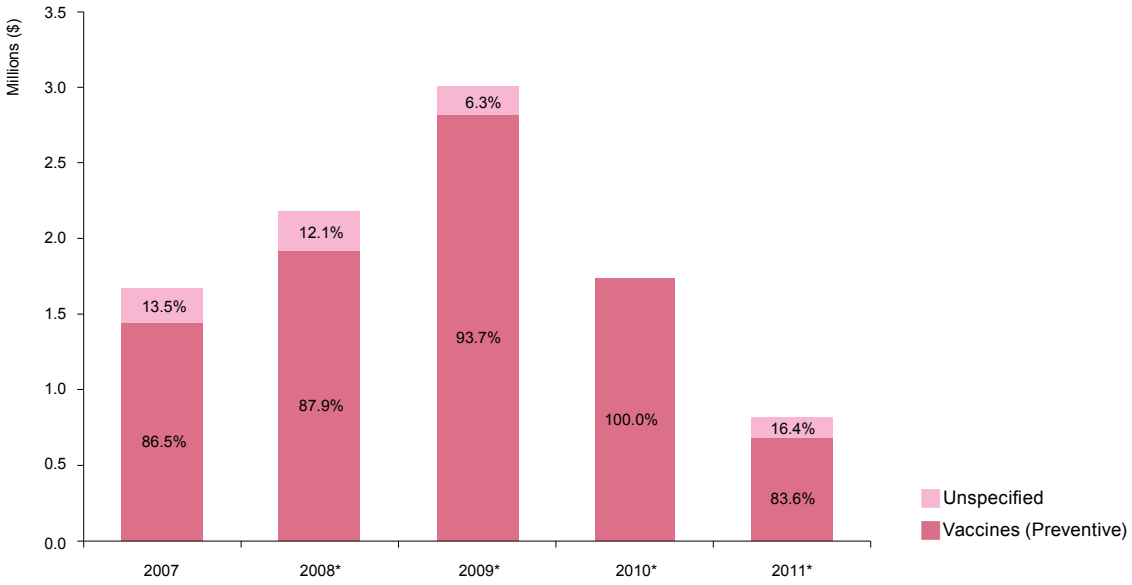
0.1%

OF GLOBAL R&D FUNDING

Rheumatic fever received $0.8m (*$1.0m*) in global R&D funding in 2011. YOY funding was almost halved for the second year in a row, decreasing by $0.7m (-45.0%). All funding reported in 2011 came from YOY funders, with none reported by irregular survey participants. Rheumatic fever remained the lowest-funded disease within the survey for a second year, with its overall share of total R&D funding remaining steady at 0.1%.

As with other low-funded diseases and as noted in previous years, apparent changes in funding should be analysed with caution. We note that the only rheumatic fever investments tracked by G-FINDER are for vaccines.

Figure 24. Rheumatic fever R&D funding by product type 2007-2011^



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

Only three funders reported rheumatic fever funding in 2011, compared to four organisations in 2010. The Swedish Research Council re-entered the rheumatic fever research field this year, providing $0.1m (16.4%). The remaining two funders (the US NIH and the Australian NHMRC) both halved their funding in 2011, with reductions of $0.4m (-52.1%) and $0.4m (-56.1%) respectively.

Table 19. Rheumatic fever R&D funders 2007-2011

Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
US NIH	768,200	40.8	1,284,919	629,315	745,605	798,886	382,275
Aggregate industry	482,617	25.6	-	963,391	1,449,696	-	-
Australian NHMRC	456,924	24.3	385,170	338,310	573,410	686,631	301,098
Australian National Heart Foundation	63,539	3.4	-	54,212	51,431	148,513	
Swedish Research Council	62,901	3.3		58,887	58,911	-	133,806
Fondazione Cariplo	43,562	2.3		-	130,685	-	
Australian DIISRTE/ARC	26,701	1.4		106,805	-	-	-
Australia - India Strategic Research Fund	25,712	1.4	-	-	-	102,846	
Disease Total			1,670,089	2,179,609	3,009,737	1,736,877	817,179

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete
- No reported funding

The public sector, and specifically HIC governments, provided all rheumatic fever R&D funding in 2011. YOY public funders reduced their funding by $0.7m (-45.0%). Industry reported no funding for rheumatic fever R&D for the second year in a row, nor did the philanthropic sector.

We have not conducted a 5-year analysis for rheumatic fever, since the very low levels of annual funding and paucity of funders (sometimes only two organisations) mean that 'trends' are often just changes in single grants by single organisations. With these provisos in mind, we note that the averaged contribution of the public, private and philanthropic sectors over the five years of the survey is as below.

Figure 25. Average rheumatic fever R&D funding by funder type 2007-2011

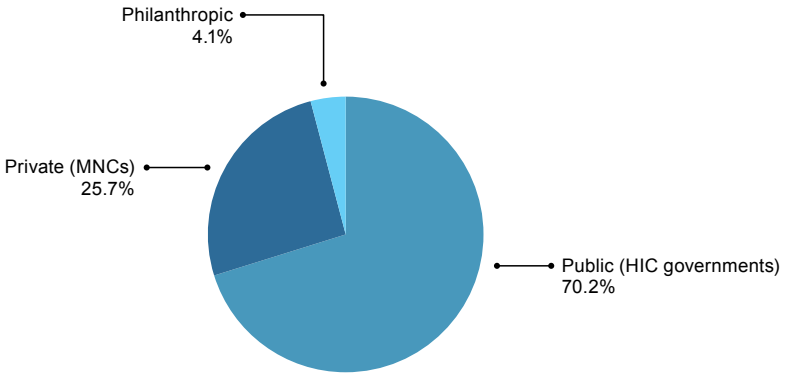


Table 20. Summary table of overall neglected disease and product funding in 2011 ($m)*

Disease	Basic Research	Drugs	Vaccines (Preventive)	Vaccines (Therapeutic)	Microbicides	Vector control products	Diagnostics	Unspecified	Total
HIV/AIDS	191.44	26.16	590.81		165.14		29.29	25.89	**1,028.72**
Malaria	158.55	204.65	135.91			28.60	14.45	16.66	**558.82**
P. falciparum	74.63	109.59	69.57			5.42	4.05	0.32	**263.59**
P. vivax	9.70	41.41	5.92			0.29	0.47	0.66	**58.46**
Other and/or unspecified malaria strains	74.21	53.65	60.41			22.88	9.94	15.68	**236.77**
Tuberculosis	140.79	223.69	99.09	0.07			47.87	14.28	**525.78**
Dengue	37.53	26.61	157.38			3.02	4.11	0.33	**228.97**
Diarrhoeal diseases	33.66	11.29	84.25				11.87	11.18	**152.24**
Rotavirus			51.09					0.56	**51.65**
Cholera	18.29	1.56	4.04				0.58	1.49	**25.97**
Shigella	8.25	2.01	11.31				0.88	1.42	**23.87**
Cryptosporidium	2.05	2.68	0.15				2.47	-	**7.36**
Enterotoxigenic *E.coli* (ETEC)			4.08				2.27	0.34	**6.69**
Giardia							0.51	-	**0.51**
Enteroaggregative *E.coli* (EAggEC)			-				0.19	-	**0.19**
Multiple diarrhoeal diseases	5.06	5.03	13.58				4.96	7.36	**36.00**
Kinetoplastids	60.88	54.51	5.40	0.84		-	9.17	0.91	**131.71**
Leishmaniasis	24.57	13.75	5.01	0.82			1.40	0.77	**46.31**
Sleeping sickness	21.43	8.36	0.10			-	4.19	0.14	**34.21**
Chagas' disease	10.52	10.20	0.29	0.01		-	3.55	0.01	**24.59**
Multiple kinetoplastids	4.36	22.20	-	-		-	0.04		**26.59**
Bacterial pneumonia & meningitis			78.19				4.42	14.02	**96.63**
Streptococcus pneumoniae			63.72				3.13	0.10	**66.96**
Neisseria meningitidis			14.47				0.38	0.03	**14.87**
Both bacteria							0.91	13.89	**14.81**
Helminths (worms & flukes)	38.39	19.49	16.80			0.80	3.16	2.49	**81.13**
Schistosomiasis (bilharziasis)	12.74	1.65	3.80			0.15	1.26	1.88	**21.49**
Lymphatic filariasis (elephantiasis)	5.49	6.00				0.54	0.27	0.57	**12.87**
Onchocerciasis (river blindness)	0.62	6.60	0.69			-	0.92	0.01	**8.84**
Hookworm (ancylostomiasis & necatoriasis)	2.24	-	7.23					-	**9.47**
Roundworm (ascariasis)	1.45	0.29						-	**1.74**
Tapeworm (cysticercosis/taeniasis)	1.58	0.05				0.10		-	**1.73**
Whipworm (trichuriasis)	0.97	-						-	**0.97**
Strongyloidiasis & other intestinal roundworms	0.90	0.04	0.04				0.14	-	**1.12**
Multiple helminths	12.41	4.86	5.04				0.57	0.02	**22.89**
Salmonella infections	27.71	0.13	13.15				2.18	1.24	**44.41**
Non-typhoidal *Salmonella enterica* (NTS)	13.57	0.00	3.45				0.73	-	**17.75**
Typhoid and paratyphoid fever (*S. typhi, S. paratyphi A*)	5.26	0.04	8.74				1.42	1.24	**16.71**
Multiple salmonella infections	8.88	0.09	0.96				0.03	-	**9.96**

Disease	Basic Research	Drugs	Vaccines (Preventive)	Vaccines (Therapeutic)	Microbicides	Vector control products	Diagnostics	Unspecified	Total
Trachoma			3.63				5.96	-	9.59
Leprosy	6.06	0.27					1.08	-	7.41
Buruli ulcer	0.86	0.59	2.00				0.26	2.10	5.81
Rheumatic fever			0.68					0.13	0.82
Core funding of a multi-disease R&D organisation									91.31
Unspecified disease									64.70
Platform technologies	General diagnostic platforms			Adjuvants and immunomodulators			Delivery technologies and devices		
	10.29			5.14			1.72		17.16
Total R&D funding									3,045.23

* All figures are FY 2011, adjusted for inflation and reported in 2007 US dollars
- No reported funding
Category not included in G-FINDER

FINDINGS - NEGLECTED DISEASE FUNDERS

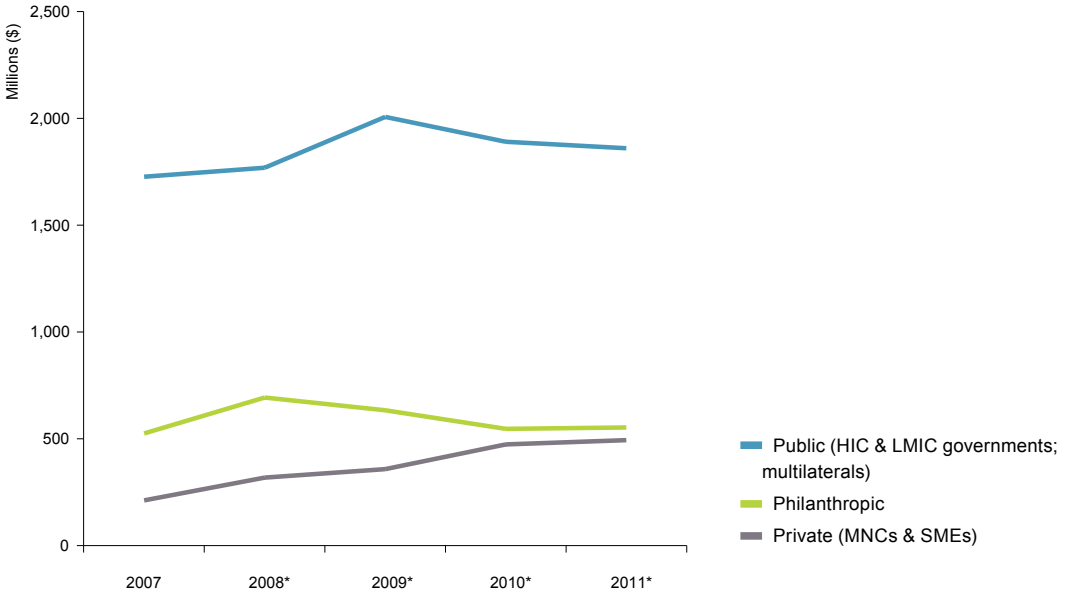
Funder overview

The public sector continued to play a key role in neglected disease R&D, again providing almost two-thirds ($1.9bn, 64.0%) of global funding, compared to 65% ($2.0bn) in 2010. Public sector funding predominantly came from HIC governments ($1.9bn, 95.9%). The philanthropic sector contributions ($570.6m, 18.7%) continued to be closely matched by investments from industry ($525.1m, 17.2%). The remaining funding originated from unspecified funders ($0.4m, 0.01%).

Global funding for neglected disease R&D was essentially steady in 2011, with YOY R&D funding down just $3.6m (-0.1%). But this aggregate figure masks shifts in the contribution of each sector, with public funding falling again, after a drop in 2010, offset by increases in philanthropic and industry funding. Public funding from HIC governments decreased by $33.3m (-1.8%) which drove down overall public funding (down $30.4m, -1.6%) despite modest increased investments from multilaterals (up $1.8m, 26.8%) and LMIC governments (up $1.1m, 3.7%). Philanthropic funding was up $6.5m (1.2%) in 2011, reversing the decline in funding seen in recent years. As in 2010, the pharmaceutical industry accounted for the biggest sectoral increase (up $20.0m, 4.2%), although this was far smaller than the 2010 increase in industry funding of $107.3m (up 28.2%). MNCs were responsible for most of the 2011 increase (up $25.6m, 5.8%) with SME investments at a similar level to 2010 (down $5.6m, -18.2%).

In terms of 5-year trends, global investment in neglected disease R&D reached $2.9bn in 2011, up from $2.5bn in 2007, with YOY funders investing $443.7m more in 2011 than they did in 2007. Both public and philanthropic funding have dropped away since the global financial crisis, although both were still at higher levels in 2011 than they were in 2007. YOY public funding peaked at $2.0bn in 2009 and has been in slow decline since, but was still $133.3m higher in 2011 than in 2007. Philanthropic funding declined even more, with 2011 funding now close to 2007 levels: $551.4m in 2011 compared to $523.3m in 2007. However, industry funding has increased dramatically over the survey period, most notably due to a strongly increased MNC contribution in neglected disease R&D, up from $273.3m in 2008 to $466.9m in 2011.

