G-FINDER | 2014

POLICYCURES

NEGLECTED DISEASE RESEARCH AND DEVELOPMENT: **EMERGING TRENDS**

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ACKNOWLEDGEMENTS

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

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The survey

The seventh G-FINDER survey reports on 2013 global investment into research and development (R&D) of new products for neglected diseases, and identifies trends and patterns across the seven years of global G-FINDER data. In all, 197 organisations completed the survey in 2013, which covered:

- 34 neglected diseases
- 138 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.

A key change for the 2014 report is that all years' data is reported in 2013 US dollars (US$), not converted to a 2007 US$ baseline as in previous reports. A further change is that, following a review by our new Advisory Committee (AC), the survey has been expanded to include three additional diseases: cryptococcal meningitis, hepatitis C genotype 4 and leptospirosis. The AC review also identified the increased commercialisation of dengue vaccine R&D. As a result, dengue vaccines no longer fit the criteria for inclusion in the G-FINDER survey, and investments in dengue vaccines were excluded retrospectively. This does not affect other dengue products, which will continue to be included.

Findings

In 2013, a reported $3,219m was invested in neglected disease R&D, consisting of $2,964m from repeat survey participants (called year-on-year – YOY – funders) and $254m from irregular survey participants. Although a substantial investment, this represented a significant drop from 2012 levels, with YOY funding down by $193m (-6.2%). This decline more than offset the moderate rise in YOY funding in 2012 (up $86m, 2.8%).

FUNDING BY DISEASE

As in previous years, the three 'top tier' diseases – HIV/AIDS, malaria and tuberculosis (TB) – received the vast majority of global neglected disease R&D funding. While funding for all tiers dropped in 2013, the top tier diseases saw a far larger decrease in YOY funding than the second tier, leading to a further evening out of funding share between tiers. TB was the only top tier disease to see an increase in YOY funding (up $16m, 3.1%) in 2013. After an increase in investment in HIV/AIDS last year, funding for this disease dropped again this year (down $95m, -8.3%). Malaria funding continued to drop with a $51m fall (-9.1%).

The 'second tier' diseases include diarrhoeal diseases, kinetoplastids, bacterial pneumonia & meningitis, helminth infections, dengue, salmonella infections and hepatitis C genotype 4. Within this group, bacterial pneumonia & meningitis saw a moderate YOY decrease (down $26m, -26%), as did kinetoplastids (down $23m, -18%). On the other hand, increased funding was reported for diarrhoeal diseases (up $21m, 14%) and salmonella infections (up $3.5m, 6.6%). Investment in the remaining second tier diseases was fairly stable. The 'third tier' diseases – leprosy, Buruli ulcer, trachoma, cryptococcal meningitis, rheumatic fever and leptospirosis – each continued to receive less than 0.5% of global R&D funding.

Funding for platform technologies – adjuvants and immunomodulators, general diagnostic platforms, and delivery technologies and devices – saw a small YOY decrease due to a drop in adjuvant and immunomodulator investment (down $6.3m, -23%). Core funding – investments that are not earmarked and are given to organisations working on multiple neglected diseases – remained stable at $120m.

FUNDERS

The US budget sequester had a major impact

As in previous years, the public sector played a key role in neglected disease R&D, providing two-thirds of funding ($2,128m, 66%), predominantly from high-income country governments ($2,001m, 94% of public sector funding). The philanthropic sector contributed $688m (21%) while industry invested $401m (12%). Please note that reported industry funding for all years is substantially lower than figures in previous G-FINDER reports, since dengue vaccine R&D has been fully excluded (this is an area in which industry had significant investments).

In line with previous years, the top three public funders were the US, the European Commission (EC) and the UK. Of these, the US was the only public funder to decrease YOY investment in neglected disease R&D (down $184m, -11%) due to the impact of the US budget sequester, which led to a significant drop from the US National Institutes of Health (NIH, down $188m, -13%). Six other top 12 government funders also reduced their YOY investment, including Australia (down $16m, -36%) and Germany (down $15m, -46%). Funding from the UK increased by $27m (up 31%), reflecting a $26m (up 62%) climb in UK Department for International Development's (DFID) funding. Other notable increases included France (up $24m, 41%), the EC (up $18m, 18%) and the Netherlands (up $12m, 86%).

YOY philanthropic funding was fairly stable, increasing by $5.1m (up 0.8%). This marginal change was the result of a $17m (up 3.4%) increase from the Bill & Melinda Gates Foundation (Gates Foundation) – by far the largest philanthropic funder in 2013 – partly offset by an $11m (-8.2%) decrease from the Wellcome Trust. Multinational pharmaceutical companies (MNCs) were solely responsible for the drop in industry investment, decreasing funding by $38m (-11%).

FUNDING FLOWS

Just over three-quarters of 2013 R&D funding (76% or $2,431m) was in the form of external grants from science and technology agencies (S&T, $1,432m, 59%), philanthropy ($688m, 28%), aid agencies ($205m, 8.5%) and other funders ($106m, 4.4%). This was a decrease of $132m (-5.5%) on 2012, due to large cuts in grant funding from the US NIH, the world's largest S&T agency.

Funding to PDPs increased for the first time since 2008

Product development partnerships (PDPs) received $482m (15%) of neglected disease R&D funding in 2013. This year saw the first YOY increase in PDP funding in five years (up $28m, 6.5%), slightly reversing funding cuts since 2008. The rise mainly came from aid agencies (up $34m, 24%), which was offset by a small decrease from the philanthropic sector (down $7.8m, -3.1%).

DISCUSSION

The US budget sequester had a significant impact on neglected disease R&D funding in 2013

- As by far the world's largest government funder, any changes in US Government funding patterns or policy have a substantial impact on global trends
- In 2013, total YOY neglected disease R&D funding dropped by $193m (-6.2%), primarily as a result of the 2013 US budget sequester. The sequester lowered the US NIH's budget across all health and research areas, with its neglected disease R&D funding seeing a $188m (-13%) funding cut. European public funders only partly offset the impact of the US sequester, increasing their funding by $46m (up 13%).

2013 saw the first increase in funding to PDPs in five years

- Over the past five years, PDP funding from both its main sources has been declining; YOY aid agency funding dropped by $92m (-39%) between 2009 and 2012, while philanthropic funding has decreased by $152m (-38%) since 2008
- 2013, however, saw the first increase in funding to PDPs in the past five years, entirely due to an increase in aid agency funding (up $34m, 24%). These increases were largely from European funders, in particular UK DFID, up $26m (up 62%) due to the first disbursement of a new five-year funding stream to PDPs
- The net result was a slight upturn (up $28m, 6.5%) in investment into PDPs in 2013, although funding was still down 12% (down $63m) on 2007 levels. Sustained and increased funding will be needed as products from PDPs come into large late-stage trials.

Industry funding is low and declining

- The removal of dengue vaccines, an increasingly commercial area, from G-FINDER in 2013 has allowed trends in industry investment to be seen more clearly; industry contributed only 12% of global funding for neglected disease R&D
- Industry funding has also been declining since 2010, with a YOY drop of $74m (-19%) between 2010 and 2013 due to falls in malaria and TB funding. The malaria funding fluctuations appear to reflect normal changes in the pipeline; however, TB R&D presents a different story. Industry TB funding decreased by over a quarter (down $45m, -27%) from 2010 to 2013
- Industry TB funding drops were almost entirely due to decreased investment in the early drug pipeline, with three companies reporting no further investment in early stage drug development in 2013, and one additional company reporting substantially decreased funding. It was also unclear whether companies with late-stage drugs were continuing to fill their early TB drug pipeline.

Changing funding patterns from the Gates Foundation

- Although still far from their highest level of funding in 2008, 2013 saw the first increase in overall funding by the Gates Foundation in five years, largely due to greater investments in industry and other mechanisms.
- The Gates Foundation remains the largest funder of PDPs, with a 2013 investment of $234m (45% of Gates Foundation funding). Since the 2008 funding peak, there has been a decrease of $148m (-39%) in Gates Foundation funding to PDPs, meaning that their PDP funding has decreased to levels lower than in 2007. This could be attributed to a shift from largely core funding to PDPs to project-based funding, and the lack of advancements in late-stage trials in recent years.
- Conversely, Gates Foundation funding to industry, and other philanthropic and non-profit organisations more than tripled (up $54m) from 2008 to 2013. Although still a small percentage of its investments, funding to industry increased from $2.6m in 2008 to $30m in 2013, while funding to other philanthropic and non-profit organisations increased by $27m (up 146%) over the same period.

INTRODUCTION

Background to the G-FINDER survey

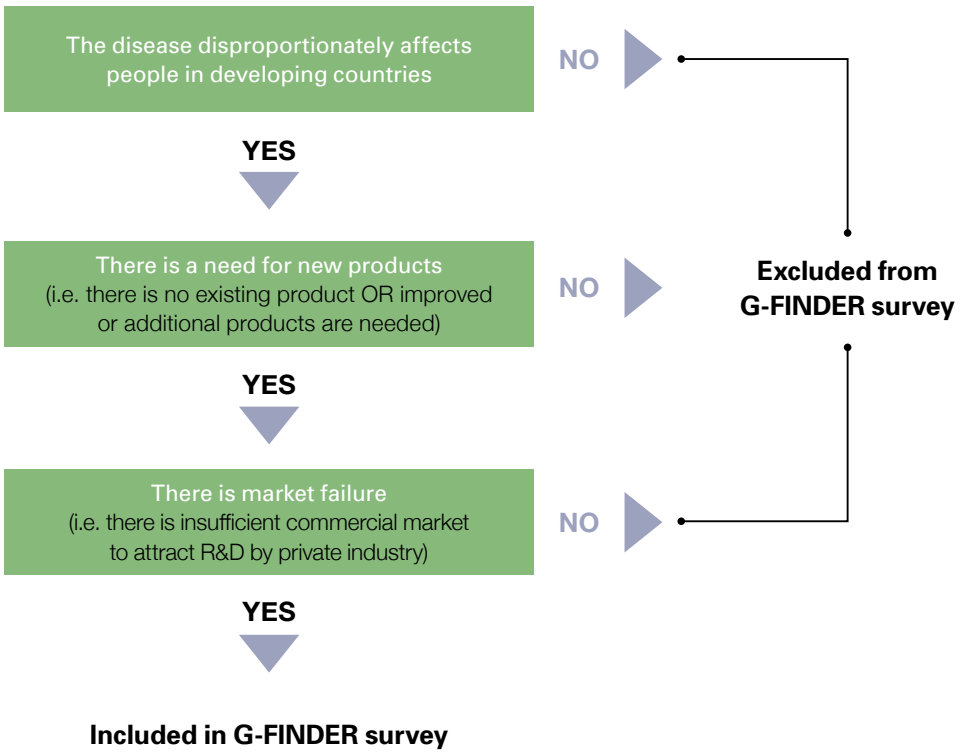
The first six G-FINDER reports have shed light on global investment into research and development (R&D) of new products to prevent, diagnose, manage or cure neglected diseases of the developing world each year since 2007. The seventh G-FINDER survey reports on 2013 investments.

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. Filter to determine G-FINDER inclusions



Three new diseases are being tracked 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 commercial 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 and 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.

The initial scope of G-FINDER diseases and eligible R&D areas was determined in the first survey year (2007) in consultation with an international Advisory Committee (AC) of experts in neglected diseases and neglected disease product development. A second 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.

In year seven, following a review by our new AC (Annexe 2), the survey has been expanded to include three additional diseases: cryptococcal meningitis, hepatitis C genotype 4 and leptospirosis. The AC review also identified the increased commercialisation of dengue vaccine R&D. As a result, dengue vaccines no longer fit the criteria for inclusion in the G-FINDER survey, and investments in dengue vaccines will be excluded retrospectively. This does not affect other dengue products, which will continue to be included.

In year seven, an Expert Advisory Group (EAG) was also set up to advise on reproductive health R&D funding, which we have collected for the first time this year, with the first reproductive health R&D report to be released in early 2015. This new G-FINDER reproductive health survey means that some funding previously categorised as HIV/AIDS microbicides research will now instead be included in the reproductive health report under the category of Multipurpose Prevention Technologies that include a microbicide.

Vaccines for dengue are no longer included

The final agreed scope of G-FINDER neglected diseases, products and technologies is shown in Table 1.

Table 1. G-FINDER neglected diseases, products and technologies

Disease		Basic research	Drugs	Vaccines (Preventive)	Diagnostics	Microbicides	Vaccines (Therapeutic)	Vector control products
HIV/AIDS		R	R	Y	Y	Y		
TB		Y	Y	Y	Y		Y	
Malaria	*P. falciparum*	Y	Y	Y	Y			Y
	P. vivax	Y	Y	Y	Y			Y
	Other and/or unspecified malaria strains	Y	Y	Y	Y			Y
Diarrhoeal diseases	Rotavirus			R				
	Enterotoxigenic *E. coli* (ETEC)			Y	Y			
	Cholera	Y	R	Y	Y			
	Shigella	Y	R	Y	Y			
	Cryptosporidium	Y	R	Y	Y			
	Enteroaggregative *E.coli* (EAggEC)			Y	Y			
	Giardia				Y			
	Multiple diseases	Y	R	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
Bacterial pneumonia & meningitis	*S. pneumoniae*			R	Y			
	N. meningitidis			R	Y			
	Both bacteria				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
Dengue		Y	Y		Y			Y
Salmonella infections	Non-typhoidal *S. 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			
Hepatitis C genotype 4			Y	Y	Y			
Leprosy		Y	Y		Y			
Buruli ulcer		Y	Y	Y	Y			
Trachoma				Y	Y			
Cryptococcal meningitis			Y					
Rheumatic fever				Y				
Leptospirosis					R			

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

'R' denotes a restricted category where only some investments are eligible, as defined in the neglected disease R&D scope document
'Y' denotes a category where a disease or product is 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 investment 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] 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.

Participating 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. 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 seventh G-FINDER survey was open for a six-week period from May to June 2014, during which intensive follow-up and support for key recipients led to a total of 8,938 entries being recorded in the database for financial year 2013.

With the exception of grants from major key funders in particular the US NIH, 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 and biotechnology companies (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?

In 2013, 203 organisations participated in the G-FINDER survey. Of these, 177 reported neglected disease data and 31 reported reproductive health data (25 organisations reported both); an additional 20 reported no investment. Participation was consistent with 2012, where 201 organisations reported neglected disease data, 20 of which had no investment to report.

G-FINDER is primarily a survey of funding, and thus of funders. In its seventh year, 132 funders in 30 countries around the world participated in the survey. These included:

- Public, private and philanthropic funders in:
  - High Income Countries (HICs) that are part of the Organisation for Economic Co-operation and Development (OECD)
  - European Union (EU) Member States and the European Commission (EC)
  - HICs outside the OECD, but with a significant research base (such as Taiwan)
- Public funders in three Innovative Developing Countries (IDCs) (South Africa, Brazil and India)
- Public funders in an additional six Low- and Middle-Income Countries (LMICs) (Argentina, Chile, Ghana, Mexico, Russia, and Thailand)
- Private sector funders in three LMICs (Brazil, India, and South Africa).

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.

HOW WERE CHANGES IN PARTICIPATION MANAGED?

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

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

Reading the findings

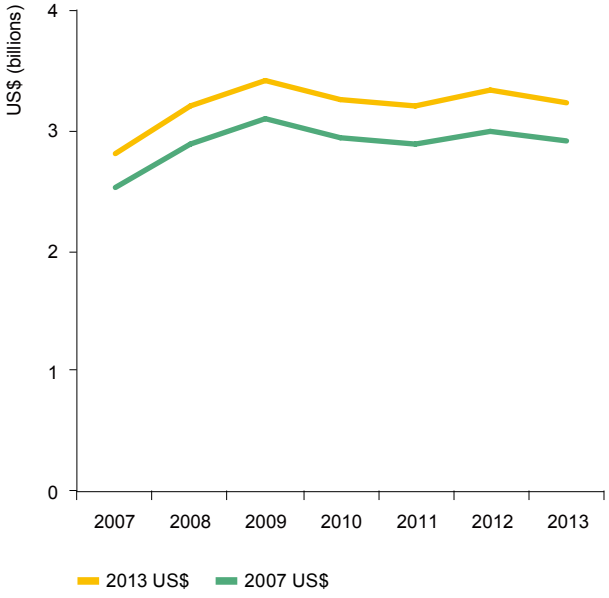
The seventh G-FINDER survey collected data on financial year 2013 investments. Throughout the text, we refer to survey years as follows: 2007 refers to financial year 2007 (year one of the survey), 2008 refers to financial year 2008 (year two of the survey) and so on up to the current year (financial year 2013, year seven of the survey).

In a major change, all funding will be reported in current dollars

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

As in previous G-FINDER reports, all funding data has been adjusted for inflation and converted to US dollars (US$) to eliminate artefactual effects caused by inflation and exchange rate fluctuations, thus allowing accurate comparison of YOY changes. However, in response to participant requests, we have updated the base year for reported funding from 2007 US$ (as used in previous G-FINDER reports) to 2013 US$ (the current financial year of the survey). Future G-FINDER reports will report data in US$ of the current financial year of the survey; for example, the report for financial year 2014 will report in 2014 US$.

Figure 2. Effect of currency rebase on reported total funding



As a result of this rebasing, historical G-FINDER data for the years 2007 to 2012 included in this report will differ from the figures published in previous G-FINDER reports (since this data is now reported in 2013 US$ rather than in 2007 US$), but the relative YOY funding changes are essentially unaffected, as shown in Figure 2.

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

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

Around 2.9% ($93m) 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.

A further 3.7% ($120m) was given as core funding to R&D organisations that work in multiple disease areas, for example, the European and Developing Countries Clinical Trial Partnership (EDCTP) and the Foundation for Innovative New Diagnostics (FIND). As this funding could not be accurately allocated by disease it was reported as unallocated core funding. In cases where grants to a multi-disease organisation were earmarked for a specific disease or product, they were included under the specific disease-product area.

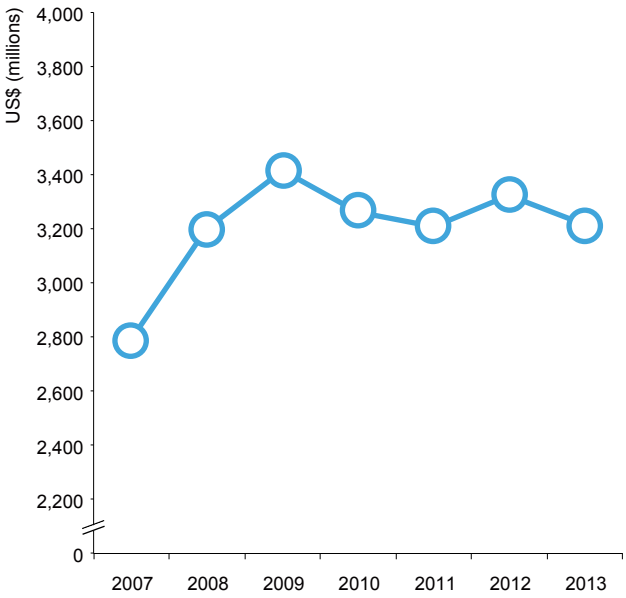
Finally, readers should be aware that, as with all surveys, there are limitations to the data presented. Survey non-completion by funders will have an impact, as will methodological choices (see Online annexe A for further details).

FUNDING BY DISEASE

In 2013, a reported $3,219m was invested in neglected disease R&D,[i] consisting of $2,964m from repeat survey participants (called year-on-year – YOY – funders) and $254m reported by irregular survey participants.

Although a substantial investment, this nevertheless represented a significant drop from 2012 levels, with YOY funding down by $193m (-6.2%). This decline more than offset the moderate rise in YOY funding in 2012 (up $86m, 2.8%).

Figure 3. Total R&D funding 2007-2013



As in previous years, diseases fell into three distinct tiers when analysed by funding levels. We note that G-FINDER was expanded in 2013 to include one additional disease in the second tier – hepatitis C genotype 4 – and two additional diseases in the third tier – cryptococcal meningitis and leptospirosis. These new diseases are excluded from all trend analysis in this report.

The 'top tier' diseases – HIV/AIDS, TB and malaria – collectively received over two-thirds ($2,217m, 69%) of total global neglected disease R&D funding, with HIV/AIDS receiving 34%, TB 18% and malaria 17%. TB was the only top tier disease that saw an increase in YOY funding (up $16m, 3.1%). HIV/AIDS funding decreased in 2013 (down $95m, -8.3%), after a rise in 2012 (up $41m, 3.7%); while malaria funding decreased again (down $51m, -9.1%), following a 2012 drop of $21m (-3.5%).

'Second tier' diseases are those that received between 1.0% and 10% of total funding, including diarrhoeal diseases, kinetoplastids, bacterial pneumonia & meningitis, helminth infections, dengue, salmonella infections and hepatitis C genotype 4. Bacterial pneumonia & meningitis saw a moderate decrease in YOY funding (down $26m, -26%), as did kinetoplastids (down $23m, -18%), while funding increased for diarrhoeal diseases (up $21m, 14%) and salmonella infections (up $3.5m, 6.6%). Investment in the remaining second tier diseases was essentially stable.

The 'third tier' diseases each received less than 0.5% of global funding, making them the most poorly funded of the neglected diseases covered in this report. These include leprosy, Buruli ulcer, trachoma, cryptococcal meningitis, rheumatic fever and leptospirosis. Trends for third tier diseases could not be analysed due to the very small numbers of funders and grants they receive in any year.