Figure 26. Total funding by funder type 2007-2011



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

Public funders

While government funders continued to be the mainstays of neglected disease R&D funding, the global financial crisis once again had a negative impact on public sector funding, although cuts were less dramatic than in 2010. Eleven of the top 20 government funders cut their neglected disease R&D funding in 2011, including half of the top 12 funders (these 12 collectively account for 93.8% of all public funding). The majority of the funding cuts came from HIC governments (down $33.3m, -1.8%), while multilaterals (up $1.8m, 26.8%) and LMIC governments (up $1.1m, 3.7%) reported small overall increases in funding despite cuts from some.

As in all the four previous G-FINDER surveys, the top 3 public funders were the US, the UK and the EC. The US maintained its position as the pre-eminent funder of neglected disease R&D, accounting for just under 70% of all public funding ($1.4bn, 69.5%), and over $1bn more than the next largest public funder. The US NIH remained the principle instrument of US public funding, investing $1.2bn in neglected disease R&D.

Although it remained the top global funder, US public funding dropped again in 2011 (down $30.6m, -2.2%) with the US NIH accounting for the bulk of the decrease (down $27.6m, -2.3%). There were also funding cuts from USAID (down $4.6m, -5.3%) and US Centers for Disease Control (CDC, down $3.9m, -23.3%). After notable increases in 2009 and 2010, UK public funding decreased significantly in 2011 (down $29.2m, -18.0%), driven by a $21.5m drop in funding from UK DFID due to uneven disbursement of grants across the funding cycle. There were also small decreases from a number of other European governments including Norway (down $2.5m, -18.7%), Spain (down $1.5m, -14.4%) and Switzerland (down $1.3m, -24.8%).

In contrast to 2010 – when thirteen of the top 20 governments cut their neglected disease R&D funding – several public funders increased funding in 2011. Increases were reported by the EC (up $12.7m, 13.7%), Australia (up $6.7m, 27.1%), Netherlands (up $6.1m, 35.5%) and Japan (up $2.3m, 423.6%). The apparent increase in funding from France (up $19.6m, 48.7%) may be artefactual, stemming from better data reporting from Inserm in 2011 (up $17.2m, 85.4%).

It was a similar story for the innovative developing countries (IDCs), with some governments increasing funding as others made cuts. India increased YOY funding (up $3.0m, 21.4%) while Brazil (down $0.07m, -0.8%) and South Africa (down $1.8m, -29.3%) both decreased YOY funding. India and Brazil were both in the top 12 public funders globally, with Brazil regaining its place despite cuts from its YOY funders, thanks to a $0.4m increase in funding from irregular survey participants.

Table 21. Top 12 public funders 2007-2011

Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)	2009 (US$)	2010 (US$)	2011 (US$)
United States of America	1,342,764,296	69.2	1,252,598,360	1,258,318,321	1,461,035,845	1,386,550,051	1,355,318,903
United Kingdom	129,515,349	6.7	104,684,734	103,328,720	142,591,385	163,812,491	133,159,414
European Commission	113,462,229	5.8	121,366,882	129,899,906	118,311,296	92,529,756	105,203,303
France	38,719,237	2.0	15,667,008	29,296,116	48,161,454	40,534,200	59,937,405
India	30,506,459	1.6		32,518,735	24,587,971	31,099,602	33,819,529
Netherlands	26,413,183	1.4	34,088,694	26,976,797	28,741,454	18,067,252	24,191,720
Australia	24,470,780	1.3	18,166,780	25,132,872	22,767,236	24,976,220	31,310,791
Germany	23,897,163	1.2	12,055,796	3,728,140	34,120,231	37,755,148	31,826,498
Sweden	23,698,050	1.2	21,566,527	25,600,321	33,096,084	18,854,648	19,372,670
Brazil	22,583,032	1.2	22,120,129	36,797,688	31,784,738	10,932,289	11,280,315
Spain	16,484,824	0.8	10,723,060	26,701,408	19,679,113	13,800,191	11,520,349
Canada	15,565,862	0.8	19,134,610	23,098,342	16,857,846	9,461,476	9,277,035
Subtotal top 12 public funders†			1,666,183,078	1,734,272,596	1,982,152,491	1,853,745,452	1,828,869,444
Total public funding			1,775,079,830	1,872,824,080	2,111,645,711	1,990,081,760	1,949,070,434

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12
Did not participate in the survey this year

PUBLIC FUNDING AND INTERNATIONAL AID

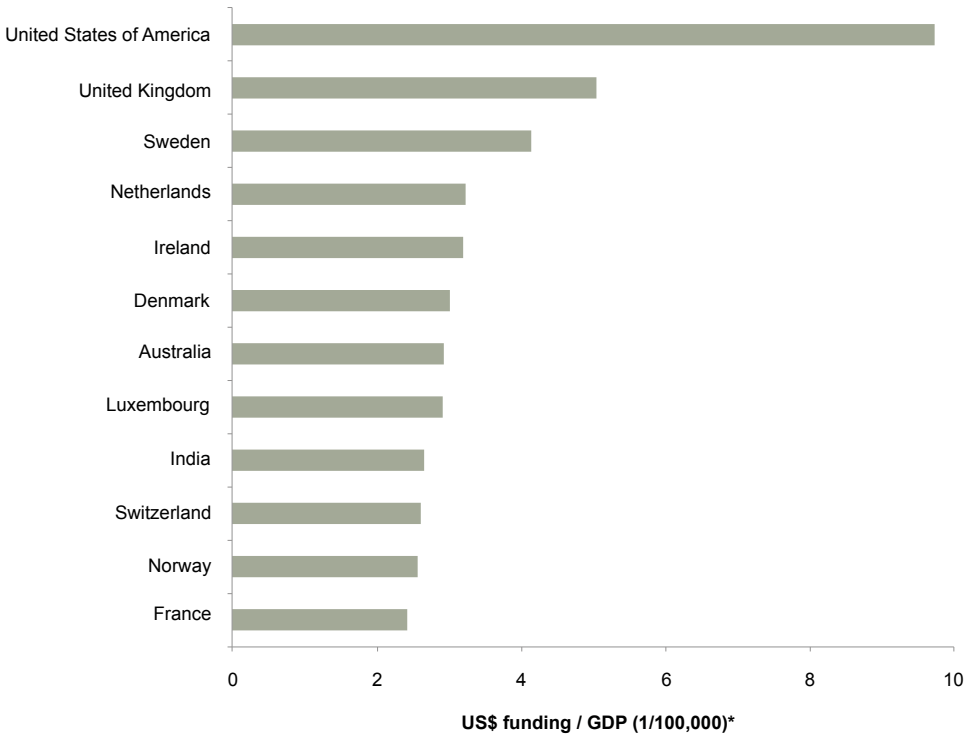
The global financial crisis has had a severe effect on neglected disease R&D budgets as the introduction of austerity measures has scaled back funding in many of the richer nations. This was evident in 2010 when all international aid agencies except the UK's DFID cut their funding for neglected disease R&D. In 2011, the picture was slightly more mixed, with aid agencies in the Netherlands (DGIS), Denmark (Danish Ministry of Foreign Affairs/Danish International Development Agency, DANIDA), Belgium (Belgian Development Cooperation, DGDC) and Canada (Canadian International Development Agency, CIDA) driving public sector funding increases in these countries. However, these were offset by cuts from aid agencies in the UK (down $21.5m, -22.2%; mostly due to cyclical grant patterns), Spain (down $2.8m, -39.4%), Norway (down $2.3m, -25.6%) and Ireland (down $0.3m, -5.0%), who each accounted for more than 60% of the decrease in their government's support for neglected disease R&D in 2011.

PUBLIC FUNDING BY GDP

Absolute funding can be a misleading measure of public R&D, as it can underplay the relative contributions of smaller countries and LMICs. For this reason, country investments are also analysed in relation to the gross domestic product (GDP) to provide a fairer assessment of the contributions made by countries of varying sizes and wealth.

When neglected disease R&D funding is analysed by GDP, a slightly different picture emerges. Four countries that are not in the top 12 public funders in terms of absolute funding do appear in the top 12 public funders when ranked by contribution relative to GDP: Ireland, Denmark, Luxembourg and Norway. In contrast, three countries in the top 12 funders (by amount) drop out of the list of the top funders by GDP: Germany, Spain and Brazil. However, seven of the top nine public funders are in the top 12 public funders regardless of the method used to rank them: USA, UK, Sweden, Netherlands, Australia, India and France.

Figure 27. Public funding by GDP 2011



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

HIGH-INCOME COUNTRIES (HICs)

High-income countries and multilaterals (down $31.5m, -1.7%) decreased their public investments in neglected disease R&D once again in 2011, although the decline in funding was considerably smaller than in 2010, when YOY funding decreased by $109.8m (-5.6%). Funding was spread across the neglected diseases in much the same proportions as in 2010. Three diseases accounted for nearly three-quarters (73.5%) of public funding: HIV/AIDS ($855.1m, 45.6%), malaria ($266.4m, 14.2%) and TB ($257.2m, 13.7%). No other disease received more than $100m in annual funding and three diseases – leprosy, Buruli ulcer and rheumatic fever – received less than $5m each.

It was nevertheless notable that the top three diseases all saw YOY cuts from HIC public funders in 2011: HIV/AIDS (down $28.9m, -3.3%), TB (down $24.7m, -9.1%) and malaria (down $20.0m, -7.2%). There were additional cuts in funding for kinetoplastids (down $8.5m, -9.3%), salmonella (down $4.3m, -13.5%) and helminths (down $2.8m, -6.3%). However, high-income governments increased their investments for bacterial pneumonia and meningitis (up $10.4m, 70.5%) and diarrhoeal diseases (up $7.0m, 9.5%), largely due an increase from the US NIH and a reported increase from Inserm due to more comprehensive data reporting in 2011.

Table 22. Public funding (high-income countries and multilaterals) by disease 2007-2011

Disease or R&D area	2007 (US$)	2008 (US$)*	2009 (US$)*	2010(US$)*	2011 (US$)*	2007%	2008%	2009%	2010%	2011%
HIV/AIDS	934,216,900	919,537,895	959,365,147	891,198,304	855,076,246	54.0	51.8	47.1	46.3	45.6
Malaria	216,669,290	232,502,900	263,175,158	287,723,341	266,448,126	12.5	13.1	12.9	14.9	14.2
Tuberculosis	220,574,931	209,438,529	310,078,935	286,072,312	257,212,458	12.7	11.8	15.2	14.9	13.7
Kinetoplastids	45,914,987	79,417,771	95,004,648	95,976,744	87,147,882	2.7	4.5	4.7	5.0	4.6
Diarrhoeal diseases	43,811,832	60,425,405	91,444,544	75,611,767	82,681,877	2.5	3.4	4.5	3.9	4.4
Dengue	58,170,246	49,432,879	75,074,454	61,609,653	63,066,166	3.4	2.8	3.7	3.2	3.4
Helminths (worms & flukes)	37,290,440	32,592,635	47,354,561	45,286,626	43,813,507	2.2	1.8	2.3	2.4	2.3
Salmonella infections	9,063,018	26,066,338	32,305,261	33,304,890	29,421,836	0.5	1.5	1.6	1.7	1.6
Bacterial pneumonia & meningitis	10,045,739	9,607,259	12,096,326	16,193,251	25,279,361	0.6	0.5	0.6	0.8	1.3
Trachoma	29,198	1,806,994	1,798,463	2,625,248	5,530,824	0.0	0.1	0.1	0.1	0.3
Leprosy	3,476,655	3,568,644	6,179,200	3,454,795	3,951,169	0.2	0.2	0.3	0.2	0.2
Buruli ulcer	2,248,998	1,474,556	1,478,445	3,745,849	3,369,874	0.1	0.1	0.1	0.2	0.2
Rheumatic fever	1,670,089	1,133,316	1,377,925	1,588,364	817,179	0.1	0.1	0.1	0.1	0.0
Platform technologies	3,589,301	5,451,059	6,818,132	10,018,424	10,603,046	0.2	0.3	0.3	0.5	0.6
General diagnostic platforms	1,045,152	1,906,221	1,805,033	5,074,675	8,343,779	0.1	0.1	0.1	0.3	0.4
Adjuvants and immunomodulators	23,260	731,956	2,622,387	3,781,680	1,816,789	0.0	0.0	0.1	0.2	0.1
Delivery technologies and devices	2,520,889	2,812,882	2,390,713	1,162,069	442,478	0.1	0.2	0.1	0.1	0.0
Core funding of a multi-disease R&D organisation	96,754,956	87,332,082	66,903,506	69,778,296	85,632,559	5.6	4.9	3.3	3.6	4.6
Unspecified disease	47,663,432	56,598,960	68,093,441	41,062,149	56,991,876	2.8	3.2	3.3	2.1	3.0
Total public funding (HICs/multilaterals)	1,731,190,015	1,776,387,220	2,038,548,147	1,925,250,012	1,877,043,985	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 just under 4% ($72.0m) of all public funding for neglected disease R&D funding in 2011. The majority ($51.9m, 72.0%) came from the three IDCs included in the survey – Brazil, India and South Africa. Other countries surveyed included Argentina, Chile, Colombia, Ghana, Malaysia, Mexico, Nigeria, Thailand and Uganda.

LMIC neglected disease R&D funding was concentrated on HIV/AIDS, tuberculosis, diarrhoeal diseases and malaria, which collectively received just over 70% of public funding. Other diseases, namely trachoma, Buruli ulcer and rheumatic fever, received no funding at all from LMIC governments and there was only limited funding for bacterial pneumonia and meningitis.

YOY LMIC funders increased funding by $1.1m (up 3.7%) compared to 2010, with increased funding from India (up $3.0m, 21.4%) offset by cuts from South Africa (down $1.8m, -29.3%) and Brazil (down $0.07m, -0.8%).

Three diseases saw modest increases in funding, predominantly from Brazil and India: diarrhoeal diseases (up $4.5m, 235.8%), TB (up $3.7m, 63.5%) and malaria (up $2.4m, 84.8%). Leprosy received $0.1m from YOY funders, after receiving no funding at all from these funders in 2010. All other areas saw funding cuts, including HIV/AIDS (down $3.9m, -39.5%), dengue (down $2.2m, -79.0%), kinetoplastids (down $1.0m, -34.2%), bacterial pneumonia and meningitis (down $0.2m, -70.4%), salmonella (down $0.1m, -40.8%), helminths (down $0.1m, -51.9%) and R&D into platform technologies. With the exception of HIV/AIDS, these increases and decreases largely reflected funding patterns in Brazil and India.

Table 23. Public funding by LMICs by disease 2010-2011

Disease or R&D area	2010(US$)*	2011 (US$)*	2010%	2011%
HIV/AIDS	16,566,425	15,419,581	25.6	21.4
Tuberculosis	9,046,580	14,001,886	14.0	19.4
Diarrhoeal diseases	6,012,338	11,884,296	9.3	16.5
Malaria	8,005,557	10,297,467	12.3	14.3
Kinetoplastids	9,791,798	9,348,992	15.1	13.0
Dengue	6,788,216	4,409,622	10.5	6.1
Leprosy	2,841,055	1,916,379	4.4	2.7
Helminths (worms & flukes)	919,723	1,665,150	1.4	2.3
Salmonella infections	733,825	1,031,781	1.1	1.4
Bacterial pneumonia & meningitis	346,435	102,542	0.5	0.1
Trachoma	-	-	0.0	0.0
Platform technologies	2,743,252	395,904	4.2	0.5
General diagnostic platforms	734,540	365,746	1.1	0.5
Delivery technologies and devices	1,480,053	30,158	2.3	0.0
Adjuvants and immunomodulators	528,660	-	0.8	0.0
Core funding of a multi-disease R&D organisation	1,036,545	295,218	1.6	0.4
Unspecified disease	-	1,257,630	0.0	1.7
Total public funding (LMICs)	64,831,747	72,026,449	100.0	100.0

* Figures are adjusted for inflation and reported in 2007 US dollars
\- No reported funding in category

Five-year public funding trends

The five years of the G-FINDER survey have coincided with a turbulent period for public funders, due to the global financial crisis. Yet despite cuts made by the richer nations in recent years, most of the top public funders were still funding at higher levels in 2011 than in 2007. The US was by far the largest funder for all five years, consistently contributing around 70% of all public funding. The US reported funding of $1.35bn in 2011 compared to $1.25bn in 2007, even though it has cut funding in the last two years. A similar picture emerges for the UK ($133.2m in 2011 compared to $103.2m in 2007), France ($59.9m in 2011 compared to $14.9m in 2007) and Australia ($31.3m compared to $15.5m in 2007). However, for some public funders, large cuts made in the wake of the global financial crisis means that 2011 funding was lower than in 2007. EC funding was $16.2m lower in 2011 than in 2007, at $105.2m. Similarly, funding from Sweden fell to $19.4m in 2011 after reaching $32.8m in 2009.

IDCs have also had a mixed track record with India – over the four years it has participated in the survey – increasing YOY funding from $12.9m in 2008 to $16.9m in 2011 and South Africa increasing YOY funding from $1.8m in 2007 to $4.4m in 2011, while Brazil has halved its YOY funding from $19.3m in 2007 to $9.1m in 2011. As a result, India usurped Brazil as the leading IDC funder of neglected disease R&D in 2011.

Funding from aid agencies has been particularly disrupted by the global financial crisis, with many countries prioritising domestic funding. Over the five years since 2007, there has been a decrease in neglected disease R&D funding from YOY aid agency funders from $268.9m in 2007 to $224.0m in 2011, with all YOY aid agency funders decreasing funding, except UK DFID (up from $47.6m in 2007 to $75.7m in 2011) and USAID (up from $80.6m in 2007 to $81.4m in 2011). In some countries, R&D investments from international aid budgets are just a fraction of what they were in 2007, with funding cuts from Irish Aid (down from $24.3m in 2007 to $6.2m in 2011), the Dutch DGIS (down from $34.0m in 2007 to $23.3m in 2011) and Swedish SIDA (down from $21.5m in 2007 to $13.1m in 2011); and smaller cuts from Norwegian NORAD, Danish DANIDA, Belgian DGDC and Canadian CIDA.

Philanthropic funders

After large funding cuts in 2009 (down $59.7m, -8.6%) and 2010 (down $87.0m, -13.8%), YOY philanthropic funding increased slightly in 2011 (up $6.5m, 1.2%). This was mostly due to a $14.3m increase in funding from the Wellcome Trust, which masked decreases from the Gates Foundation (down $7.9m, -1.7%) and the UBS Optimus Foundation (down $2.0m, -27.3%).

Together, the Gates Foundation and the Wellcome Trust represented 95.1% of all philanthropic funding in 2011, although 2011 saw a further rebalancing due to steady growth in Wellcome Trust funding since 2007 and a consistent decline in Gates Foundation funding since 2008, which they attribute to grant completion for TB drugs and diagnostics and kinetoplastids, and cyclical disbursement of other grants.

Table 24. Top philanthropic funders 2007-2011

Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
Gates Foundation	506,068,577	83.3	452,102,715	616,991,512	557,518,315	455,832,350	447,897,993
Wellcome Trust	72,245,100	11.9	59,985,371	60,864,206	65,121,278	80,459,662	94,794,984
UBS Optimus Foundation	6,353,335	1.0				7,357,535	5,349,135
MSF	5,784,554	1.0	7,187,885	7,275,268	4,563,905	4,725,479	5,170,234
GAVI	5,407,565	0.9	10,083,609	14,812,687	-	2,141,529	-
Funds raised from the general public	899,371	0.1	2,064,283	1,214,399	440,079	310,513	467,580
All other philanthropic organisations	14,081,717	2.3	6,308,954	14,259,336	15,599,224	17,275,933	16,965,141
Total philanthropic funding			538,279,744	716,528,175	644,348,488	568,103,001	570,645,068

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
\- No reported funding in category
Did not participate in the survey: Any contributions listed for this year are based on data reported by funding recipients so may be incomplete

HIV/AIDS, malaria and TB collectively received 73.4% of philanthropic funding in 2011, the biggest share since 2007, mainly due to a large increase in malaria funding (up $54.8m, 44.8%).

Several diseases saw funding decreases in 2011, with YOY philanthropic funders reducing their investments in TB (down $16.3m, -14.1%), diarrhoeal diseases (down $14.1m, -31.0%), kinetoplastids (down $8.1m, -27.4%), bacterial pneumonia and meningitis (down $5.4m, -13.5%), HIV/AIDS (down $2.3m, -1.7%) – despite the fact that funding from irregular survey participants increased the overall philanthropic funding for HIV/AIDS in 2011 – and dengue (down $1.7m, -18.9%).

By contrast, helminths and salmonella infections saw modest YOY funding increases in 2011 (up $7.0m, 34.5% and up $2.7m, 43.0% respectively), in part due to a $2.7m grant from the Gates Foundation to the Drugs for Neglected Disease initiative (DNDi, its first grant to this product development partnership (PDP) to conduct helminth R&D) and a $1.5m grant from the Wellcome Trust to the University of Maryland for salmonella R&D.

Table 25. Philanthropic funding by disease 2007-2011

Disease or R&D area	2007 (US$)	2008 (US$)*	2009 (US$)*	2010(US$)*	2011 (US$)*	2007%	2008%	2009%	2010%	2011%
Malaria	155,550,721	203,158,929	212,540,833	125,638,436	180,437,992	28.9	28.4	33.0	22.1	31.6
HIV/AIDS	100,983,453	174,781,553	132,859,771	134,934,183	135,183,570	18.8	24.4	20.6	23.8	23.7
Tuberculosis	118,664,226	138,389,222	107,815,071	120,220,907	103,218,979	22.0	19.3	16.7	21.2	18.1
Bacterial pneumonia & meningitis	6,168,184	26,798,409	22,377,790	43,721,396	34,549,824	1.1	3.7	3.5	7.7	6.1
Diarrhoeal diseases	55,568,392	42,267,335	47,109,061	45,724,283	31,608,754	10.3	5.9	7.3	8.0	5.5
Helminths (worms & flukes)	10,831,571	26,448,071	22,225,965	20,875,018	27,982,461	2.0	3.7	3.4	3.7	4.9
Kinetoplastids	67,927,698	49,366,955	53,603,095	30,226,137	22,751,655	12.6	6.9	8.3	5.3	4.0
Salmonella infections	54,194	1,033,056	3,615,088	7,087,967	9,539,589	0.0	0.1	0.6	1.2	1.7
Dengue	2,113,145	17,522,069	13,296,670	10,035,762	7,407,036	0.4	2.4	2.1	1.8	1.3
Buruli ulcer	-	194,224	315,272	1,710,178	2,442,700	0.0	0.0	0.0	0.3	0.4
Leprosy	658,000	1,057,064	979,784	2,465,391	1,453,926	0.1	0.1	0.2	0.4	0.3
Trachoma	1,461,110	-	-	-	145,074	0.3	0.0	0.0	0.0	0.0
Rheumatic fever	-	54,212	182,116	148,513	-	0.0	0.0	0.0	0.0	0.0
Platform technologies	1,989,289	8,145,750	14,448,469	12,824,228	6,021,582	0.4	1.1	2.2	2.3	1.1
Adjuvants and immunomodulators	-	1,339,006	2,181,111	4,858,300	3,327,409	0.0	0.2	0.3	0.9	0.6
General diagnostic platforms	1,989,289	2,728,734	6,807,783	3,565,209	1,442,694	0.4	0.4	1.1	0.6	0.3
Delivery technologies and devices	-	4,078,010	5,459,574	4,400,720	1,251,479	0.0	0.6	0.8	0.8	0.2
Core funding of a multi-disease R&D organisation	13,026,847	9,921,287	5,492,440	6,067,278	5,096,200	2.4	1.4	0.9	1.1	0.9
Unspecified disease	3,282,916	17,390,040	7,487,062	6,423,325	2,805,724	0.6	2.4	1.2	1.1	0.5
Total philanthropic funding	538,279,744	716,528,175	644,348,488	568,103,001	570,645,068	100.0	100.0	100.0	100.0	100.0

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

Five-year philanthropic funding trends

Philanthropic funding for neglected disease R&D has fluctuated widely over the past 5 years, reflecting the 5-10 year time cycles and cyclical disbursement of very large grants seen in some disease areas. That said, YOY philanthropic funding has declined sharply since its peak of $691.5m in 2008, with 2011 funding now only slightly above the funding levels of 5 years ago ($551.4m compared to $523.3m in 2007).

This trend mostly reflects changes in funding from the Gates Foundation, which provided an average 83.3% of philanthropic funding between 2007 and 2011, and has had marked year-to-year swings related to disbursement of multi-year funds, for example the large 2009 disbursement for Phase III RTS,S malaria vaccine trials. Gates Foundation funding has been as low as $452.1m in 2007 and $447.9m in 2011 and as high as $617.0m in 2008. By contrast, the Wellcome Trust, the second biggest philanthropic funder, has steadily increased its neglected disease R&D funding across all five years of the report, from $60.0m in 2007 to $94.8m in 2011.

Most diseases and R&D areas saw modest increases from YOY philanthropic funders between 2007 and 2011, including malaria (up from $153.5m in 2007 to $176.9m in 2011), HIV/AIDS (up from $99.7m in 2007 to $130.2m in 2011), and bacterial pneumonia & meningitis (up from $6.2m in 2007 to $34.4m in 2011); with smaller increases for helminths, salmonella infections, dengue, platform technologies and Buruli ulcer.

Other diseases have seen a gradual drop in YOY philanthropic funding over the five years, including TB (down from $118.5m in 2007 to $99.5m in 2011), kinetoplastids (down from $67.4m in 2007 to $21.4m in 2011), and diarrhoeal diseases (down from $45.4m to $31.3m in 2011), although we note the provisos on cyclical funding outlined above.

Private sector funders

The pharmaceutical industry reported an increase in its 2011 investments (up $20.0m, 4.2%). Industry investments reached $525.1m in 2011, with MNCs accounting for $469.2m (89.4%) of industry funding and SMEs accounting for the remaining $55.9m (10.6%).

Increases in industry investment in 2011 were driven by MNCs (up $25.6m, 5.8%), offsetting decreased investment from SMEs (down $5.6m, -18.2%).

MULTINATIONAL PHARMACEUTICAL COMPANIES (MNCs)

Three diseases – dengue, TB and malaria – accounted for the majority (81.6%) of MNC investments in neglected disease R&D in 2011. MNC investment dropped for almost all diseases in 2011, including a significant drop for malaria (down $20.0m, -17.5%), and smaller drops for diarrhoeal diseases (down $9.4m, -30.2%), TB (down $5.1m, -3.6%), HIV/AIDS (down $3.7m, -22.3%), helminths (down $1.9m, -60.8%) and kinetoplastids (down $1.5m, -13.9%). However, these cuts were masked by a large increase for dengue (up $56.0m, 59.2%) as vaccine candidates reached end stage product development, and smaller increases for bacterial pneumonia and meningitis (up $5.9m, 22.4%) and salmonella infections (up $1.6m, 60.6%).

There were no MNC investments in trachoma, leprosy, Buruli ulcer, rheumatic fever or platform technologies.