[i] A review by the G-FINDER AC in 2013 identified the increased commercialisation of dengue vaccine R&D since year one of the survey. As a result, dengue vaccines no longer fit the criteria for inclusion in the G-FINDER survey and funding for all dengue vaccine R&D, including previous years' funding, is excluded from this report

Table 2. R&D funding by disease 2007-2013^

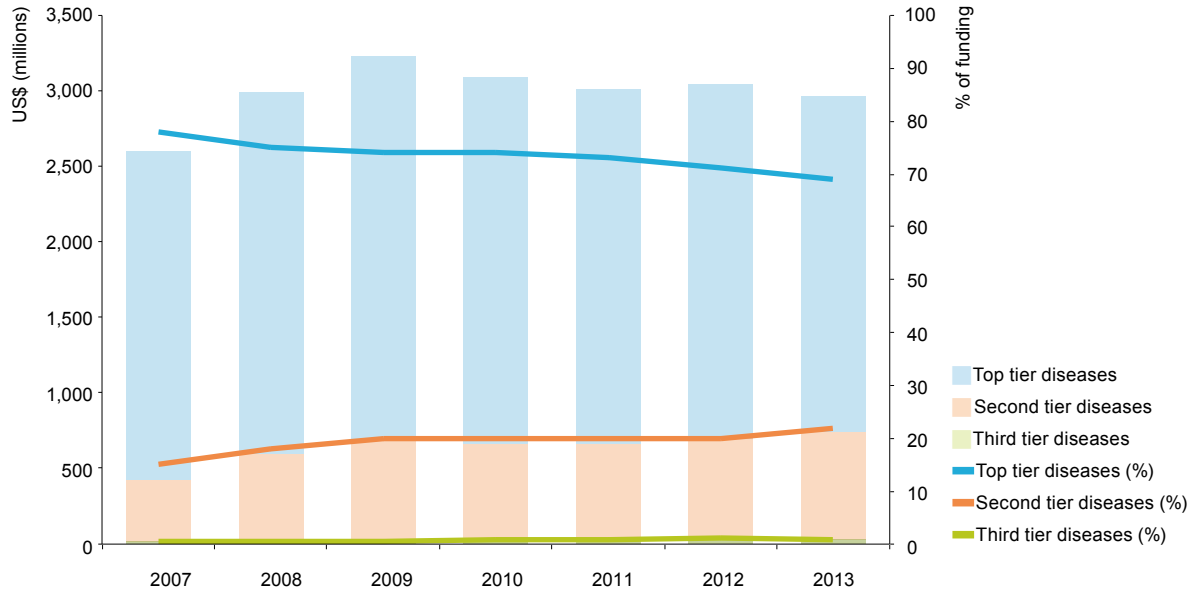
Disease or R&D area	US$ (millions)						2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013	
HIV/AIDS	1,205	1,299	1,268	1,196	1,150	1,187	1,089	34.0
Tuberculosis	456	497	613	636	584	562	580	18.0
Malaria	509	598	656	591	609	596	549	17.0
Diarrhoeal diseases	127	149	202	178	171	170	200	6.2
Kinetoplastids	136	153	179	161	144	149	124	3.8
Bacterial pneumonia & meningitis	35.6	101	76.4	104	109	111	105	3.3
Helminths (worms & flukes)	57.6	74.7	88.7	82.5	90.1	93.9	94.1	2.9
Dengue	51.6	53.5	82.1	69.8	79.7	81.4	75.8	2.4
Salmonella infections	10.1	43.9	43.9	48.7	48.9	58.0	65.4	2.0
Hepatitis C genotype 4							50.6	1.6
Leprosy	6.6	11.3	12.3	10.3	8.6	15.0	12.8	0.4
Buruli ulcer	2.7	2.2	2.0	6.1	6.5	6.8	7.2	0.2
Trachoma	1.6	2.3	2.0	5.1	10.8	9.7	5.9	0.2
Cryptococcal meningitis							3.2	0.1
Rheumatic fever	2.0	2.6	3.5	2.2	1.0	1.0	0.9	<0.1
Leptospirosis							0.4	<0.1
Platform technologies	11.3	17.9	24.8	30.6	19.1	49.6	43.9	1.4
Adjuvants and immunomodulators	3.4	2.5	6.3	10.3	5.8	27.4	20.9	0.7
General diagnostic platforms	5.7	5.9	9.7	10.6	11.3	17.3	17.0	0.5
Delivery technologies and devices	2.1	9.6	8.8	9.8	1.9	4.8	6.0	0.2
Core funding of a multi-disease R&D organisation	122	112	80.6	83.5	101	117	120	3.7
Unspecified disease	58.3	84.2	85.2	54.0	73.1	114	93.1	2.9
Disease total	2,793	3,201	3,419	3,259	3,206	3,321	3,219	100

^ 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

New disease added to G-FINDER in 2013

While YOY funding for all tiers dropped in 2013, the top tier diseases saw a far larger decrease in funding (down $131m, -5.9%) than the second tier (down $27m, -4.5%). This led to a further evening out of funding share between the tiers, with top tier diseases receiving 69% of funding in 2013 (compared to 71% in 2012 and 75% in 2008); while second tier diseases received 22% (up from 20% in 2012 and 18% in 2008). Third tier diseases saw a small decrease in overall share to 0.9% (down from 1.0% in 2012).

Figure 4. Funding distribution 2007-2013^



^ Percentages do not add to 100% because of non-disease specific and unclassified funding

Platform technologies are those that can potentially be applied to a range of areas, but which are not yet focused on a specific product or disease. Platform technology investment totalled $44m in 2013. Investment from YOY funders decreased by $4.4m (-9.3%) due to a decrease in funding to adjuvants and immunomodulators (down $6.3m, -23%), partly countered by a small increase to delivery technologies and devices (up $1.3m, 28%). Funding for diagnostic platforms remained stable (up $0.6m, 3.7%). The drop in funding to adjuvants and immunomodulators was mostly due to a decrease from the Bill & Melinda Gates Foundation (Gates Foundation, down $4.3m, -47%) although this followed a $5.3m (up 142%) rise in 2012, likely reflecting cyclical grant disbursement.

Core funding – investment that was given to an organisation that researches and develops products for multiple neglected diseases and was not earmarked for a specific disease – was $120m in 2013. YOY core funding was stable compared to 2012 (down $0.4m, -0.4%).

HIV/AIDS

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

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

The rapid mutation of the HIV virus has posed a significant challenge for vaccine development, with an efficacious vaccine still many years away. Whilst proving for the first time that a vaccine could prevent HIV infection, Phase III clinical trials of the most advanced vaccine candidate (a prime boost combination) in 2009, demonstrated a very modest 30% efficacy.[4] Antiretroviral (ARV) drugs are available, but many are not adapted for DC use, and paediatric formulations and FDCs are needed. Current methods for early diagnosis and support of HIV treatment are also often unsuitable for DCs, although there has been progress towards robust, simple, rapid point-of-care diagnostics, with several promising candidates in preclinical and clinical development.[5] The LYNX HIV p24 Antigen Test, the only platform in the pipeline dedicated entirely to early infant diagnosis, is undergoing evaluation in Africa and Asia.[6]

Following several failures of microbicide candidates in Phase II/III trials (PRO 2000®, BufferGel® and VivaGel®), new candidates using active ingredients from ARVs had promising results in Phase II and Phase III trials. Dapivirine gel has completed Phase I/II trials.[7,8] Tenofovir gel is being further evaluated in another Phase III trial, FACTS 001.[9] However, resistance to the ARV component of these microbicides in HIV-infected individuals or those who develop HIV while using the microbicide is a growing concern.[5]

TOTAL SPEND ON HIV/AIDS R&D IN 2013

OF GLOBAL R&D FUNDING

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

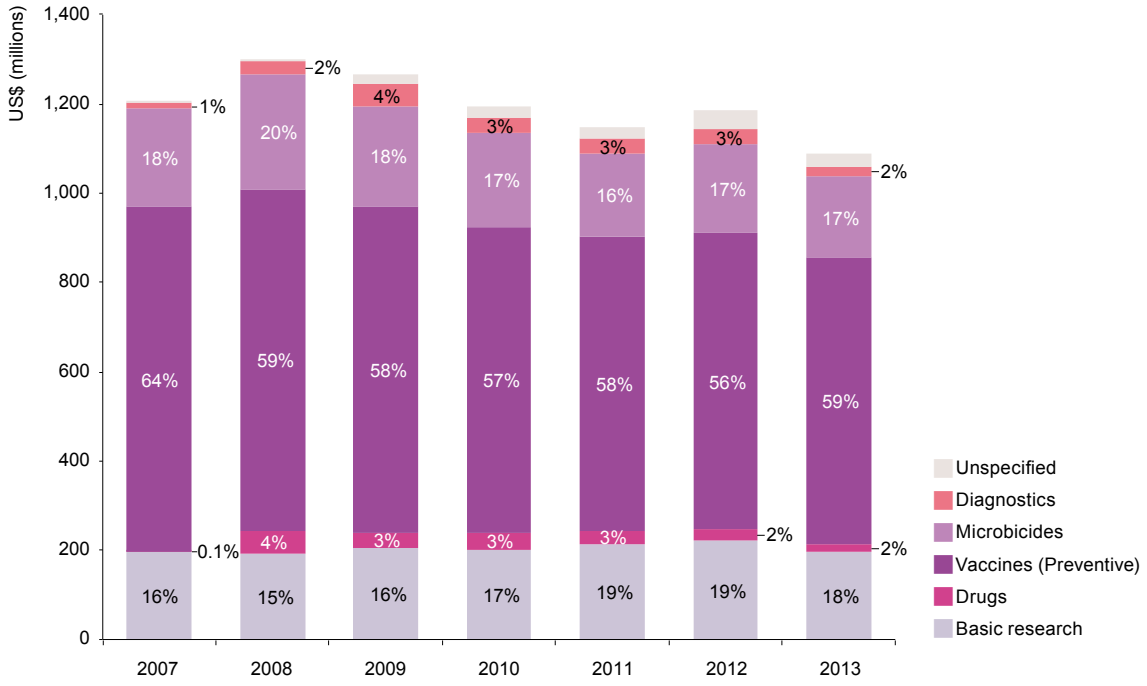
- Basic research
- Drugs specific to DC needs
- Preventive vaccines
- Diagnostics
- Microbicides

HIV/AIDS received $1,089m in R&D funding in 2013. Funding from YOY participants decreased in 2013 (down $95m, -8.3%), reversing last year's increase of $41m (up 3.7%).

As in previous years, over half of HIV/AIDS funding was directed to vaccine development ($642m, 59%). Basic research and microbicides received $196m (18%) and $180m (17%) respectively, with modest amounts invested in developing world-focused diagnostics ($22m, 2.0%) and drug development ($19m, 1.8%).

There were YOY funding drops in all research areas: vaccines by $34m (-5.2%); basic research by $25m (-12%); microbicides by $16m (-8.5%); drug development by $4.5m (-21%); and diagnostics by $3.0m (-14%). However, we note that some of the drop in microbicide funding ($5.0m, 31%) is because the total no longer includes microbicides that are being developed as part of reproductive health Multipurpose Prevention Technologies. Funding for these will instead be reported in the new G-FINDER Reproductive Health Report, which is being published for the first time in early 2015.

Figure 5. HIV/AIDS R&D funding by product type 2007-2013



The top 12 funders accounted for 93% of total HIV/AIDS R&D funding in 2013. The US NIH remained by far the largest funder, contributing almost two-thirds ($663m, 61%) of the total.

Several organisations decreased their funding in 2013. The largest decrease came from the US NIH (down $66m, -9.0%), with a modest decrease from the US Agency for International Development (USAID, down $6.6m, -9.2%). Both these drops were the result of the 2013 US budget sequester. The decrease from the UK Department for International Development (DFID, down $14m, -66%) was due to the scheduled completion of one funding stream, while the Wellcome Trust reduction (down $4.9m, -19%) was due to uneven disbursement across funding cycles. Increases that did occur were modest, including the Dutch Ministry of Foreign Affairs (DGIS, up $4.2m, 97%) and the US Department of Defense (DOD, up $3.3m, 6.5%). The increase in funding disbursed from the Dutch DGIS placed it in the top 12 funders for the first time since 2007.