Table 26. Multinational pharmaceutical company (MNC) funding by disease 2007-2011

Disease	2007 (US$)	2008 (US$)*	2009 (US$)*	2010(US$)*	2011 (US$)*	2007%	2008%	2009%	2010%	2011%
Dengue	15,982,205	43,145,203	58,941,327	94,513,621	150,866,980	8.6	15.5	17.4	21.4	32.2
Tuberculosis	50,406,352	73,805,679	107,440,859	142,913,356	137,745,285	27.2	26.5	31.8	32.3	29.4
Malaria	80,171,520	80,676,451	80,831,793	114,453,210	94,428,200	43.2	28.9	23.9	25.9	20.1
Bacterial pneumonia & meningitis	15,164,876	31,943,693	25,412,690	26,287,804	32,167,756	8.2	11.4	7.5	5.9	6.9
Diarrhoeal diseases	10,696,100	22,032,982	32,548,361	31,064,572	21,689,493	5.8	7.9	9.6	7.0	4.6
HIV/AIDS	7,835,409	19,945,834	17,544,478	16,730,164	12,967,324	4.2	7.1	5.2	3.8	2.8
Kinetoplastids	5,133,194	1,263,713	3,835,429	10,500,299	9,043,162	2.8	0.5	1.1	2.4	1.9
Salmonella infections	-	1,166,675	1,773,897	2,712,092	4,356,292	0.0	0.4	0.5	0.6	0.9
Helminths (worms & flukes)	61,200	3,892,100	8,132,792	3,175,480	2,299,068	0.0	1.4	2.4	0.7	0.5
Trachoma	104,000	96,339	-	-	-	0.1	0.0	0.0	0.0	0.0
Buruli ulcer	-	88,938	-	-	-	0.0	0.0	0.0	0.0	0.0
Rheumatic fever	-	963,391	1,449,696	-	-	0.0	0.3	0.4	0.0	0.0
Unspecified disease	-	-	-	-	3,648,124	0.0	0.0	0.0	0.0	0.8
Total MNC funding	185,554,857	279,020,998	337,911,323	442,350,599	469,211,684	100.0	100.0	100.0	100.0	100.0

* Figures are adjusted for inflation and reported in 2007 US dollars
\- No reported funding in category

SMALL PHARMACEUTICAL AND BIOTECHNOLOGY FIRMS (SMEs)

SME funding totalled $55.9m in 2011, consisting of $39.8m (71.1%) from firms in developed countries and $16.1m (28.9%) from IDC firms.

Investment from YOY SMEs dropped in 2011 (down $5.6m, -18.2%). YOY SME funding for TB dropped slightly (down $3.4m, -20.8%), as did funding for malaria (down $2.7m, -50.3%) and HIV/AIDS (down $2.3m, -44.8%). There were modest increases in funding for dengue (up $0.5m, 24.0%) and kinetoplastids (up $0.1m, 447.6%). Investment in trachoma increased by $2.0m (108.2%), reflecting development of new diagnostics by firms in developed countries.

Table 27. Small pharmaceutical and biotechnology firm (SME) funding by disease 2007-2011

Disease or R&D area	2007 (US$)	2008 (US$)*	2009 (US$)*	2010(US$)*	2011 (US$)*	2007%	2008%	2009%	2010%	2011%
Tuberculosis	15,548,363	13,223,374	15,710,495	17,108,747	13,598,764	33.5	15.3	21.4	28.0	24.3
HIV/AIDS	11,800,216	27,504,031	17,797,740	13,373,177	10,002,003	25.5	31.9	24.3	21.9	17.9
Malaria	10,622,063	9,934,683	18,471,385	11,168,065	7,199,572	22.9	11.5	25.2	18.3	12.9
Helminths (worms & flukes)	753,763	1,058,521	408,232	3,255,580	5,370,150	1.6	1.2	0.6	5.3	9.6
Bacterial pneumonia & meningitis	582,161	18,551,060	8,381,567	5,826,610	4,533,200	1.3	21.5	11.4	9.5	8.1
Diarrhoeal diseases	2,980,328	2,069,864	4,648,062	505,167	4,354,697	6.4	2.4	6.3	0.8	7.8
Trachoma	-	-	-	1,882,470	3,918,460	0.0	0.0	0.0	3.1	7.0
Kinetoplastids	16,323	1,648,585	1,277,425	1,363,852	3,419,873	0.0	1.9	1.7	2.2	6.1
Dengue	3,412,551	648,796	4,171,825	4,696,264	3,219,802	7.4	0.8	5.7	7.7	5.8
Leprosy	-	-	-	79,291	92,316	0.0	0.0	0.0	0.1	0.2
Salmonella infections	-	11,146,435	1,667,150	143,376	65,132	0.0	12.9	2.3	0.2	0.1
Buruli ulcer	15,200	196,747	-	-	-	0.0	0.2	0.0	0.0	0.0
Platform technologies	30,836	249,882	820,306	1,772,596	134,782	0.1	0.3	1.1	2.9	0.2
General diagnostic platforms	30,836	-	-	-	134,782	0.1	0.0	0.0	0.0	0.2
Adjuvants and immunomodulators	-	-	784,109	-	-	0.0	0.0	1.1	0.0	0.0
Delivery technologies and devices	-	249,882	36,197	1,772,596	-	0.0	0.3	0.0	2.9	0.0
Unspecified disease	595,986	-	-	-	-	1.3	0.0	0.0	0.0	0.0
Total SME funding	46,357,791	86,231,977	73,354,187	61,175,195	55,908,750	100.0	100.0	100.0	100.0	100.0

* Figures are adjusted for inflation and reported in 2007 US dollars
\- No reported funding in category

PRIVATE FIRMS IN INDIA AND BRAZIL

Three SMEs from India and four SMEs from Brazil participated in the G-FINDER survey this year, down from four and nine respectively in 2010, reporting investments in R&D for eight neglected diseases.

Investment from IDC firms was $16.1m in 2011, up from $10.4m in 2010. Increased investment in kinetoplastids (up $1.5m, 497.5%) was entirely from Brazilian firms. Similarly, a decrease in funding for bacterial pneumonia and meningitis (down $1.0m, -18.4%) came solely from Indian SMEs.

Table 28. Private sector IDC funding by disease 2009-2011

Disease	2009 (US$)*	2010(US$)*	2011 (US$)*	2009%	2010%	2011%
Helminths (worms & flukes)	184,852	3,083,528	4,959,302	1.0	29.6	30.7
Bacterial pneumonia & meningitis	8,368,036	5,558,697	4,533,200	44.5	53.3	28.1
Diarrhoeal diseases	4,267,630	452,390	4,354,697	22.7	4.3	27.0
Kinetoplastids	814,959	710,021	1,846,327	4.3	6.8	11.4
Dengue	1,028,391	350,858	328,988	5.5	3.4	2.0
Salmonella infections	-	143,376	65,132	0.0	1.4	0.4
HIV/AIDS	-	33,038	38,745	0.0	0.3	0.2
Malaria	4,139,686	19,823	23,247	22.0	0.2	0.1
Leprosy	-	79,291	-	0.0	0.8	0.0
Total private sector IDC funding	18,803,555	10,431,020	16,149,637	100.0	100.0	100.0

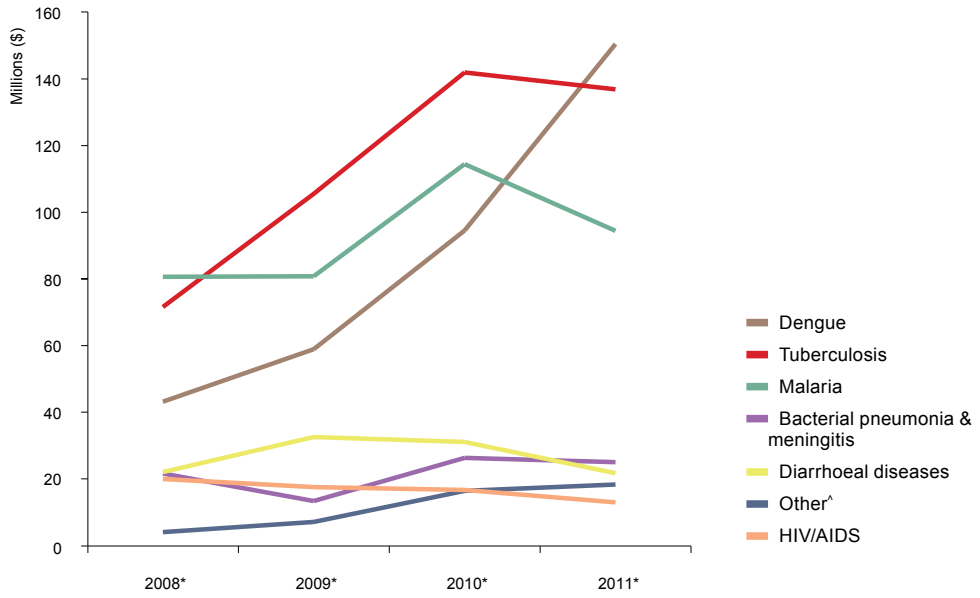
* Figures are adjusted for inflation and reported in 2007 US dollars
\- No reported funding in category

Five-year private sector funding trends

Although some pharmaceutical companies participated in the first G-FINDER survey in 2007, it was not until 2008 that G-FINDER captured a fair representation of MNC industry investment in neglected disease R&D, and not until 2009 that the survey was expanded to include SMEs from the IDCs. Therefore, funding trends for MNCs are analysed only since 2008, and for SMEs since 2009.

Since 2008, MNCs have become increasingly engaged in neglected disease R&D with their YOY investments rising steadily from $273.3m in 2008 to $466.9m in 2011. However, nearly two-thirds of this increase was due to very large investments in a single product area, the more commercial area of dengue vaccines (up from $40.2m in 2008 to $141.6m in 2011), where expensive late-stage trials are underway. That said, TB has also seen a significant increase (up from $71.6m in 2008 to $136.9m in 2011), predominantly for drug development, with several MNCs active in this area; and industry's malaria investment has increased from $80.6m in 2008 to $94.4m in 2011 across both drug and vaccine development.

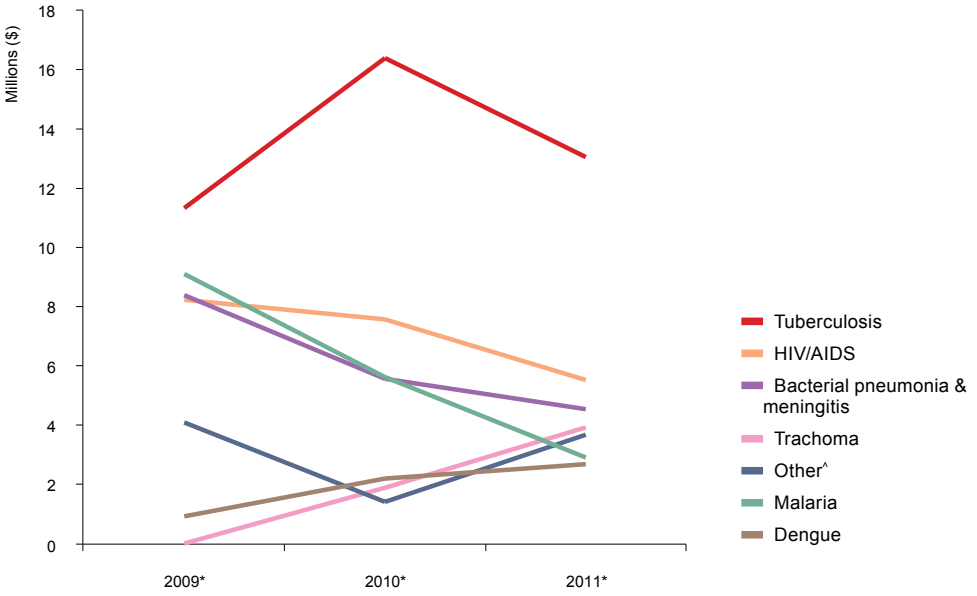
Figure 28. Total MNC investment by disease 2008-2011



* Figures are adjusted for inflation and reported in 2007 US dollars
^ 'Other' includes kinetoplastids, salmonella infections, helminth infections, trachoma, Buruli ulcer, rheumatic fever and unspecified disease

Since 2009, when SMEs from IDCs first participated in G-FINDER, total YOY SME investment has fallen by $5.8m – from $42.0m in 2009 to $36.3m in 2011. Brazilian firms have made modest increases in investment, focusing particularly on diseases that are prevalent in the region – investment in R&D for kinetoplastids has increased from $0.5m in 2009 to $1.8m in 2011. In the same period, Indian investment contracted from $8.9m in 2009 to $5.2m in 2011 with funding for bacterial pneumonia and meningitis falling from $8.4m to $4.5m during that time.

Figure 29. Total SME investment by disease 2009-2011



* Figures are adjusted for inflation and reported in 2007 US dollars
^ 'Other' includes kinetoplastids, diarrhoeal diseases, helminth infections, leprosy, salmonella infections and platform technologies

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 to their recipients and a significant cost to companies.

Table 29. Typical industry in-kind contributions to neglected disease R&D 2011

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	GSK Pfizer AstraZeneca sanofi-aventis Otsuka Janssen (Johnson & Johnson company)
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	Novartis GSK Pfizer Abbott Laboratories AstraZeneca sanofi-aventis Janssen (Johnson & Johnson company) Otsuka
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	Novartis GSK Pfizer AstraZeneca Janssen (Johnson & Johnson company) Otsuka
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 not-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	Novartis GSK Pfizer Abbott Laboratories sanofi-aventis Janssen (Johnson & Johnson company)
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 Abbott Laboratories sanofi-aventis Janssen (Johnson & Johnson company)

* 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 in 2011 with the top 12 funders contributing 89.5% ($2.72bn), compared to 89.6% ($2.74bn) in 2010.

The same twelve funders occupied the top 12 slots in 2011 as in 2010, although their order changed slightly due to around half of the organisations increasing their funding in 2011 while the remaining half decreased their funding. The three largest funders continued unchanged, these being the US NIH (down $27.6m, -2.3%), industry (up $20.0m, 4.2%) and the Gates Foundation (down $7.9m, -1.7%).

The most notable increase came from the Wellcome Trust (up $14.3m, 17.8%), which became the fifth largest funder of neglected disease R&D in 2011 due to increased funding for HIV/AIDS (up $5.4m, 47.2%), dengue (up $4.7m, 199%) and helminths (up $3.0m, 51.3%). Other increases came from the European Commission (up $12.7m, 13.7%) and the Australian NHMRC (up $7.3m, 37.5%). Increased Inserm funding in 2011 (up $17.2m, 85.4%) reflected better reporting rather than an increase in investment.

Conversely, UK DFID decreased funding in 2011 (down $21.5m, -22.2%), mostly due to cyclical grants patterns, with large up-front disbursements made in 2009 and 2010. The apparent decrease in funding from The Institut Pasteur (down $13.9m, -30.9%) cannot be interpreted as a funding cut per se since they did not report 2011 funding from five of the 32 institutes in their International Network.

Table 30. Top neglected disease funders 2007-2011

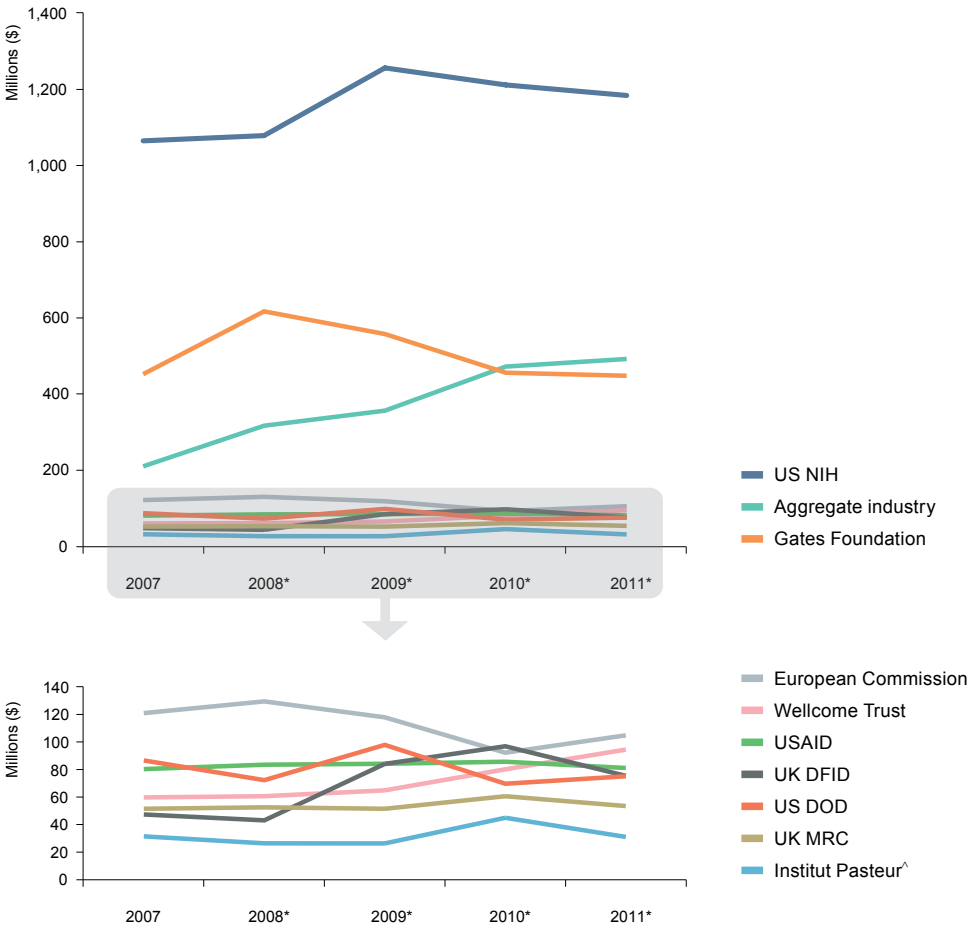
Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
US NIH	1,159,146,846	39.2	1,064,859,791	1,078,627,652	1,256,471,979	1,211,704,054	1,184,070,752
Gates Foundation	506,068,577	17.1	452,102,715	616,991,512	557,518,315	455,832,350	447,897,993
Aggregate industry	407,415,472	13.8	231,912,647	365,252,975	411,265,510	503,525,794	525,120,434
European Commission	113,462,229	3.8	121,366,882	129,899,906	118,311,296	92,529,756	105,203,303
USAID	83,255,653	2.8	80,600,336	83,805,395	84,483,425	85,975,465	81,413,642
US DOD	80,605,929	2.7	86,914,578	72,548,392	98,236,367	69,942,925	75,387,384
Wellcome Trust	72,245,100	2.4	59,985,371	60,864,206	65,121,278	80,459,662	94,794,984
UK DFID	69,630,927	2.4	47,565,987	43,278,878	84,396,112	97,229,720	75,683,938
UK MRC	54,148,502	1.8	51,716,968	52,765,367	51,710,748	60,857,019	53,692,407
Institut Pasteur	32,202,567	1.1	31,617,540	26,547,885	26,477,069	45,158,519	31,211,821
Dutch DGIS	25,718,636	0.9	33,951,646	26,911,215	27,268,947	17,183,122	23,278,248
Australian NHMRC	20,122,741	0.7	15,457,337	18,682,020	20,242,107	19,464,047	26,768,195
Subtotal top 12 funders†			2,286,866,018	2,577,455,990	2,808,483,550	2,742,875,728	2,738,685,443
Total R&D funding			2,560,068,749	2,955,964,344	3,168,940,958	3,062,669,973	3,045,225,945

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12

Five-year analysis

The top 3 global funders of neglected disease R&D have remained the same since the start of G-FINDER in 2007, although industry surpassed the Gates Foundation in 2010 to become the second largest funder and remained so in 2011. Outside the top 3, the most significant increase in funding came from the Wellcome Trust which increased its investment in neglected diseases R&D every year of the survey from $60.0m in 2007 to $94.8m in 2011. In the same period, investment from the European Commission moved in the opposite direction, going down from $121.4m in 2007 to $105.2m in 2011. Despite these changes, the funders making up the top 12 have changed little in the five years, with ten funders present in the top 12 list every year of the survey: US NIH, industry, the Gates Foundation, the European Commission, UK DFID, USAID, US DOD, the Wellcome Trust, UK MRC and Institut Pasteur. Four funders have enjoyed brief spells in the top 12 – Irish Aid (2007), Swedish SIDA (2008), Dutch DGIS (2007-2009) and Inserm (2009-2011) – although Irish Aid dropped to 24th in 2011 while the Dutch DGIS and Swedish SIDA remained just outside the top 12 in 2011 (13th and 14th respectively).

Figure 30. Top 10 neglected disease funders 2007-2011



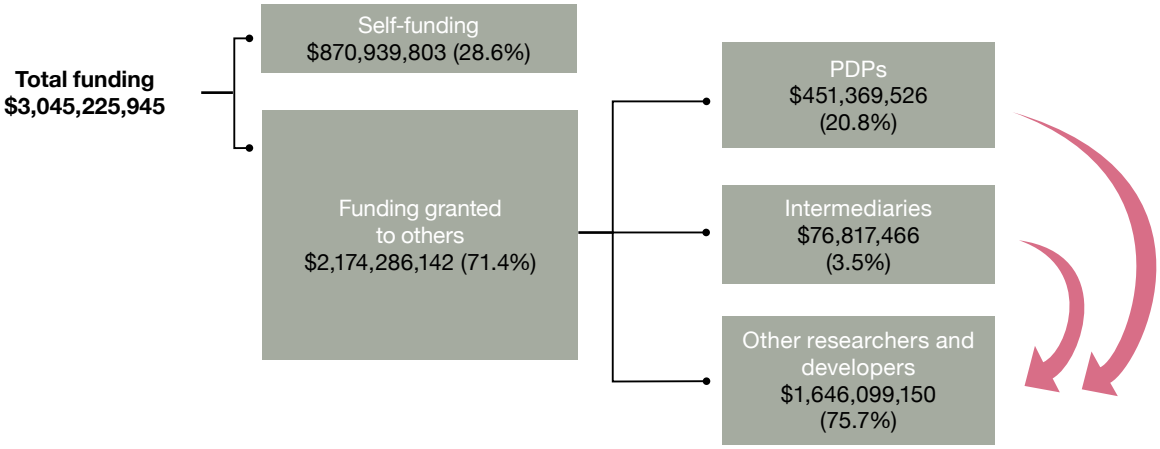
* Figures are adjusted for inflation and reported in 2007 US dollars
^ Drop in 2011 funding reflects incomplete reporting for that year

FINDINGS - 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[iv] 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.

Slightly more than two-thirds of 2011 R&D funding was in the form of external grants (71.4% or $2,174m), while intramural funding (self-funding) accounted for 28.6% ($870.9m). There was a small apparent shift from external funding (down $8.5m, -0.4%) to self-funding (up $5.0m, 0.6%) but this was largely due to cyclical disbursement of UK DFID grants (down $21.5m, -22.2%). The 2011 grant pie was shared out in the same proportions as in previous years: three-quarters ($1.65bn, 75.7%) went directly to researchers and developers; just under one-quarter ($451.4m, 20.8%) to PDPs; and a small fraction ($76.8m, 3.5%) to other intermediaries. We note that the central 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 ($18.0m, 1.5%) 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 38.0% of global grant funding for neglected disease R&D in 2011.

Figure 31. Overall R&D funding patterns 2011



Five-Year Analysis

YOY self-funding increased from $505.9m in 2007 to $825.2m in 2011 and now represents 28.4% of all YOY funding, compared to 20.6% in the first year of the G-FINDER survey. Grant funding to researchers and product developers also increased from $1.4bn in 2007 to $1.5bn in 2011, although it is still $94.9m below its 2009 peak, when the infusion of ARRA funds drove US NIH funding to its highest level during the five years of the G-FINDER survey.

Conversely, over the same five year period, PDP funding saw dramatic cuts, steadily falling from the 2008 peak of $580.1m to $451.4m in 2011 – a 22% drop in three years (down $128.7m).

[iv] 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 (59.8%) came from private industry, which almost invariably funds only its own internal R&D programmes, with nearly all the remainder from governments investing into their own institutions.

There was a small increase in self-funding (up $5.0m, 0.6%) in 2011, continuing a trend seen in in the first four years of the survey. This included modest increases from private industry (up $20.0m, 4.2%) partially offset by decreased internal investment from several top 10 self-funders, including UK MRC (down $5.3m, -12.7%) and US CDC (down $3.8m, -24.0%). The changes in funding at the two French research institutes, Inserm (up $17.2m, 85.4%) and The Institut Pasteur (down $13.9m, -30.9%), are both artefactual, reflecting better data reporting from the former and incomplete data from the latter.

Table 31. Top 10 self-funders 2007-2011

Funder	Average annual funding (US$)^ 2007-2011*	Average % of total	2007 (US$)	2008 (US$)^	2009 (US$)^	2010 (US$)^	2011 (US$)^
Aggregate industry	401,155,018	53.7	228,957,902	355,313,341	401,732,684	498,625,790	521,145,374
US NIH	147,931,379	19.8	133,097,100	158,435,807	141,855,155	156,280,607	149,988,226
US DOD	59,778,463	8.0	70,340,000	51,274,796	79,810,736	47,835,664	49,631,120
UK MRC	36,898,800	4.9	35,989,099	33,560,426	36,569,047	41,845,984	36,529,445
Institut Pasteur	32,197,172	4.3	31,617,540	26,520,909	26,477,069	45,158,519	31,211,821
Inserm	17,951,200	2.4	1,774,770	3,121,721	27,222,504	20,196,417	37,440,590
Indian ICMR	16,894,905	2.3		19,533,928	17,230,631	15,954,793	14,860,268
US CDC	12,893,705	1.7	5,703,200	12,672,614	18,565,920	15,642,774	11,884,017
Undisclosed participant	6,083,135	0.8	-	2,611,579	7,276,341	6,637,445	7,807,176
Statens Serum Institute	5,117,327	0.7	3,672,882	3,870,205	10,232,619	5,207,031	2,603,898
Subtotal top 10 self-funders†			525,334,601	668,434,839	766,972,707	853,385,025	863,101,935
Subtotal self-funders			527,676,354	686,739,852	780,738,996	866,174,525	870,939,803
Total R&D funding			2,560,068,749	2,955,964,344	3,168,940,958	3,062,669,973	3,045,225,945

* Averages calculated across years of available data
^ Figures are adjusted for inflation and reported in 2007 US dollars
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12
- No reported funding
Did not participate in the survey this year

Five-year self-funding trends

YOY self-funding increased from $505.9m in 2007 to $825.2m in 2011. Much of this growth (up 82.6%) stems from the increased contribution of MNCs to neglected disease R&D. Other noteworthy increases include US NIH (up from $133.1m in 2007 to $150.0m in 2011 after peaking in 2008 at $158.4m) and US CDC (up from $5.7m in 2007 to $11.9m in 2011 after peaking in 2009 at $18.6m). Conversely, the US DOD (down from $70.3m in 2007 to $49.6m in 2011) decreased self-funding during the G-FINDER survey period. Inserm has reported a large increase in intramural funding over the past five years, up from $1.8m in 2007 to $37.4m in 2011, but this predominantly reflects better reporting of their neglected disease R&D investments.

Product development partnerships

PDPs received $451.4m in 2011. This represented 14.8% of global funding, 23.0% of global grant funding, and 38.0% of global grant funding if the "NIH factor" is excluded, as before. The top four PDPs – Program for Appropriate Technology in Health (PATH), Medicines for Malaria Venture (MMV), International AIDS Vaccine Initiative (IAVI) and Aeras – accounted for over half of all PDP funding ($251.7m, 58.1%).

PDP funding declined again in 2011 (down $31.8m, -6.6%), after earlier decreases in 2009 (down $50.0m, -8.6%) and 2010 (down $46.9m, -8.8%). This partially reflects uneven disbursement of multiyear grants (for instance, UK DFID disbursed their PDP funding investments up-front in 2009 and 2010) but also more entrenched underlying trends, with over half of YOY PDP funders either freezing or further decreasing their PDP investments in 2011.

There were wide differences in PDP funding in 2011, with increases reported by PATH (up $21.1m, 31.7%), Infectious Disease Research Institute (IDRI, up $9.1m, 88.2%) and the Sabin Vaccine Institute (up $3.9m, 104.5%), but significant drops in funding reported by IPM (down $17.1m, -55.4%), Innovative Vector Control Consortium (IVCC, down $14.5m, -100.0%), the TB Alliance (down $13.7m, -28.5% and OneWorld Health (OWH, down $10.8m, -52.3%) – all due to uneven disbursement or completion of multi-year grants from the Gates Foundation or UK DFID. Funding for other PDPs was relatively steady, including MMV and Aeras.