Table 3. Top HIV/AIDS R&D funders 2013

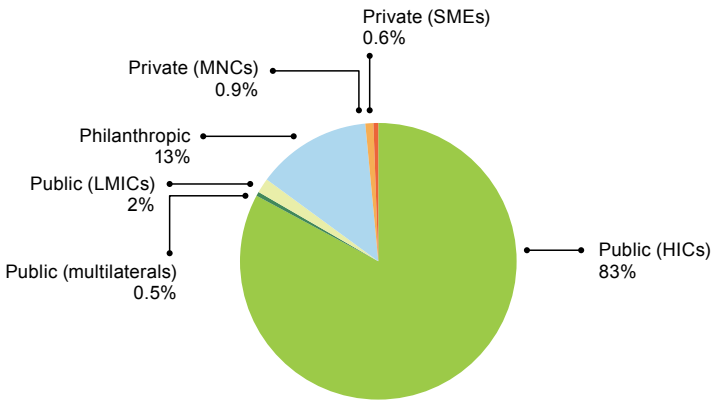
Funder	US$ (millions)						2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013	
US NIH	763	723	774	739	708	729	663	61
Gates Foundation	103	180	134	133	124	123	120	11
USAID	76	76	77	77	73	71	65	6.0
US DOD	31	27	38	36	47	52	55	5.0
Wellcome Trust	6.5	9.2	9.2	11	16	26	21	1.9
European Commission	27	29	30	21	21	16	19	1.7
Aggregate industry	22	53	39	33	26	23	16	1.5
Inserm	0.4	1.3	14	15	15	15	14	1.3
French ANRS	11	16	13	12	11	11	13	1.2
Canadian CIHR	4.0	2.2	6.3	10	9.3	9.0	9.4	0.9
Dutch DGIS	14	9.7	7.9	4.3	6.7	4.4	8.6	0.8
UK DFID	29	28	38	20	16	21	7.0	0.6
Subtotal of top 12^	1,125	1,192	1,186	1,117	1,074	1,102	1,011	93
Disease total	1,205	1,299	1,268	1,196	1,150	1,187	1,089	100

^ Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013

Public funders continued to provide the vast majority of HIV/AIDS R&D funding in 2013, with public investment totalling $926m (85%). Almost all public funding (97%) came from HICs, of which the US NIH accounted for almost three-quarters (74%). Philanthropic funders remained the second highest contributors, investing $146m (13%) in 2013. The pharmaceutical industry invested $16m (1.5%) in DC HIV/AIDS R&D. Of this, $10m (62%) came from MNCs and $6.1m (38%) from SMEs.

All sectors cut their investment in 2013. Public funders decreased their YOY investment by $82m (-8.4%), the philanthropic sector by $7.5m (-5.0%) and the pharmaceutical industry by $5.6m (-35%). The majority of the public drop came from the US NIH, due to the US budget sequester; while the majority of the philanthropic drop came from the Wellcome Trust, and was due to a cyclical funding effect.

Figure 6. HIV/AIDS R&D funding by sector 2013



TUBERCULOSIS

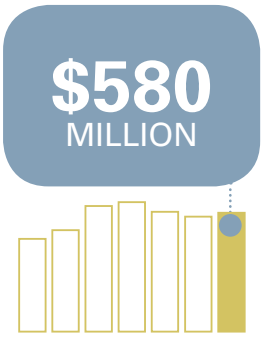
Tuberculosis (TB) is a bacterial disease that usually affects the lungs, and is spread by air droplets. After infection, TB may remain latent with no symptoms. However, if it progresses to active disease, it causes coughing, night sweats, fever and weight loss. TB is a leading cause of death among people with HIV/AIDS. TB was responsible for 49.0 million DALYs and 1.2 million deaths in the developing world in 2010. It was the fourth highest cause of morbidity and second highest cause of mortality from neglected diseases.

The only available TB vaccine is the BCG vaccine, an 80 year-old vaccine that is highly effective only against disseminated TB in children.[10] A new vaccine is needed that is more effective, but as safe as, BCG. Current TB treatment regimens are complex and last from six to 24 months, leading to poor compliance and fuelling drug resistance, treatment failure and death. New drugs are needed that act more rapidly, are efficacious against multidrug-resistant and extensively drug-resistant TB (MDR-TB and XDR-TB), and are safe to use with HIV treatments. Existing point-of-care diagnostics detect less than half of active TB cases;[11] there is a need for cheap, rapid, easy-to-use diagnostics that can distinguish between active and latent disease, even in the presence of HIV co-infection.

There are several vaccine candidates in clinical development. Phase IIb trials for M72/AS01E are underway in Africa, and VPM1002, one of the only candidates that is safe for infants, is undergoing a second Phase IIa trial.[12] However, progress has been slower than hoped, with some trials being downscaled (Phase IIb trials of AERAS-402/Crucell Ad35)[12] and others showing inadequate efficacy in infants (MVA85A/AERAS-485 Phase IIb trial).[13] Another candidate, ID93 + GLA-SE, entered Phase I clinical trials in August 2012.[14]

In the past two years, two new drugs developed by industry – delamanid and bedaquiline – were given conditional approval in Europe and/or the US for the treatment of MDR-TB, however these are expensive and have low availability in the developing world.[15] Both are currently in Phase III clinical trials designed to finalise their approval status, and bedaquiline is now in Phase II trials by the Global Alliance for TB Drug Development (TB Alliance) as part of a multi-drug regimen (bedaquiline, PA-824 and pyrazinamide) suitable for developing world use. The TB Alliance is also developing a novel three-drug combination (PA-824, moxifloxacin and pyrazinamide), which has shown promising results against both drug-sensitive and MDR-TB in Phase IIb trials.[16]

Negotiated price reductions are increasing the affordability of Cepheid's nucleic acid detection device Xpert® MTB/RIF test for DCs, but the cost remains a barrier to access.[17] Other diagnostics are underway, with FIND's TB LAMP assay undergoing field evaluation.[18]



TOTAL SPEND ON TB R&D IN 2013

OF GLOBAL R&D FUNDING

R&D needs for TB include:

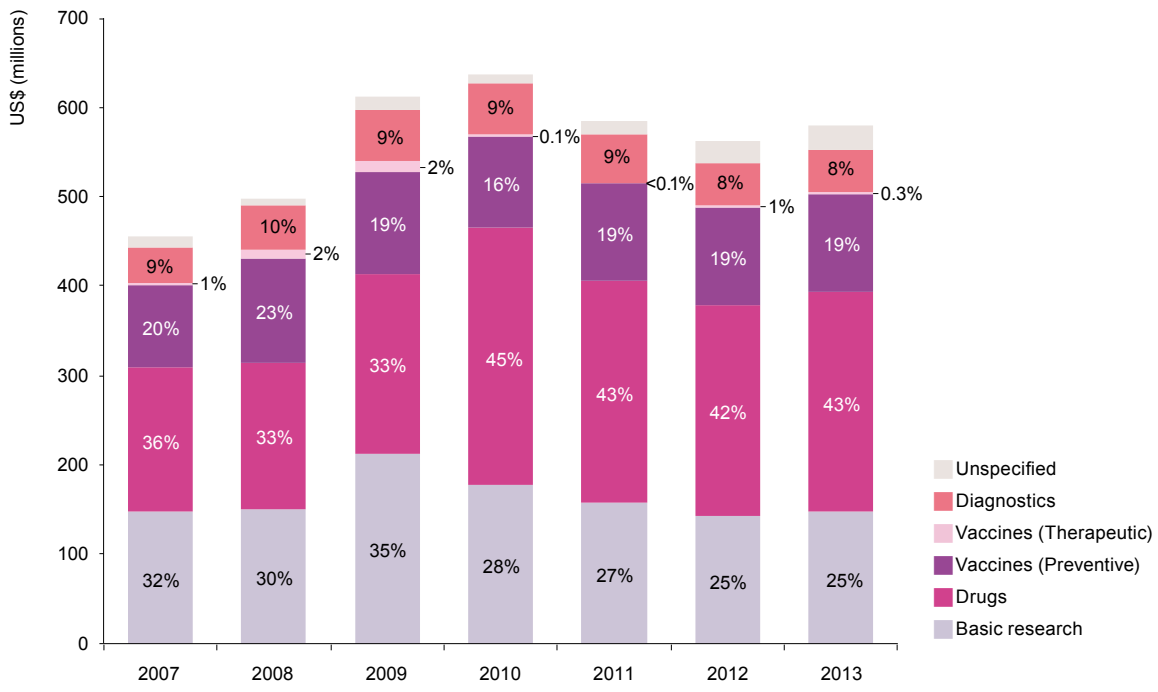
- Basic research
- Drugs
- Diagnostics
- Preventive vaccines
- Therapeutic vaccines

TB received $580m in R&D funding in 2013. There was a moderate rise in YOY TB funding (up $16m, 3.1%) to $536m, with the remaining $44m provided by irregular survey participants.

As in 2012, drug development received the most funding ($248m, 43%), followed by basic research ($147m, 25%) and preventive vaccines ($108m, 19%). Of the remaining funding, $49m (8.4%) was invested in diagnostics and $1.6m (0.3%) in therapeutic vaccines.

The overall YOY rise in TB investment was due to increases in funding for diagnostics (up $7.6m, 20%), drugs (up $6.6m, 2.9%) and preventive vaccines (up $5.7m, 5.7%). There was a small decrease in funding to therapeutic vaccines (down $1.8m, -53%), while basic research remained stable (down $1.6m, -1.2%).

Figure 7. TB R&D funding by product type 2007-2013



Funding concentration for TB R&D remained high, with just two organisations – the US NIH and the Gates Foundation – providing half of total funding ($291m, 50%).

Eight of the top 12 funders increased their investment in TB R&D in 2013, with the largest increase from the Gates Foundation (up $24m, 24%). UK DFID's funding rose by $12m (a nine-fold increase, albeit from a low base), reflecting the first disbursement of a new PDP funding stream. The Argentinian Ministry of Science, Technology and Productive Innovation (MINCYT) became a top 12 funder for the first time after increasing funding from $0.1m in 2012 to $9.8m in 2013.

Of the four top 12 funders that decreased their funding, the pharmaceutical industry had the biggest decrease, with YOY funding down $16m (-11%). There were also decreases from the US NIH (down $13m, -7.2%, due to the US budget sequester), the UK Medical Research Council (MRC, down $2.8m, -19%) and USAID (down $1.2m, -13%). The Australian Department of Foreign Affairs and Trade (DFAT, previously the Australian Agency for International Development, AusAID) dropped out of top 12 TB funders in 2013, as medical research funding was not disbursed that year while the Government undertook a strategic review of aid funding.