Table 32. Funds received by PDPs 2007-2011

PDPs	2007 (US$)	2008 (US$)*	2009 (US$)*	2010(US$)*	2011 (US$)*	2007%	2008%	2009%	2010%	2011%
PATH	38,024,679	111,230,644	123,951,227	67,214,453	87,845,636	8.1	19.2	23.4	13.9	19.5
MMV	75,982,931	46,030,619	41,804,090	70,299,462	71,651,774	16.2	7.9	7.9	14.5	15.9
IAVI	81,297,482	86,598,890	72,086,128	65,398,560	59,946,714	17.3	14.9	13.6	13.5	13.3
Aeras	40,121,983	63,786,605	53,395,878	39,742,200	38,665,906	8.5	11.0	10.1	8.2	8.6
DNDi	28,520,251	22,439,428	32,413,869	33,775,958	36,763,676	6.1	3.9	6.1	7.0	8.1
TB Alliance	39,587,358	34,106,803	36,252,220	48,509,444	35,689,961	8.4	5.9	6.8	10.0	7.9
WHO/TDR[A]	32,675,307	37,039,908	34,721,350	28,779,509	30,637,913	7.0	6.4	6.6	6.0	6.8
FIND	22,881,808	30,359,050	20,258,906	24,429,531	21,156,658	4.9	5.2	3.8	5.1	4.7
IDRI	8,094,908	14,340,933	16,552,206	11,500,854	20,418,151	1.7	2.5	3.1	2.4	4.5
IPM	46,311,916	60,503,137	35,599,621	30,785,388	14,321,145	9.9	10.4	6.7	6.4	3.2
OWH	27,377,321	28,409,977	15,231,696	20,998,848	9,887,157	5.8	4.9	2.9	4.3	2.2
Sabin Vaccine Institute	7,621,112	14,527,323	8,818,384	3,777,544	7,944,293	1.6	2.5	1.7	0.8	1.8
EVI	7,745,898	4,398,783	3,877,131	5,250,423	7,563,245	1.7	0.8	0.7	1.1	1.7
IVI	13,150,000	16,678,372	21,683,793	13,863,539	5,054,002	2.8	2.9	4.1	2.9	1.1
TBVI	-	-	65,342	4,161,286	3,791,892	0.0	0.0	0.0	0.9	0.8
IVCC	-	9,633,911	13,337,199	14,679,823	31,401	0.0	1.7	2.5	3.0	0.0
Total funding to PDPs	469,392,952	580,084,383	530,049,041	483,166,820	451,369,526	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 is included here since it has operated as a de facto PDP since the mid-1970s
- No reported funding in category

PDP funders

As in previous survey years, philanthropic organisations provided over half of total PDP funding in 2011 ($239.9m, 53.2%), virtually all from the Gates Foundation, while HIC governments provided $201.0m (44.5%). Ten organisations accounted for over 90% ($406.4m) of PDP funding in 2011, with the Gates Foundation providing almost half ($222.4m, 49.3%) and HIC aid agencies contributing more than one-third ($164.8m, 36.5%) of total funding.

Over half of YOY PDP funders reduced their funding in 2011, with cuts of $64.6m that were only partially offset by increases from others. The largest drop in PDP funding was, as in 2010, from the Gates Foundation (down $31.4m, -12.4%), a decrease they attributed to successful project completion and cyclical grants to FIND, TB Alliance and Aeras. Eight out of twelve aid agencies also cut their funding to PDPs, with a collective reduction of $30.6m in 2011, continuing the downward trend seen in previous years. These included cuts from UK DFID (down $21.6m, -22.2%), although this was due to uneven disbursement of multi-year grants, Spanish Ministry of Foreign Affairs and Cooperation for Development (MAEC, down $2.8m, -39.4%), Norwegian NORAD (down $2.3m, -25.6%), USAID (down $1.8m, -4.5%), Danish DANIDA (down $0.9m, -35.4%) and Swiss Agency for Development and Cooperation (SDC, down $0.9m, -22.7%). Other aid agencies did not cut their PDP funding in 2011 but kept it at very low levels. For instance, the Belgian DGDC contributed $1.7m and the German Federal Ministry for Economic Cooperation and Development (BMZ) contributed $0.9m.[v]

These decreases were offset by increased YOY funding of $29.9m from other organisations and $2.9m from irregular survey participants. Interestingly, slightly over half of the 2011 funding increase (up 51.7%) came from the US NIH (up $15.5m, 611%), which had previously been only a limited funder of PDPs; while the Dutch DGIS also played a role (up $4.8m, 30.6%). The increased US NIH funds went mainly to IDRI ($7.5m, 41.6%), FIND ($3.0m, 16.6%) and MMV ($2.2m, 12.3%). Other groups who modestly increased their PDP funding in 2011 were the WHO (up $3.6m, 162%), the Japanese government (up $2.5m, 657%) and the Swedish SIDA (up $1.3m, 29.6%).

Five-year PDP funding trends

PDP funding has decreased over the five years of the G-FINDER survey, with 2011 funding of $451.4m being well below the 2008 peak of $580.1m and even lower than when the survey commenced in 2007 ($469.4m). PDPs have seen cuts in the order of $30m to $50m per year for each of the past three survey years – a total drop of $130m in annual funding.

The steady decrease since 2009 partially reflects healthy funding cuts (for instance, successful completion of large scale trials including the $72.6m drop in RTS,S related funding to PATH in 2010), artefacts (for instance, uneven disbursement of multi-year grants including the $14.7m drop to IVCC in 2011) but also more worrying trends, with the majority of funders freezing or decreasing their PDP investments between 2009 and 2011, with little or no correlation to portfolio or product development maturity.

Since the first G-FINDER survey in 2007, nearly two-thirds of PDPs (10 out of 16) have seen funding cuts. The most notable decreases were for PDPs working in HIV/AIDS, with the IPM reporting a decrease in funding from $46.3m in 2007 to $14.3m in 2011, and IAVI seeing a similar decline from $81.3m in 2007 to $60.0m in 2011. Other PDPs who saw funding cuts include OWH (down $27.4m in 2007 to $9.9m in 2011) and International Vaccine Institute (IVI) (down from $13.1m in 2007 to $5.1m in 2011). Six PDPs reported overall increases between 2007 and 2011 including PATH (up from $38.0m in 2007 to $87.8m in 2011), IDRI (up from $8.1m in 2007 to $20.4m in 2011) and DNDi (up from $28.5m in 2007 to $36.8m in 2011).

[v] Germany's aid agency (BMZ) registered a drop in funding in 2011, however we note that Germany's science ministry, the Federal Ministry of Education and Research (BMBF) included, for the first time in 2011, a dedicated budget line to support PDPs

PDP funding concentration has remained very high throughout the five years, with four organisations (the Gates Foundation, UK DFID, USAID and Dutch DGIS) providing over three quarters ($2.0bn or 78%) of overall PDP funding during that time, and the Gates Foundation and UK DFID providing two thirds ($1.7bn or 66%) of this funding. Despite fluctuations, there has nevertheless been a significant overall trend towards decreased funding of PDPs with over 60% of YOY PDP funders and 77% of aid agencies cutting their investments between 2007 and 2011.

Table 33. Top PDP funders 2007-2011

Funder	Average annual funding (US$)* 2007-2011^	Average % of total	Average % of org's funds given to PDPs 2007-2011	To PDPs 2007 (US$)	To PDPs 2008 (US$)^	To PDPs 2009 (US$)^	To PDPs 2010 (US$)^	To PDPs 2011 (US$)^
Gates Foundation	269,493,406	53.6	53.3	231,183,854	351,426,826	288,742,058	253,755,901	222,358,392
UK DFID	62,386,011	12.4	89.6	33,430,151	28,094,083	77,492,166	97,229,720	75,683,938
USAID	39,450,050	7.8	47.4	40,776,000	40,052,987	37,730,743	40,243,034	38,447,486
Dutch DGIS	21,587,808	4.3	83.9	32,170,024	19,807,172	19,454,348	15,833,146	20,674,350
Norwegian NORAD	10,621,804	2.1	100.0	13,271,949	12,389,471	11,667,625	9,047,299	6,732,677
Irish Aid	9,668,564	1.9	95.4	23,586,318	6,820,567	5,227,392	6,508,789	6,199,757
Spanish MAEC/ AECID	8,473,044	1.7	89.3	3,426,196	13,116,474	14,323,053	7,159,668	4,339,830
Swedish SIDA	7,872,953	1.6	43.1	10,505,567	11,188,482	7,952,989	4,231,695	5,486,032
US NIH	7,101,452	1.4	0.6	4,141,065	3,287,014	7,538,694	2,531,809	18,008,680
Canadian CIDA	6,477,045	1.3	92.4	11,796,354	15,506,676	5,082,193	-	-
MSF	5,731,557	1.1	99.1	7,187,885	7,275,268	4,563,905	4,725,479	4,905,247
GAVI	4,979,259	1.0	92.1	10,083,609	14,812,687	-	-	-
Subtotal top 12 PDP funders†				426,662,580	528,101,928	485,636,091	453,170,675	415,663,574
Total PDP funding				469,392,952	580,084,383	530,049,041	483,166,820	451,369,526
% of total PDP funding (top 12)				90.9	91.0	91.6	93.8	92.1

^ Figures are adjusted for inflation and reported in 2007 US dollars
* Averages calculated across years of available data
† Subtotals for 2007, 2008, 2009, 2010 and 2011 reflect the top funders for those years, not the average top 12
- No reported funding
Did not participate in the survey. Any contributions listed for this year are based on data reported by funding recipients so may be incomplete

The biggest cuts came from the Gates Foundation, down from $351.4m in 2008 to $222.4m in 2011. The most significant aid agency cuts during the five year survey period were from Irish Aid (down from $23.6m in 2007 to $6.2m in 2011), the Dutch DGIS (down from $32.2m in 2007 to $20.7m in 2011), the Norwegian NORAD (down from $13.3m in 2007 to $6.7m in 2011) and the Swedish SIDA (down from $10.5m in 2007 to $4.2m in 2011). The Canadian CIDA stopped funding PDPs in 2010, having provided an average of $10.8m in funding per year between 2007 and 2009.

Other PDP funders increased their funding between 2007 and 2011, including UK DFID (up from $33.3m in 2007 to $75.7m in 2011) and the US NIH (up from $4.1m in 2007 to $18.0m in 2011).

DISCUSSION

Over the past five years, we have seen changes – albeit modest – in the type of research that is funded and developed for patients in developing countries. Many of these changes stem from changing funding patterns of the public and philanthropic sectors, including shifts in funding for basic research and product development, and in funding mechanisms (for example, through PDPs). Changes in the share of funding by each of the three sectors, particularly the increased role of industry in funding neglected disease R&D, have also resulted in shifts in funding focus within and between diseases.

PUBLIC FUNDING

Public funding accounts for two-thirds of all neglected disease R&D funding, therefore public funding trends have a significant influence on what research is done

The public sector was the top funding sector in each year of the survey, providing two-thirds (65.6%) of total funding across the five years. Despite a moderate dip in 2010, public funding remained by far the largest source of funding both before, during and after the global financial crisis.

Public funding has shifted substantially from product development to basic research

In 2007, the public sector invested one-quarter (26.0%) of its funding into basic research but by 2010 this had increased to one-third (32.6%). Although there has been some stabilisation since, basic research still accounted for 31.2% of total public funding in 2011, with $124.2m more invested into basic research in 2011 than in 2007. Much of this shift has been due to the US NIH and the EC.

Public funding for PDPs has remained steady overall but with significant changes in funding sources

Apart from a dip in 2008, overall public funding for PDPs has remained relatively constant over the past five years, at an average of a little over $200m per year. However, there have been important shifts in public funding sources, with significant decreases in funding from aid agencies, offset by increased funding from science & technology (S&T) agencies.

Aid agency funding for PDPs dropped by nearly 15% between 2009 and 2011 (down $25.3m, -13.3%), from a peak of $190.1m in 2009 to $164.8m in 2011. Reductions were widespread, with all aid agencies cutting their PDP funding in either 2010, 2011 or both years (although some of these drops were due to cyclical funding). In a potential early and offsetting trend, some key S&T agencies (including the US NIH and the EC) have increased support for PDPs since 2009, with their share of overall funding increasing substantially. S&T agencies accounted for only 2% to 4.5% of total public PDP funding between 2007 and 2009 but were providing 12.2% of total public PDP funding by 2011.

PHILANTHROPIC FUNDING

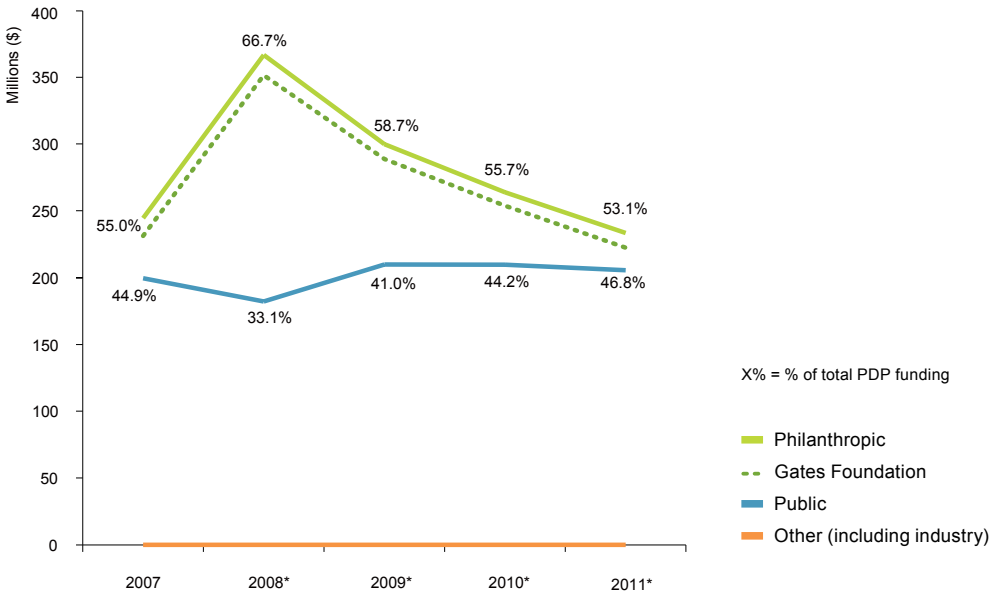
Since the global financial crisis, philanthropic funding has dropped significantly overall and for PDPs, driven by lower funding from the Gates Foundation

The Gates Foundation has been the mainstay of philanthropic funding for the past five years, accounting for over $2.5bn and over 80% of global philanthropic funding for R&D during that time ($2.53bn, 83.3%). As a result, philanthropic funding trends largely reflect Gates Foundation funding trends.