Table 4. Top TB R&D funders 2013

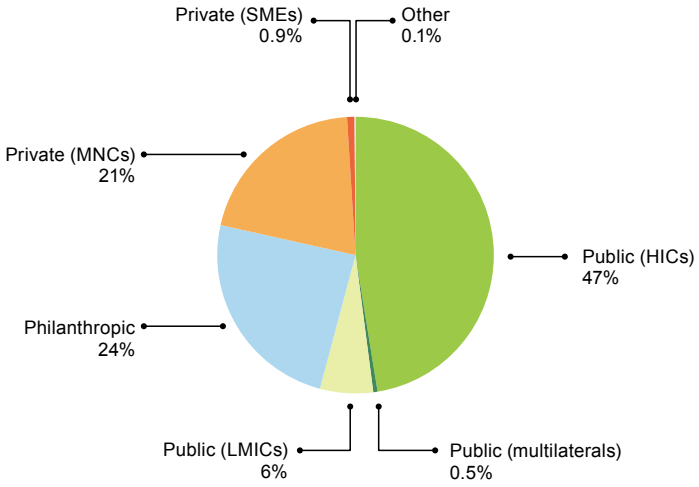
Funder	US$ (millions)							2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013		
US NIH	137	127	183	176	171	178	165	28	
Gates Foundation	130	148	109	115	97	102	126	22	
Aggregate industry	74	98	140	179	170	148	124	21	
European Commission	23	31	32	24	20	12	20	3.4	
UK DFID	1.7	3.3	17	21	12	1.6	14	2.4	
Wellcome Trust	2.4	5.3	8.1	13	12	13	14	2.4	
UK MRC	12	12	12	14	15	15	12	2.1	
Argentinian MINCYT				0.2	-	0.1	9.8	1.7	
USAID	4.4	7.4	9.2	9.4	9.2	9.7	8.5	1.5	
Indian ICMR		1.0	2.1	3.3	3.4	6.6	7.9	1.4	
Inserm	0.4	0.4	6.5	<0.1	3.6	4.4	6.1	1.1	
German BMBF	4.8	0.4	5.5	4.7	4.4	5.6	5.7	1.0	
Subtotal of top 12^	429	455	552	586	530	505	513	88	
Disease total	456	497	613	636	584	562	580	100	

^ Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

Public funders accounted for over half of total TB funding ($314m, 54%), followed by the philanthropic sector ($141m, 24%) and the pharmaceutical industry ($124m, 21%). Public funding was dominated by HIC governments ($275m, 88%), with the US NIH remaining by far the largest investor ($165m, 60% of HIC government funding). MNCs continued to contribute the vast majority (96%) of industry funding, with SMEs providing the remaining 4.0%.

The 2013 rise in YOY TB funding reflected philanthropic and public sector increases, offsetting a $16m (-12%) drop from MNCs. The philanthropic sector showed the largest increase (up $24m, 21%), while public sector funding rose by $7.5m (up 2.8%).

Figure 8. TB R&D funding by sector 2013



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 in children under five years of age).[19]

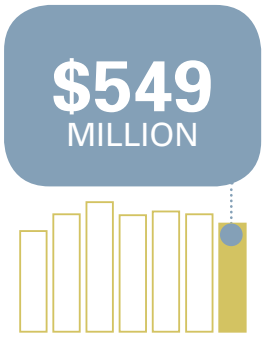
Malaria caused 82.7 million DALYs and at least 1.2 million deaths in the developing world in 2010, making it the highest cause of morbidity and third highest cause of mortality from neglected diseases. *P. falciparum* is by far the most deadly strain, and in 2010 accounted for 98% of malaria cases in Africa.[20] However, *P. vivax* is estimated to account for 25-40% of the global malaria burden[21] and is particularly common in South-East Asia and South America.[22]

The emergence of resistance to artemisinin-based combination therapies (ACTs) and insecticides means new products are needed.[19] Cheap, sensitive and specific Rapid Diagnostic Tests (RDTs) are available, but their quality and heat stability can be problematic; and new diagnostics are needed to distinguish between uncomplicated and severe malaria, and between malaria and other febrile illnesses.[5]

The Phase III trial of the most advanced malaria vaccine candidate, RTS,S, showed a 46% and 27% decrease in clinical malaria cases in children and infants respectively over 18 months of follow-up, and RTS,S has now been submitted to the European Medicine Agency (EMA) for an assessment of its quality, safety and efficacy.[23,24] The next most advanced malaria vaccine candidates are in earlier stage clinical trials (Phase IIb).[25]

One synthetic artemisinin drug candidate, ozonide arterolane maleate/PQP, has recently been registered – and others are in late-stage clinical trials, including OZ439 which is undergoing Phase II trials and has shown potential as a one-dose cure.[26] Work is ongoing on two paediatric formulations of existing drugs for *P. falciparum*, with Pyramax® paediatric close to submission to the EMA for review. Phase IIb trials for tafenoquine showed it prevented relapse of *P. vivax* malaria, and planning for Phase III trials is underway.

In 2013, the first field molecular assay (LAMP test) entered the market, greatly reducing the time to diagnosis.[27] Diagnostic technologies in the pipeline include a urine-based malaria test (in clinical evaluation in 2014).[28]



TOTAL SPEND ON MALARIA R&D IN 2013

OF GLOBAL R&D FUNDING

Malaria R&D is needed in many areas including:

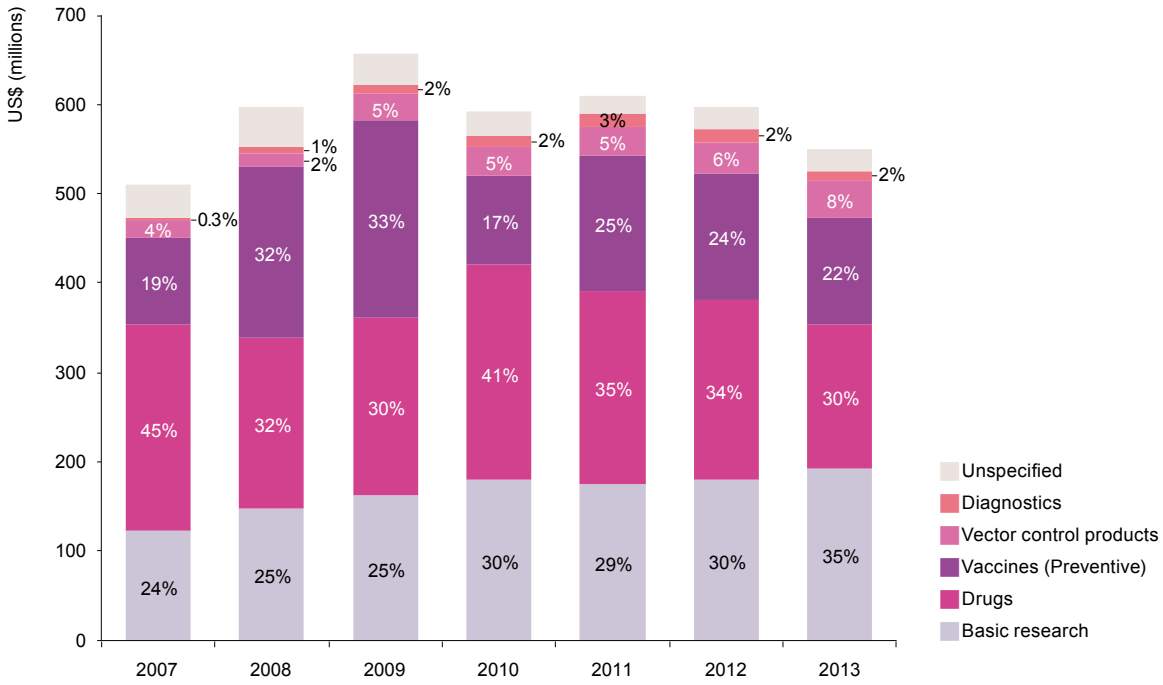
- Basic research
- Drugs
- Preventive vaccines
- Diagnostics
- Vector control products

Global funding for malaria R&D in 2013 was $549m. Following the 2012 decrease, YOY funding fell again (down $51m, -9.1%) to $512m, with irregular survey participants providing the remaining $37m.

Basic research accounted for over a third ($193m, 35%) of malaria funding, followed by drug development ($162m, 30%). Another $119m (22%) went to vaccine development, $42m (7.7%) to vector control products and $11m (2.0%) to diagnostics.

The largest impact of the overall drop in funding for malaria was decreased YOY investment in drugs (down $37m, -19%) and vaccines (down $23m, -16%), with a far smaller decrease in diagnostics funding (down $4.3m, -34%). These decreases were marginally softened by funding increases for vector control products (up $8.9m, 31%) and basic research (up $7.4m, 4.5%).

Figure 9. Malaria R&D funding by product type 2007-2013



Concentration of malaria funding remained high in 2013 with 12 funders accounting for 91% of all malaria R&D funding, and the US NIH, the Gates Foundation, industry and UK DFID making up over two-thirds (67%) of total funding.

The top three funders of malaria R&D decreased their investment – YOY industry funders by $33m (-29%), the US NIH by $32m (-19%, due to the US budget sequester), and the Gates Foundation by $9.7m (-7.5%). There were smaller drops from the Australian National Health and Medical Research Council (NHMRC, down $4.0m, -21%) and the Wellcome Trust (down $2.7m, -8.9%), although the Wellcome Trust decrease was due to cyclical funding disbursement.

Half of the top 12 organisations increased their investment in 2013, including UK DFID (up $21m) whose quadrupling of their malaria investment reflected their new PDP funding stream. Other increases came from US DOD (up $11m, 107%) and the EC (up $7.6m, 48%), but these did not offset the larger decreases from other funders. The Brazilian Research Support Foundation of the State of Amazonas (FAPEAM) was in the top 12 funders for the first time in 2013 and the Indian Council of Medical Research (ICMR) re-entered it after dropping out in 2012.

Table 5. Top malaria R&D funders 2013

Funder	US$ (millions)							2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013		
US NIH	95	118	130	149	137	170	138	25	
Gates Foundation	140	195	205	98	163	129	120	22	
Aggregate industry	94	97	107	130	104	119	85	15	
UK DFID	3.8	3.6	3.6	22	20	6.4	28	5.1	
Wellcome Trust	27	26	27	32	30	30	27	5.0	
European Commission	24	28	27	27	24	16	24	4.3	
US DOD	37	34	42	25	20	10	22	3.9	
UK MRC	17	18	20	21	19	17	17	3.2	
Australian NHMRC	10	12	14	13	16	19	15	2.7	
Brazilian FAPEAM			0.3				11	1.9	
Indian ICMR		9.7	6.7	4.8	4.9	6.4	7.2	1.3	
Inserm	0.5	0.5	3.9	5.0	5.6	7.1	6.9	1.3	
Subtotal of top 12^	481	560	601	543	555	542	500	91	
Disease total	509	598	656	591	609	596	549	100	

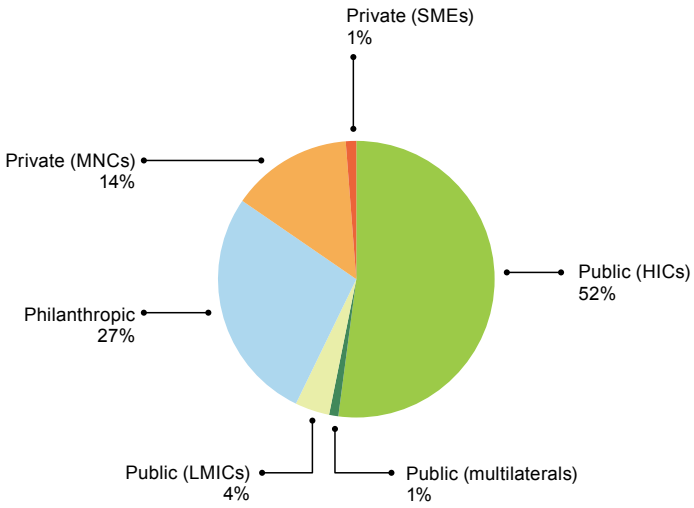
^ Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013

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

As in 2012, over half of malaria funding came from public funders ($314m, 57%) and just over a quarter from the philanthropic sector ($150m, 27%). HIC governments continued to contribute the vast majority of public funding ($286m, 91%). The remaining funding came from industry ($85m, 15%), most of this from MNCs ($78m, 92%).

All sectors cut their malaria funding in 2013. The largest YOY decrease was from the pharmaceutical industry, virtually all due to cuts in MNC funding (down $33m, -30%). Funding from the philanthropic sector fell (down $12m, -7.7%), reflecting decreases from the Gates Foundation and the Wellcome Trust; as did investment from the public sector (down $6.5m, -2.2%).

Figure 10. Malaria R&D funding by sector 2013



DIARRHOEAL DISEASES

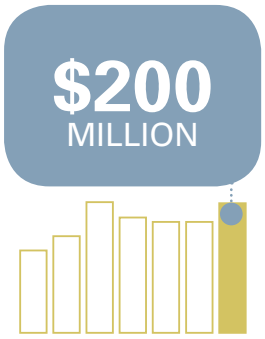
Diarrhoeal diseases are a group of illnesses caused by viruses, bacteria or protozoa, that all present with fever and diarrhoea. They range from rotavirus and *E. coli*, which are relatively common in the West; to cholera and *Shigella*, which are mostly prevalent in DC settings. Diarrhoeal diseases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

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

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 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.[29] New rapid diagnostic tests capable of distinguishing between diarrhoeal diseases are also required.[5]

Several vaccine candidates are in Phase II and III trials, including ACE527 for enterotoxigenic *E. coli* (ETEC), Invaplex 50 for *Shigella* and ORV 116E (ROTAVAC®) for rotavirus,[30] which reported positive Phase III clinical trial results in 2013. ROTAVAC® was developed as a collaborative initiative between the Program for Appropriate Technology in Health (PATH), the Indian Department of Biotechnology (DBT) and Bharat Biotech, and will only cost $1 per dose.[31] Other advanced candidates include RV3, the only rotavirus vaccine intended to be administered at birth. RV3 is in Phase IIb trials in Indonesia and is under development by Murdoch Children's Research Institute in Australia, and BioFarma and Universitas Gadjah Mada – both in Indonesia.[32,33]

A new diagnostic test capable of distinguishing between causes of diarrhoeal diseases is also in early development.[5]



TOTAL SPEND ON DIARRHOEAL DISEASE R&D IN 2013

OF GLOBAL R&D FUNDING

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

Diarrhoeal diseases received $200m in R&D funding in 2013. This was a moderate increase from 2012, with YOY funders increasing their investment by $21m (up 14%) to $179m, and irregular survey participants providing the remaining $21m.

As in 2012, the distribution of funding was weighted towards rotavirus, *Shigella* and cholera, which accounted for $118m (59%) of total diarrhoeal disease investment.

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

Within the diarrhoeal diseases, there was a YOY increase for *Shigella* (up $7.9m, 38%) and ETEC (up $5.0m, 124%, albeit from a low base). Funding for cholera dropped (down $13m, -37%), as did rotavirus funding (down $2.5m, -5.1%); and there were small drops for the other diarrhoeal diseases: *Cryptosporidium* by $0.8m (-14%), *Giardia* by $0.5m (-46%) and enteroaggregative *E. coli* (EAggEC) by $0.1m (-59%).

For diseases where data was collected for all product types (cholera, *Shigella* and *Cryptosporidium*), funding profiles varied across product areas. For *Shigella*, preventive vaccines received more than half of R&D funding ($16m, 54%) and basic research just under a third ($9.8m, 32%). For cholera, basic research received $19m (71%) and preventive vaccines $3.1m (12%). For *Cryptosporidium*, funding was spread between basic research ($2.7m, 51%), drugs ($1.7m, 32%) and diagnostics ($0.8m, 15%).

Taken as a whole, YOY funding for diarrhoeal diseases increased for vaccines (up $22m, 27%) and drugs (up $1.5m, 13%). Funding to diagnostics was down $0.7m (-11%) and basic research funding was relatively stable (down $0.7m, -1.6%).

Table 6. Diarrhoeal disease R&D funding 2013 (US$ millions)^

Disease	Basic research	Drugs	Vaccines (Preventive)	Diagnostics	Unspecified	Total	%
Rotavirus			59		1.1	**60**	30
Shigella	10	0.2	16	1.2	2.7	**30**	15
Cholera	19	0.6	3.1	0.6	3.6	**27**	14
Enterotoxigenic *E. coli* (ETEC)			8.8	0.3	0.4	**9.5**	4.7
Cryptosporidium	2.7	1.7	0.1	0.8	-	**5.2**	2.6
Giardia				0.3	0.3	**0.6**	0.3
Enteroaggregative *E.coli* (EAggEC)			0.1	-	-	**0.1**	<0.1
Multiple diarrhoeal diseases	13	10	28	2.5	13	**67**	33
Total	45	13	116	5.6	21	200	100

^ Please note that there were strict eligibility conditions on drug and vaccine investments for some diarrhoeal disease products to avoid inclusion of overlapping commercial activity. Due to this, total funding between product categories cannot be reasonably compared

\- No reported funding

Category not included in G-FINDER

As in previous years, the top three funders accounted for almost three-quarters of total funding for diarrhoeal diseases ($141m, 71%). The Gates Foundation provided a quarter ($50m, 25%), and the US NIH ($46m, 23%) and industry ($44m, 22%) just under a quarter each.

Nine of the top 12 funders increased their diarrhoeal disease R&D funding or kept it stable. There were moderate increases from the Gates Foundation (up $11m, 29%) and YOY pharmaceutical industry funders (up $9.9m, 35%). Smaller increases came from Inserm – Institute of Infectious Diseases (Inserm, up $4.9m, 49%), UK DFID (up $3.6m, although no funding was disbursed in 2012), and the Global Alliance for Vaccines and Immunizations (GAVI, up $3.2m, 82%). The increase from UK DFID reflected the first disbursement of a new five-year PDP funding stream.

Table 7. Top diarrhoeal disease R&D funders 2013

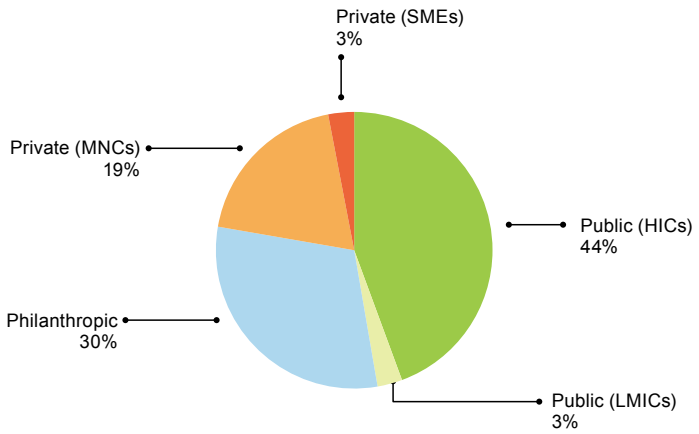
Funder	US$ (millions) 2007	2008	2009	2010	2011	2012	2013	2013 % of total	2007-2013 trend
Gates Foundation	50	30	53	50	35	39	50	25	
US NIH	35	44	68	57	59	54	46	23	
Aggregate industry	15	27	42	35	29	31	44	22	
Inserm	0.3	0.4	1.6	1.8	9.5	9.9	15	7.4	
US DOD	6.1	6.6	12	6.6	5.4	8.3	9.2	4.6	
GAVI	11	17				4.0	7.2	3.6	
Indian ICMR		4.3	3.6	4.6	2.7	2.6	4.5	2.3	
Institut Pasteur	3.7	4.2	5.7	4.7	4.7	4.5	4.4	2.2	
European Commission	0.8	0.6	0.6	0.9	3.1	3.3	3.6	1.8	
UK DFID	-	-	2.7	5.1	2.9	-	3.6	1.8	
Wellcome Trust	1.0	0.4	0.3	0.5	0.5	4.2	3.2	1.6	
UK MRC	0.3	0.9	0.8	0.6	0.4	1.0	1.8	0.9	
Subtotal of top 12^	126	141	196	171	163	163	193	97	
Disease total	127	149	202	178	171	170	200	100	

^ Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

Public funders accounted for nearly half of diarrhoeal disease R&D funding ($94m, 47%), followed by the philanthropic sector ($61m, 30%) and the pharmaceutical industry ($44m, 22%). HIC governments continued to contribute the vast majority of public funding ($89m, 94%), of which more than half came from the US NIH ($46m, 52%). MNCs contributed 86% of industry funding.

The YOY increase in industry funding was entirely due to a $9.9m (up 35%) rise from MNCs. Public funding saw a slight increase (up $1.4m, 1.7%), with funding from HICs up $2.0m (up 2.4%). The philanthropic sector increased investment by $10m (up 23%), with a moderate increase from the Gates Foundation (up $11m, 29%) balanced by a small decrease from the Wellcome Trust (down $1.0m, -24%).

Figure 11. Diarrhoeal disease R&D funding by sector 2013



KINETOPLASTIDS

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

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

Treatment and prevention 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.[34] 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 paediatric drug formulation for Chagas' disease was registered in Brazil in 2011,[35] and there are a number of other promising drug candidates in preclinical and clinical stages.[36]

Sleeping sickness needs new, safe, oral drugs that are active against both stages of the disease to replace the injectable treatments now used, as well as a vaccine. There are some promising sleeping sickness drug candidates, with fexinidazole, the first drug candidate for the treatment of advanced-stage sleeping sickness in 30 years currently in Phase II/III clinical trials in Africa.[37] A number of other compounds are in preclinical stages.[38] There is a lack of advanced projects, particularly for vaccines, for which there are no candidates in clinical trials.[5] In 2012, the first ever rapid diagnostic test designed for sleeping sickness was launched by FIND and Standard Diagnostics, Inc. of the Republic of Korea. The diagnostic, SD BIOLINE HAT, is cheap, simple to administer, can be stored at ambient temperature and can obtain results in 15 minutes.[39]

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 and new formulations of existing drugs in late-stage clinical trials, novel compounds in earlier stages, and several candidates in preclinical stages.[5]

TOTAL SPEND ON KINETOPLASTID R&D IN 2013

OF GLOBAL R&D FUNDING

R&D for kinetoplastids 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

Global funding for kinetoplastid R&D in 2013 was $124m. There was a notable decrease in YOY investment compared to 2012 (down $23m, -18%) to $105m. The remaining $18m was provided by irregular survey participants.

Funding within the kinetoplastid family was relatively evenly split between the three diseases. Sleeping sickness received the most funding ($39m, 32%), followed by leishmaniasis ($35m, 28%) and Chagas' disease ($28m, 23%). All the kinetoplastids saw a funding decrease, with the largest YOY cut for leishmaniasis (down $8.5m, -23%), and smaller drops for Chagas' disease (down $3.3m, -13%) and sleeping sickness (down $3.1m, -8.2%).

As in 2012, YOY funding for basic research saw the largest decrease (down $7.9m, -15%), which was spread evenly across the diseases. Reductions in funding to drugs (down $7.8m, -14%), diagnostics (down $4.8m, -40%) and preventive vaccines (down $2.1m, -35%) also contributed to the overall decrease.