Gates Foundation funding has dropped by over a quarter since 2008 (down $169.1m, -27.4%): as a result, their 2011 funding was at almost the same level as their 2007 funding. The Gates Foundation attributes these changes to cyclical funding and the uneven disbursement of large, multi-year grants. Gates Foundation funding for PDPs has mirrored this overall trend, dropping by over a third from its peak in 2008 (down $129.1m, -36.7%) – a particularly significant drop, given that the Gates Foundation provides over half (53.6%) of all PDP funding.

As a result of these reductions, overall philanthropic funding for neglected disease R&D has also dropped since 2008, as has overall philanthropic funding for PDPs. Although reductions from the Gates Foundation have been spread across many diseases and product areas, funding for kinetoplastids (including for drug development, diagnostics and basic research), HIV/AIDS microbicides and dengue vaccines has been particularly affected (excluding the large drop in funding for malaria vaccines in 2010, due to conclusion of grants for the RTS,S programme).

Figure 32. PDP funding 2007-2011



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

Philanthropic funding plays a contributing rather than a dominant role overall

Despite providing sometimes very large sums, the philanthropic sector (unlike public or industry) is nevertheless not the dominant funder in any disease. Its contributions range from 6.4% of total funding for dengue, through to salmonella and HIV/AIDS (12.1% and 12.4% respectively), up to 23.5% for TB, and around 30% of total funding for most other diseases: diarrhoeal diseases (30.1%), helminths (30.7%), kinetoplastids (31.7%), malaria (32.4%), bacterial pneumonia & meningitis (35.0%).

However, philanthropic funding (and particularly Gates Foundation funding) plays a very specific role, often being focused on target products for a given disease. For instance, although the Gates Foundation provides only 26.3% of overall malaria funding, it has been – along with GSK – the primary funder of the RTS,S malaria vaccine. Similarly, through its investments into PDPs, the Foundation has been the key funder of the first paediatric anti-malarial medicine, and of new insecticide development to address emerging resistance that is threatening the effectiveness of indoor residual spraying and insecticide-treated bednets.

Philanthropic funding is heavily focused on product development

In 2007, the philanthropic sector invested almost three-quarters (74.4%) of its funding into product development and by 2011 this had increased to 79.1% with $25.1m more invested into product development in 2011 than in 2007.

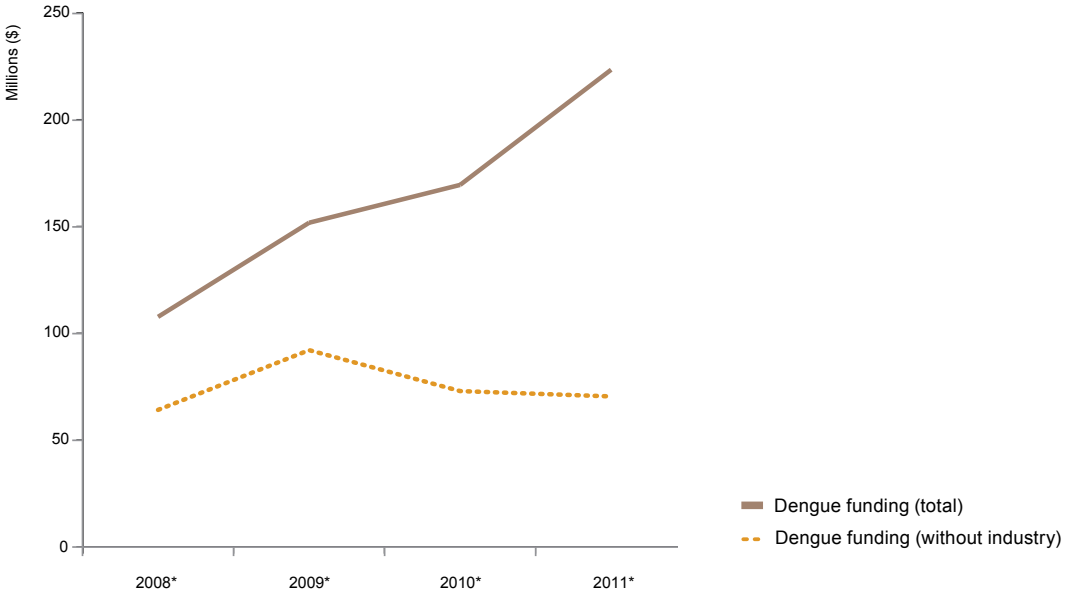
Much of this shift has been due to the Gates Foundation, which cut its basic research funding by almost two-thirds over the five survey years (from $58.3m in 2007 to $22.1m in 2011) while increasing its product development funding from $361.2m in 2007 to $380.1m in 2011. While the Wellcome Trust still invests more in basic research than product development, they also increased their relative investment in product development, with their basic research funding increasing by a half over the past five years (from $38.1m in 2007 to $56.8m in 2011) while their product development funding nearly doubled (from $14.0m to $25.9m) over the same time.

INDUSTRY FUNDING

R&D funding for diseases with stronger commercial drivers has been very resilient

Three of the neglected diseases are ‘semi-commercial’ compared to other neglected diseases, and these three have the strongest industry support. Dengue and bacterial pneumonia & meningitis received nearly half their total five-year funding from industry (48.6% and 44.2% respectively) while TB received nearly a quarter from industry (23.4%). Even in the post-financial crisis years, from 2009 to 2011, funding for dengue and bacterial pneumonia & meningitis continued to grow (by 47.2% and 63.5% respectively) while funding for all other diseases was growing at less than 15% or in actual decline.

Figure 33. Dengue R&D funding with and without industry 2008-2011



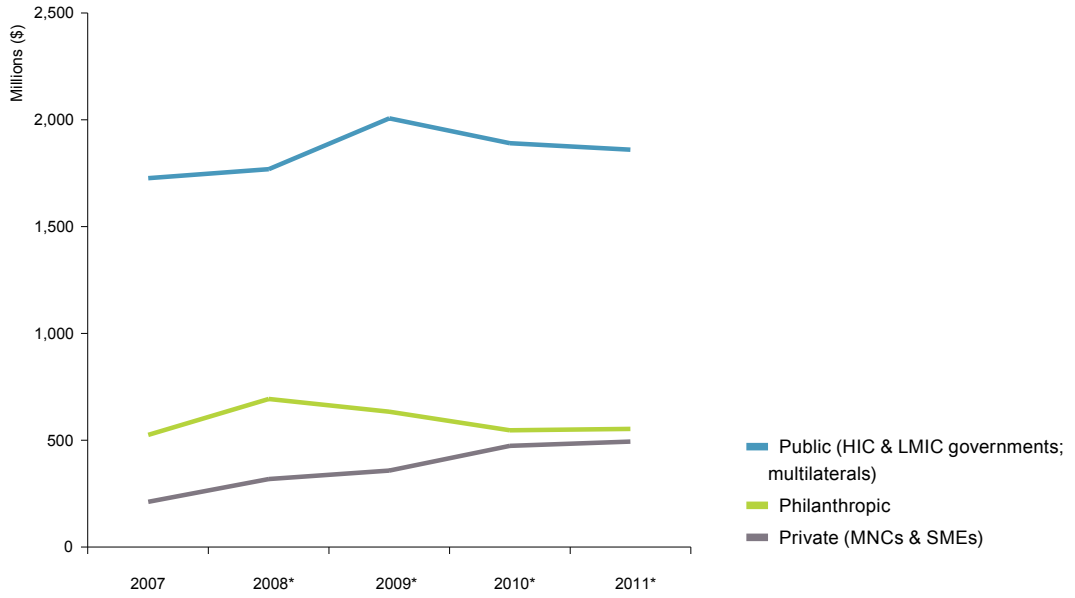
* Figures are adjusted for inflation and reported in 2007 US dollars

Industry drove the overall increase in dengue R&D funding between 2008 and 2011 (total funding up $115.8m, 107.4%), almost entirely due to increased MNC investment into clinical development of vaccines. In response, philanthropic funders have increasingly moved out of this semi-commercial area of R&D, although public funding for dengue R&D continues largely unchanged. For bacterial pneumonia & meningitis R&D, industry has been the dominant funder and provided a generally steady stream of funding, although funding increases have come from the public and philanthropic sectors. In terms of TB, industry has played a stabilising role in the wake of the global financial crisis, with increased industry investment of $33.2m between 2009 and 2011, offsetting cuts in both public (down $39.9m) and philanthropic funding (down $5.7m) of TB R&D.

OVERALL IMPACT

As noted earlier, over the past five years we have seen largely stable public funding with a shift towards basic research, declining philanthropic funding with a slight shift towards product development, and increasing industry funding that is almost entirely focused on product development. Overall, these changes have largely offset each other. However, the distinctly different research focus of each group, and their changing funding shares relative to each other over the past five years, have impacted on R&D for individual diseases within the overall neglected disease group.

Figure 34. Total funding by funder type 2007-2011



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

Despite initial fears, the global financial crisis has not had a dramatic impact on overall neglected disease R&D funding

Overall funding for neglected disease R&D has not declined significantly following the global financial crisis. Although public funding dipped moderately in 2010, it essentially stabilised in 2011, while decreases in philanthropic funding after 2008 (possibly due to cyclical grant funding) have been mostly offset by increased industry funding, which has been largely impervious to the effect of the global financial crisis.

It will be important to maintain a watching brief over the next few years, to monitor for both the anticipated cyclical increases in philanthropic funding and for the robustness of public funding. Should either of these fail, then funding stability is uncertain; particularly as industry funding is very uneven across diseases.

Differing investment patterns are favouring some neglected diseases over others

One result of changes in funding share over the past five years is that the overall mix of R&D funding has shifted towards the semi-commercial diseases (dengue, TB, and bacterial pneumonia & meningitis). These diseases have increased their share of global neglected disease R&D funding from 22.4% of total funding in 2008 to 28.0% in 2011.

Differing investment patterns between sectors not only influence the volume of funding for a given disease but also the type of research funded. An average 70% of funding for the semi-commercial diseases is invested into product development, reflecting high industry involvement. In comparison, product development accounts for only around 50% of funding in the non-commercial diseases, with even further distinctions within this. For those non-commercial diseases where the philanthropic sector has a significant stake, average investment in product development is relatively high (around 60%). However, for non-commercial diseases that rely almost exclusively on the public sector, on average only 45% of funding is invested into product development. Where funding levels for a given disease are high this is less important, but if a disease has both low funding and a low focus on product development, outcomes are likely to be poor.

While the type of funder is a strong factor, other elements also influence the investment balance between product development and basic research. Some diseases, such as Buruli ulcer, have a greater need for basic research because their related epidemiology, pathology, immunology or means of transmission are still poorly understood. And it is clearly the role of public funders to fund basic research, an area which is of less interest to many philanthropic organisations and is outside the remit of industry. Nevertheless, it remains a fact that funding patterns do not always correlate strongly with need, and that lack of product development funding for diseases that rely on the public sector will reduce their chance of finding both preventives and cures for affected patients.

We are likely to see a product development crunch for non-commercial diseases in the coming years if public funding continues to shift towards basic research and philanthropic funding continues to decline.

PDPs appear to be diversifying their funding sources beyond philanthropy and aid agencies, but their funding streams remain tenuous

PDPs are highly dependent on the Gates Foundation and aid agencies, which provided almost 90% (53.6% and 35.0% respectively) of all PDP funding in the past five years. Both groups have steadily reduced their PDP funding in the past few years, although the Gates Foundation suggests that its reductions are chiefly cyclical and we may see a change in future years. Notably, PDPs appear to have moderately diversified their funding sources over recent years, with increases since 2009 from S&T agencies (the NIH and EC particularly) almost offsetting parallel funding cuts from aid agencies. Nevertheless, PDPs have still seen collective funding cuts of $71.9m (-14.1%) since 2009.

ANNEXE 1

Additional methodological considerations

IDENTIFICATION OF SURVEY RECIPIENTS

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 whereas additional Diagnostics organisations and SMEs were also included. In 2009, the survey was further expanded to capture major public funding agencies in an additional three developing countries: Ghana, Colombia and Thailand.

In 2011, there was no formal expansion of the G-FINDER survey. However, several organisations known to be active in malaria R&D were surveyed for the first time this year as part of a separate project to measure R&D funding into malaria elimination and eradication specific activities conducted on behalf of the Malaria Eradication Scientific Alliance (MESA). This report will be published separately in 2012.

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 2011 calendar year) that had the largest overlap with 2011. 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).[54,55] Foreign currencies were then converted to US dollars based on the 2007 average annual exchange rate as reported by the IMF.[56]
- For consistency, 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 2011 figures are also occasionally included; converted using the average annual exchange rate for 2011 as reported by the IMF.[56] When this occurs, the unadjusted (nominal US dollar) figure is shown in bracketed italicised text after the adjusted figure.

SURVEY TOOL AND PROCESS

Following the methodology used in the G-FINDER 2011, the following core principles were followed:

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 and the National Institute of Allergy and Infectious Diseases.

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 2011 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 8,000 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

Although the number of survey recipients increased this year (from 889 in 2010 to 903 in 2011), the overall response rate decreased (from 240 in 2010 to 204 in 2011) as fewer organisations were actively followed up. 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 5-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 OneWorld Health, the Special Programme for Research and Training in Tropical Diseases (TDR) and 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 Research, condition, and Disease Categorization Process (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, 2007 data is least comparable to the other years. This report therefore 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 2012, use a different structure than the US NIH database used in 2008. This means reports obtained from RCDC and RePORTER in years two to five 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.[57] 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 Year Five of the survey.