Table 8. Kinetoplastid R&D funding 2013 (US$ millions)

Disease	Basic research	Drugs	Vaccines (Preventive)	Vaccines (Therapeutic)	Vector control products	Diagnostics	Unspecified	Total	%
Sleeping sickness	22	13	-		0.2	3.6	-	39	32
Leishmaniasis	20	8.6	3.8	0.5		0.6	1.7	35	28
Chagas' disease	10	16	0.2	0.1	<0.1	1.6	0.2	28	23
Multiple kinetoplastids	4.1	16	-	-	0.1	1.9	-	22	18
Total	56	53	4.0	0.6	0.3	7.7	1.9	124	100

- No reported funding
Category not included in G-FINDER

The US NIH remained the top funder of kinetoplastid R&D in 2013, although its funding decreased slightly (down $6.4m, -12%) to $45m. Small decreases in funding came from most of the other top 12 funders, including the EC (down $2.3m, -34%), the Wellcome Trust (down $1.6m, -13%), the German Federal Ministry of Education and Research (BMBF, down $1.6m, -25%) and the German Research Foundation (DFG, down $1.2m, -33%). The Wellcome Trust decrease was due to uneven disbursement across funding cycles. The Colombian Department for Science, Technology and Innovation (Colciencias) dropped out of the top 12 funders as they did not complete the survey in 2013; as did UK DFID, due to the scheduled completion of a funding stream.

Increases that did occur were modest – these included the Dutch DGIS (up $2.6m, 97%), and the Indian ICMR (up $1.4m, 46%).

Table 9. Top kinetoplastid R&D funders 2013

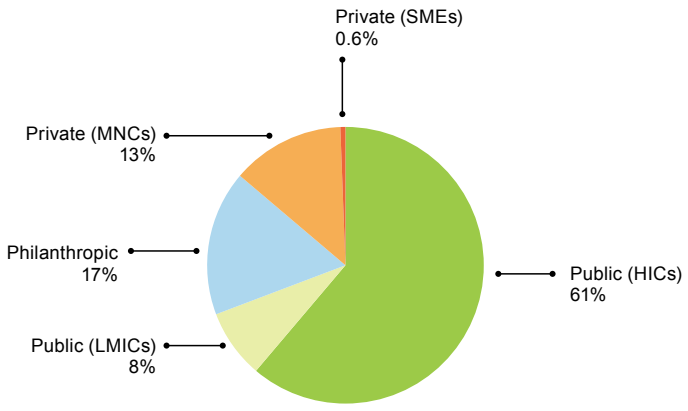
Funder	US$ (millions)							2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013		
US NIH	32	55	59	63	53	51	45	36	
Aggregate industry	5.0	3.1	5.4	12	14	19	17	14	
Wellcome Trust	14	12	11	9.1	10	13	11	8.9	
Gates Foundation	51	33	40	22	12	8.9	8.7	7.0	
Dutch DGIS	-	-	-	1.4	4.3	2.7	5.3	4.3	
German BMBF			-	-	0.9	6.3	4.7	3.8	
Indian ICMR		-	0.1	1.9	3.6	3.2	4.6	3.7	
European Commission	3.1	5.1	11	9.9	8.1	6.6	4.4	3.6	
Institut Pasteur	-	3.2	3.5	6.5	5.5	3.4	2.9	2.3	
German DFG	0.1		-	4.4	1.7	3.5	2.4	1.9	
UK MRC	2.7	3.4	2.4	2.6	2.2	1.6	2.3	1.9	
Swiss SNSF				0.6	2.4	1.0	1.8	1.4	
Subtotal of top 12^	134	138	161	147	127	134	110	89	
Disease total	136	153	179	161	144	149	124	100	

^ Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

In 2013, over two-thirds of kinetoplastid investment was contributed by public funders ($86m, 69%), with the philanthropic sector providing $21m (17%) and the pharmaceutical industry providing $17m (14%). As in previous years, MNCs contributed the vast majority ($16m, 96%) of industry funding.

YOY funding from all sectors decreased or remained stable. The public sector dropped by $22m (-24%) mostly due to decreases from HIC funders (down $18m, -20%). The philanthropic sector decreased funding slightly (down $1.8m, -8.3%), while funding from the pharmaceutical industry (up $0.6m, 4.3%) remained stable.

Figure 12. Kinetoplastid R&D funding by sector 2013



BACTERIAL PNEUMONIA & MENINGITIS

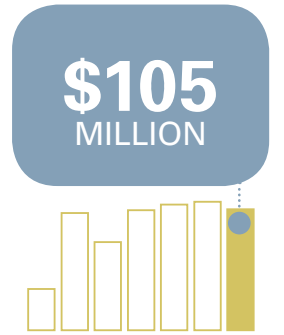
Pneumonia is a lung infection transmitted by the cough or sneeze of infected patients. It presents with cough, fever, chest pain and shortness of breath, and can be fatal especially in young children and elderly patients. Although caused by a range of bacteria and viruses, *Streptococcus pneumoniae*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

Bacterial meningitis is an infection of the fluid that surrounds the brain and spinal cord and is most commonly caused by *S. pneumoniae* 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.

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

However, previous investments in R&D have been paying off. The recently registered MenAfriVac™ vaccine protects against serogroup A meningococci, which historically accounted for the majority of epidemic and endemic disease in the meningitis belt. Since its rollout in Central and West Africa in late 2010[40] there have been no new cases of meningitis A among people who were vaccinated.[41] It is estimated that MenAfriVac™ will prevent 437,000 cases of meningitis over the next 10 years.[41] However, vaccines are still needed for other meningitis serotypes.

Traditional polysaccharide pneumococcal vaccines are unsuitable for DC use. A conjugate pneumococcal vaccine (Prevnar® 7-valent) has been licensed for use in infants and young children in DCs for some time, but is expensive and does not cover all DC strains. In 2010 the World Health Organization (WHO) prequalified conjugate vaccines (PCV10 and PCV13) were confirmed as the first vaccines in GAVI's pilot pneumococcal Advance Market Commitment (AMC) scheme.[42] Since then, these vaccines have been introduced in 40 countries.[43] Continued investment into affordable vaccines against DC-specific strains is required.



TOTAL SPEND ON BACTERIAL PNEUMONIA & MENINGITIS R&D IN 2013

OF GLOBAL R&D FUNDING

New products needed for pneumonia & meningitis are:

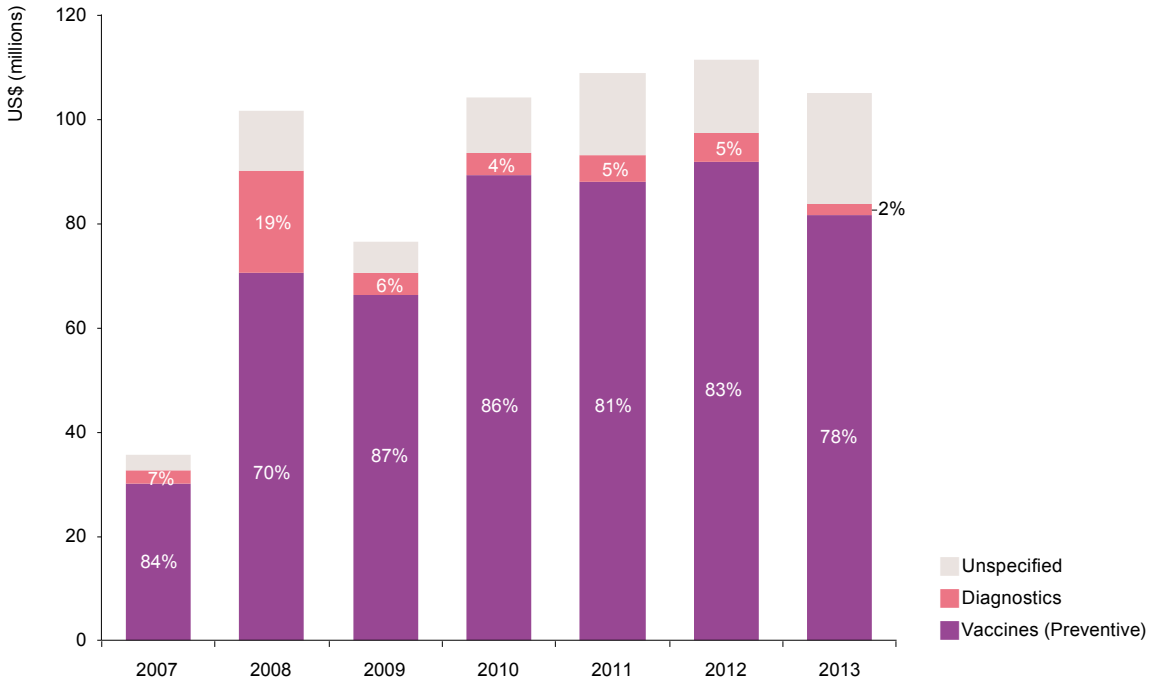
- Vaccines that include developing world strains (and possibly DC-specific vaccines that exclude Western strains)
- Diagnostics

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

Bacterial pneumonia & meningitis received $105m in R&D funding in 2013. This was a significant decrease on 2012 funding, with YOY funders dropping their investment by just over a quarter (down $26m, -26%) to $73m. Irregular survey participants provided the remaining $31m.

As in previous years, vaccines received the bulk of funding ($81m, 78%), with diagnostics receiving $2.5m (2.4%) and unspecified R&D receiving $21m (20%). Over three-quarters of vaccine investment was directed towards pneumococcal vaccines ($63m, 78%). YOY funding fell for both product areas, with vaccines down by $28m (-34%) and diagnostics by $2.9m (-54%).

Figure 13. Bacterial pneumonia & meningitis R&D funding by product type 2007-2013



As with 2012, funding for bacterial pneumonia & meningitis was highly concentrated, with the top three funders – the pharmaceutical industry, Inserm and the Gates Foundation – providing three-quarters ($79m, 75%) of funding.

The overall fall in funding reflected a mixed picture amongst the top 12 funders. The largest drop came from the Gates Foundation, which decreased funding by two-thirds (down $28m, -66%). Smaller reductions came from the US NIH (down $2.2m, -26%, due to the US budget sequester) and the Wellcome Trust (down $1.5m, -43%, although this reflects uneven disbursement across their funding cycle).

These decreases were partly balanced by increases from Inserm (up $11m, 210%, albeit from a low base) and GAVI (up $5.3m, 101%). The apparent increase from the pharmaceutical industry was from irregular survey participants, as YOY industry participants decreased funding by $5.6m (-15%). The French National Research Agency (ANR) was a top 12 funder for the first time since 2008.