VARIATION BETWEEN SURVEYS

Annual surveys of global R&D investment into some neglected diseases such as HIV/AIDS and TB in 2011 have been published or are expected to be published soon. 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
Lewellys F. Barker	Aeras	Director of Clinical Development
Ted Bianco	Wellcome Trust	Director of Technology Transfer
Simon Croft	London School of Hygiene & Tropical Medicine (LSHTM)	Professor of Parasitology and Head of the Faculty of Infectious and Tropical Diseases
Michael J. Free	Program for Appropriate Technology in Health (PATH)	Vice President and Senior Advisor for Technologies Global Program Leader, Technology Solutions
Nirmal K. Ganguly	Centre for Health Technology, National Institute for Immunology, India	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	Innovative Vector Control Consortium (IVCC)	Chief Executive Officer
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)	Assistant Director-General - Innovation, Information, Evidence and Research
Wayne Koff	International AIDS Vaccine Initiative (IAVI)	Senior Vice President and Chief Scientific Officer
Regina Rabinovich	Bill & Melinda Gates Foundation	Director, Enteric & Diarrheal Diseases and Pneumonia, Interim Director Malaria Global Health Program
Robert Ridley	World Health Organization: WHO-based Special Programme for Research and Training in Tropical Diseases (TDR)	Director

ADVISORY COMMITTEE MEMBER	ORGANISATION	TITLE
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-aventis	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
- Aché Laboratories
- Acumen Fund*
- Advinus Therapeutics
- Aeras
- African Medical Research Foundaton (AMREF)*
- American Foundation for AIDS Research (amfAR)*
- American Leprosy Missions
- Anacor Pharmaceuticals
- Argentinean Ministry of Science, Technology and Productive Innovation
- Argentinean National Council for Scientific and Technical Research (CONICET)
- AstraZeneca
- Australian Government Department of Innovation, Industry, Science and Research
  - including data from Australian Research Council (ARC)
- Australian National Health and Medical Research Council (NHMRC)
- BASF Corporation
- Bayer CropScience
- Baylor College of Medicine
- Belgian Ministry of Foreign Affairs
  - including data from Belgian Development Cooperation (DGDC)
- Bill & Melinda Gates Foundation
- Bio Manguinhos
- Biological E Limited
- Brazilian Innovation Agency (FINEP)
- Brazilian Ministry of Health: Department of Science and Technology (DECIT)
- Brazilian Ministry of Health: National STD and AIDS Programme*
- Burnet Institute (previously the Macfarlane Burnet Institute for Medical Research and Public Health)
- Campbell Foundation*
- Canadian Institutes of Health Research (CIHR)
- Canadian International Development Agency (CIDA)
- Caprion Proteomics
- Carlos III Health Institute
- Catalan Agency for Development Cooperation (ACCD)
- Catalan Health Department
- Cebu Leprosy and Tuberculosis Research Foundation (CLTRF); previously the American Leprosy Foundation/Leonard Wood Memorial
- Celgene Corporation
- Cepheid
- Chiangmai University*
- Chilean National Commission for Scientific and Technological Research (CONICYT) (Associative Research Program- PIA)
- Chilean National Fund for Scientific and Technological Development (FONDECYT)
- China, Natural Science Foundation*
- Chinese Ministry of Science and Technology*
- Colombian Department for Science, Technology and Innovation (Colciencias)
- CONRAD*
- Crucell
- Dafra Pharma International Ltd.
- Daktari Diagnostics, Inc.
- Danish Bilharziasis Laboratory (DBL)
- Danish Ministry of Foreign Affairs
  - including data from Danish International Development Agency (DANIDA)
- 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 Inc.
- 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

- Esteve Laboratories*
- Estonian Research Council*
- Estonian Science Foundation*
- European Vaccine Initiative (EVI)
- European and Developing Countries Clinical Trials Partnership (EDCTP)
- European Commission
- European Molecular Biology Laboratory (EMBL)
- Female Health Company*
- FHI 360*
- FK Biotecnológia
- 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
- Fundacion Huesped*
- Genzyme
- GeoVax Labs, Inc.
- German Agency for Technical Cooperation (GTZ)*
- 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
- GlaxoSmithKline (GSK)
  - including data from GSK Bio
- Global Alliance for TB Drug Development (TB Alliance)
- Guatemalan Ministry of Public Health and Social Affairs
- Health Research Council of New Zealand (HRC)
- Hebron Farmacêutica Ltd.
- HIVACAT*
- 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)
- Inserm - Institute of Infectious Diseases
- Institut Pasteur
- Institute of Tropical Medicine Antwerp/Prince Leopold Institute of Tropical Medicine (ITM)
- Integral Molecular
- International AIDS Vaccine Initiative (IAVI)
- International Centre for Genetic Engineering and Biotechnology (ICGEB), India
- International HIV/AIDS Alliance
- International Partnership for Microbicides (IPM)*
- International Vaccine Institute (IVI)
  - including data from Dengue Vaccine Initiative (DVI)
- Inviragen, Inc.
- Irish Aid
- Isconova AB
- ISGlobal
- Italian Foundation Centre of San Raffaele del Monte Tabor*
- Johnson & Johnson
  - including data from Ortho-Clinical Diagnostics and Tibotec
- KNCV Tuberculosis Foundation
- Korean Institute of Tuberculosis
- LEPRA India - Blue Peter Public Health & Research Centre (BPHRC)
- Liverpool School of Tropical Medicine (LSTM)
- London School of Hygiene and Tropical Medicine (LSHTM)
- Mahidol University*
- Malaysian Ministry of Science and Technology (MOSTI)
  - including data from the National Biotechnology

ORGANISATION NAME

Division (BIOTEK)
- Mapp Biopharmaceuticals
- Max Planck Society - Max Planck Institute for Infection Biology (MPIIB)
- Médecins Sans Frontières España (MSF España)
- Medicines for Malaria Venture (MMV)
- Mexican National Institute of Public Health (INSP)
- Mexico National Council of Science and Technology (CONACYT)
- Microbicides Development Programme (MDP)
- Millennium Science Initiative (ICM) program at the Chilean Ministry for the Economy, Development and Tourism
- MSD
- Mymetics
- Netherlands Leprosy Relief (NLR)
- Nicaraguan Ministry of Health
- Norwegian Institute of Public Health
- Novartis
- OneWorld Health
- Otsuka Pharmaceutical Co., Ltd.
- Ouro Fino
  - including data from Alvos - Consultoria, Desenvolvimento e Comercializacao de Produtos Biotecnologicos S.A.
- Oxford - Emergent Tuberculosis Consortium (OETC)
- Papua New Guinea Health Promotion Branch
- Partec GmbH
- Pfizer
- PolyTherics Ltd.
- Program for Appropriate Technology in Health (PATH)
  - including data from Meningitis Vaccine Project (MVP), Malaria Vaccine Initiative (MVI), Technology Solutions, Vaccine Development, Vaccine Access and Delivery
- Public Health Agency of Canada (PHAC)
- Queensland Health
- Ragon Institute of MGH, MIT and Harvard*
- Research Council of Norway
- Robert Koch Institute
- Roche
- Royal Norwegian Ministry of Foreign Affairs
  - including data from Norwegian Agency for Development Cooperation (NORAD)
- Royal Tropical Institute (KIT)
- Sabin Vaccine Institute
- Sanofi Pasteur
- sanofi-aventis
- Sasakawa Memorial Health Foundation (SMHF)
- Sequella
- Serum Institute of India
- Shantha Biotechnics
- Sigma-Tau
- South Africa Medical Research Council (MRC)
- South African AIDS Vaccine Initiative (SAAVI)
- South African Department of Science and Technology (DST)
  - including data from the Technology Innovation Agency
- Spanish Clinical Foundation for Biomedical Research (FCRB)
- Spanish Ministry of Foreign Affairs and Cooperation for Development (MAEC)
  - including data from Agency of International Cooperation for Development (AECID)
- Spanish National Research Council (CSIC)
- Statens Serum Institute (SSI)
- Swedish International Development Agency (SIDA)
- Swedish Research Council
- Swiss Agency for Development and Cooperation (SDC)
- Swiss National Science Foundation (SNF)
- Swiss State Secretariat for Education and Research (SER)
- Swiss Tropical & Public Health Institute
- Syngenta Crop Protection AG
- Syntiron
- Thailand Government Pharmaceutical Organisation (GPO)
- Thailand National Science and Technology

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

ORGANISATION NAME
Development Agency (NSTDA)
• The Egmont Trust*
• The Leprosy Mission International (TLMI)
• The Walter and Eliza Hall Institute of Medical Research
• The Wellcome Trust
• The William and Flora Hewlett Foundation*
• TuBerculosis Vaccine Initiative (TBVI)
• UBS Optimus Foundation
• UK Department for International Development (DFID)
• UK Health Protection Agency: Centre for Emergency Preparedness and Response
• UK Medical Research Council (MRC)
• United States Agency for International Development (USAID)
• Universidad Autonoma de Yucatan
• University of Bergen
• University of Bristol
• University of Cambridge
• University of Dundee
• University of Georgia (UGA)
• University of kwaZulu Natal*
• University of North Carolina
• University of Siena
• US Centers for Disease Control (CDC)
• US Department of Defense (DOD) - including data from DOD Defense Advanced Research Projects Agency (DARPA)
• US National Institutes of Health (NIH)
• Vertex Pharmaceuticals Incorporated
• Vestergaard Frandsen SA*
• World Bank
• 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

Dr Mary Moran

Director

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 Organisation, European Commission, European and Developing Countries Clinical Trials Partnership, Global Alliance for Vaccines and Immunisation (GAVI), OECD and the Wellcome Trust.

Dr Javier Guzman

Director of Research

MBBS (Bachelor of Medicine, Bachelor of Surgery, Hons); MSc in Health Policy, Planning and Financing

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 currently doing an MBA-Executive at the Australian Graduate School of Management, Sydney.

Klara Henderson

Senior Policy Analyst

BA (Bachelor of Arts); MCOM (Master of Commerce); PhD (Faculty of Medicine, School of Public Health)

Klara Henderson has over 15 years' policy experience, including 10 years as an analyst with Anderson Consulting, and as a policy and strategic development consultant with numerous Australian government agencies.

She spent time in East Africa working on HIV/AIDS projects and was a HIV/AIDS policy and financing consultant for AusAID and UNDP Asia Pacific. She has a PhD in international health policy from the University of Sydney, focussing on HIV/AIDS political commitment and funding in East Timor. Klara joined the Policy Cures team in 2007.

Roni Liyanage

Senior Policy Analyst

BA (Bachelor of Arts); MPH (Master of Public Health); MBA (Master of Business Administration)

Roni Liyanage has more than 10 years' experience working in international health policy and advocacy. Prior to joining Policy Cures, Roni worked as an advocacy and communications specialist developing initiatives and campaigns for clients including the Bill & Melinda Gates Foundation, GAVI Alliance, Imperial College London, Malaria Consortium and the Roll Back Malaria partnership. Roni spent 5 years managing reproductive health and HIV prevention programmes for adolescents in sub-Saharan Africa.

Roni received his Bachelor of Arts in Human Sciences from Oxford University. He has a Master in Public Health from Johns Hopkins Bloomberg School of Public Health and an MBA from the London Business School. Roni joined the Policy Cures team in June 2011.

Lindsey Wu

Policy Analyst

BAS Biotechnology, BA Economics, MSc Biomedicine, Bioscience and Society

Lindsey has 5 years' experience in health policy, including as a healthcare policy consultant for The Lewin Group in Washington, DC, focussing on health technology assessments for the Agency for Healthcare Research and Quality (AHRQ), clinical data analysis for the National Institutes of Health (NIH), and evidence-based reviews of pharmacogenomics for the US Department of Health and Human Services (DHHS).

Lindsey received a Bachelor of Applied Science in Biotechnology and a BA in Economics from the University of Pennsylvania, and an MSc from the London School of Economics. Lindsey joined the team as a Research Associate in February 2008.

Edwina Chin

Policy Analyst

Bachelor of Laws (Honours); BA (Bachelor of Arts); Diploma in Modern Languages (French)

Edwina has 4 years' experience in health and innovation law and policy. Prior to joining Policy Cures, Edwina worked as an intellectual property lawyer for Mallesons Stephen Jaques and as an adviser to the Australian Federal Minister for Innovation, Industry, Science and Research, providing policy advice on research and development incentives and the pharmaceutical, biotechnology and venture capital industries. Edwina has also worked as a Policy & Program Manager for Health and HIV Section at the Australian Agency for International Development (AusAID), managing a range of programs and policy issues relating to malaria, emerging infectious diseases and non-communicable diseases in the developing world.

Edwina received a Bachelor of Laws (Honours), a Bachelor of Arts and a Diploma in Modern Languages (French) from The University of Melbourne. Edwina joined Policy Cures as a Policy Analyst in April 2012.

Dr Nick Chapman

Policy Analyst

MBBS (Bachelor of Medicine, Bachelor of Surgery, Hons); BMedSci (Bachelor of Medical Science); MHR (Master of Human Rights, Merit)

Nick Chapman has 5 years' experience in health policy and practice. He has worked as a doctor in Tasmania, where he completed his medical training, during which time he was involved in a number of primary clinical research projects. Prior to joining Policy Cures, he worked with Oxfam Australia and the Australian Human Rights Commission, focussing on Indigenous health policy.

Nick has a Bachelor of Medicine, Bachelor of Surgery, and a Bachelor of Medical Science from the University of Tasmania, and a Master of Human Rights from the University of Sydney. He joined the Policy Cures team in September 2010.

Lisette Abela-Oversteegen

Policy Analyst

B (Bachelor of Health); MSc in Public Health

Lisette has 5 years' experience as a commercial analyst of the pharmaceutical industry and a further 2 years in health policy. In her last role working for business information company Datamonitor, she focussed on collecting and analysing market data and formulating strategic insights and recommendations for the pharmaceutical sector. Lisette also worked as a volunteer in several projects in Kenya and Chile focussing on sexual health education.

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. Lisette joined the Policy Cures team in October 2010.

Dimitris Gouglas

Consultant

BSc Economics, MSc Health Policy, Planning and Financing, MSc Financial Economics

Dimitris joined Policy Cures in August 2010. He previously worked in EU project consulting with a focus on public health and health policy research programmes of the European Commission. Dimitris was a Project Manager at the National School of Public Health of Greece, and a Research Assistant at the LSE Health, the George Institute for International Health, and the Personal and Social Services Research Unit (PSSRU). Dimitris has a BSc in Economics from SOAS, University of London, an MSc in Health Policy, Planning and Financing from LSE and LSHTM, University of London, and an MSc in Financial Economics from CeFiMS, University of London.

Danica Kwong

Research Associate

BA Economics, MSc Public Health

Danica has been a Research Associate with Policy Cures since January 2012. She has previously worked in pharmaceutical outcomes research and healthcare market research in Canada. More recently, Danica was an intern with the Global Fund to Fight AIDS, Tuberculosis & Malaria, working on policies related to multi-stakeholder country ownership of grants.

Danica has a BA in Economics from McGill University and an MSc in Public Health from the London School of Hygiene and Tropical Medicine, where she focussed on access to medicines in the developing world.

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