Table 10. Top bacterial pneumonia & meningitis R&D funders 2013

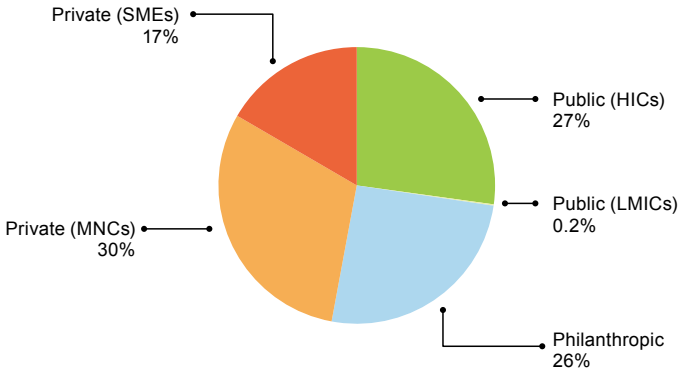
Funder	US$ (millions) 2007	2008	2009	2010	2011	2012	2013	2013 % of total	2007-2013 trend
Aggregate industry	17	56	37	36	42	43	49	47	
Inserm	-	0.1	-	-	4.9	5.0	16	15	
Gates Foundation	6.3	30	24	44	38	42	14	13	
GAVI				2.4		5.3	11	10	
US NIH	4.7	4.5	4.1	9.9	15	8.5	6.2	5.9	
German DFG	-		0.6	0.7	-	0.4	2.9	2.8	
Wellcome Trust	0.2	0.2	0.1	0.3	0.8	3.5	2.0	1.9	
French ANR		0.3	-	-	-	-	1.2	1.1	
UK DFID	-	-	-	-	-	0.1	0.9	0.8	
UK MRC	1.7	1.9	2.0	1.0	0.7	0.3	0.6	0.6	
Australian NHMRC	0.4	0.7	1.9	1.3	1.4	1.1	0.5	0.5	
Institut Pasteur	0.4	0.3	0.3	0.4	0.9	0.6	0.3	0.3	
Subtotal of top 12^	35	100	75	101	108	110	104	99	
Disease total	36	101	76	104	109	111	105	100	

^ Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

The pharmaceutical industry accounted for nearly half of bacterial pneumonia & meningitis funding ($49m, 47%), with MNCs providing the majority ($32m, 65%) as in previous years. Public funders accounted for just over a quarter ($29m, 27%), virtually all of which ($29m, 99%) was provided by HICs. The philanthropic sector contributed $27m (26%), with the majority provided by the Gates Foundation ($14m, 52%) and GAVI ($11m, 39%).

The overall YOY decrease for bacterial pneumonia & meningitis (down $26m, -26%) stemmed from philanthropic sector decreases (down $29m, -64%) and a slight decrease from pharmaceutical industry participants (down $5.6m, -15%). The public sector increased funding (up $8.5m, 50%), owing to a boost from HICs (up $8.6m, 51%).

Figure 14. Bacterial pneumonia & meningitis R&D funding by sector 2013



HELMINTH INFECTIONS

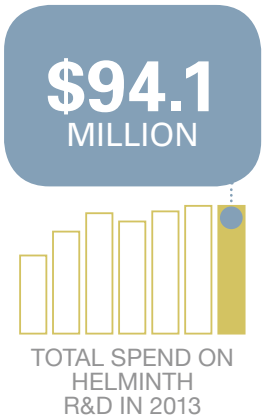
Helminths are parasitic worms and flukes that can infect humans. Helminth infections include ancylostomiasis and necatoriasis (hookworm), ascariasis (roundworm), trichuriasis (whipworm), strongyloidiasis and cysticercosis/taeniasis (tapeworm), collectively referred to as soil-transmitted helminths. Other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

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

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

There is no vaccine against any of the above helminth infections, as well as growing concern that the drugs used to treat soil-transmitted helminths and schistosomiasis are becoming outdated, with evidence of loss of efficacy and increasing resistance.[44] Current diagnostic products for detection of some helminths are also outdated, meaning new effective diagnostics are needed.

A drug (Moxidectin) for onchocerciasis is currently in Phase III clinical trials. Development of a paediatric drug formulation of praziquantel is also underway – Phase I trials were conducted in 2014 and a taste study in African children will take place in 2015 prior to Phase II trials (the size and bitter taste of current oral praziquantel tablets hampers treatment).[45] Two vaccine candidates for schistosomiasis are in clinical trials, Bilhvax in Phase III and a Phase I trial for *Sm*-TSP-2 beginning in 2014.[5,46] A vaccine candidate against human hookworm infection (NaGST-1) completed Phase I trials in Brazil in 2014.[47]



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

Global funding for helminth R&D in 2013 was $94m. Funding from YOY survey participants remained stable (down $0.1m, -0.1%) at $83m, with the remaining $11m reported by irregular survey participants.

Just over a quarter of total helminth funding went to schistosomiasis ($25m, 26%), followed by lymphatic filariasis ($15m, 16%), onchocerciasis ($14m, 15%) and hookworm ($7.1m, 7.5%). The other helminth infections received less than $2.0m each.

In 2013, YOY funding for schistosomiasis decreased by $4.1m (-14%), hookworm by $2.5m (-29%), tapeworm by $1.9m (-51%) and roundworm by $1.4m (-70%). Onchocerciasis increased by $2.0m (up 18%) and lymphatic filariasis by $1.1m (up 9.1%).

Just under half of helminth funding went to basic research ($43m, 46%), although YOY funding to this area dropped by $7.1m (-15%). Investment for vaccines also dropped by $2.5m (-28%). Just over a quarter of investment was allocated to drug development ($25m, 26%), which saw the largest increase in funding (up $6.7m, 39%).

Table 11. Helminth R&D funding 2013 (US$ millions)

Disease	Basic research	Drugs	Vaccines (Preventive)	Vector control products	Diagnostics	Unspecified	Total	%
Schistosomiasis (bilharziasis)	11	3.2	3.3	-	3.5	4.1	25	26
Lymphatic filariasis (elephantiasis)	7.6	5.8		<0.1	0.5	1.4	15	16
Onchocerciasis (river blindness)	3.1	5.9	0.7	-	4.2	0.5	14	15
Hookworm (ancylostomiasis & nectoriasis)	2.9	0.5	3.7	-		-	7.1	7.5
Tapeworm (cysticercosis/ taeniasis)	1.6	0.1		0.2		-	1.8	2.0
Strongyloidiasis & other intestinal roundworms	1.1	<0.1	<0.1		0.1	<0.1	1.2	1.3
Whipworm (trichuriasis)	0.9	<0.1				-	0.9	1.0
Roundworm (ascariasis)	0.5	0.1				-	0.6	0.6
Multiple helminths	15	9.0	3.4	0.1	0.6	-	28	30
Total	43	25	11	0.2	8.8	6.0	94	100

- No reported funding
Category not included in G-FINDER

The overall stable funding in 2013 was the net result of a decrease from the US NIH (down $8.2m, -23%, due to the US budget sequester) and several smaller increases. YOY funding from the pharmaceutical industry increased by $5.4m (more than tripling, albeit from a low base). There were also increases from the Gates Foundation (up $2.1m, 11%), the Dutch DGIS (up $1.9m, an eight-fold increase, again from a very low base) and the Wellcome Trust (up $1.3m, 21%, although this was due to uneven disbursement across funding cycles). The Michelson Medical Research Foundation (MMRF) entered the top 12 table for the first time, due to its funding for early-stage vaccine development.

Table 12. Top helminth R&D funders 2013

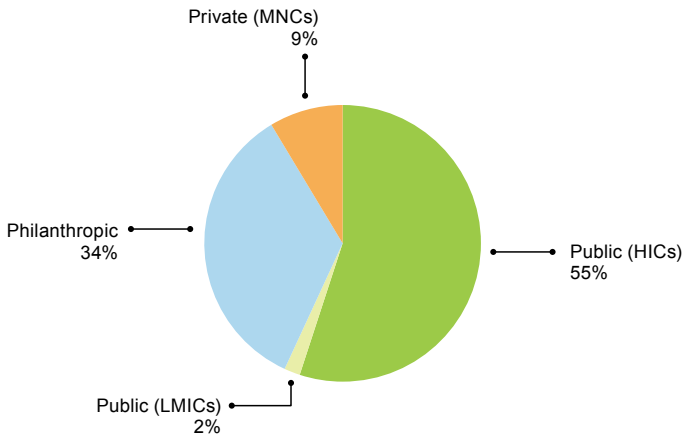
Funder	US$ (millions) 2007	2008	2009	2010	2011	2012	2013	2013 % of total	2007-2013 trend
US NIH	31	26	32	33	27	37	28	30	
Gates Foundation	8.1	24	18	16	21	19	21	23	
Aggregate industry	0.9	5.5	9.6	7.6	9.4	4.2	8.2	8.7	
European Commission	4.6	3.5	3.3	8.7	7.3	8.4	8.1	8.6	
Wellcome Trust	3.0	3.9	4.9	5.4	8.2	6.2	7.5	8.0	
German DFG	-		7.5	0.6	0.7	3.0	3.4	3.6	
MMRF						0.3	2.9	3.1	
Inserm	0.3	0.6	2.2	<0.1	2.1	2.3	2.6	2.8	
Dutch DGIS	-	-	-	0.6	1.7	0.3	2.2	2.3	
UK MRC	1.0	1.4	1.1	1.1	3.3	2.3	2.0	2.2	
Indian ICMR		0.4	0.4	1.0	1.2	1.3	1.5	1.6	
Texas Children's Hospital					0.1	0.8	1.3	1.3	
Subtotal of top 12^	57	70	84	79	84	87	89	95	
Disease total	58	75	89	82	90	94	94	100	

^ Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

As in previous years, more than half of the investment in helminth infections came from the public sector ($53m, 57%), and more than half of that was from the US NIH ($28m, 53%). The philanthropic sector provided just over a third of funding ($32m, 34%), and the pharmaceutical industry the remaining $8.2m (8.7%).

YOY public funding decreased by $9.2m (-17%), driven by an $8.2m (-23%) drop from the US NIH, again due to the US budget sequester. Funding from other sectors increased – the pharmaceutical industry by $5.4m (more than tripling, albeit from a low base) and philanthropy by $3.7m (up 15%).

Figure 15. Helminth R&D funding by sector 2013



DENGUE

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

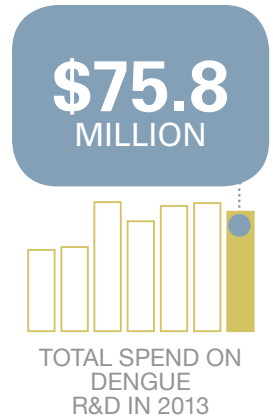
Dengue differs from many other tropical diseases in that it has a relatively large commercial market, driven by demand from travellers, the military and a high prevalence in several wealthier DCs in South-East Asia and Latin America. Dengue was responsible for 777,384 DALYs and 13,042 deaths in 2010.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

As there is no curative drug or preventive vaccine for dengue; management is focused on control of transmission and supportive therapy to minimise patient dehydration or shock from haemorrhagic fever. New drugs to treat dengue are needed, but there is already a strong commercial programme for dengue vaccines (which are therefore now excluded from G-FINDER, as below). A diagnostic that is able to detect early-stage disease and distinguish dengue from other causes of fever is needed.[5] There is also a need for evaluation of the currently available diagnostic kits.[48]

A small number of early-stage drug candidates are in development,[5] while in mid-2012, the US Centers for Disease Control (CDC) received approval from the US Food and Drug Administration (FDA) for a new diagnostic test which can detect the presence of all four dengue virus types.[49]

NOTE: A review by the G-FINDER AC in 2013 identified the increased commercialisation of dengue vaccine R&D since year one of the survey. As a result, dengue vaccines no longer fit the criteria for inclusion in G-FINDER and funding for all dengue vaccine R&D, including previous years' funding, is therefore excluded from this report. This has a major impact on reported total dengue funding: vaccine R&D made up 71% of reported dengue funding in 2012.

We will continue to monitor the dengue vaccine R&D landscape in consultation with the AC, as with all neglected diseases, so that we can respond to any future changes.



R&D needed for dengue includes:

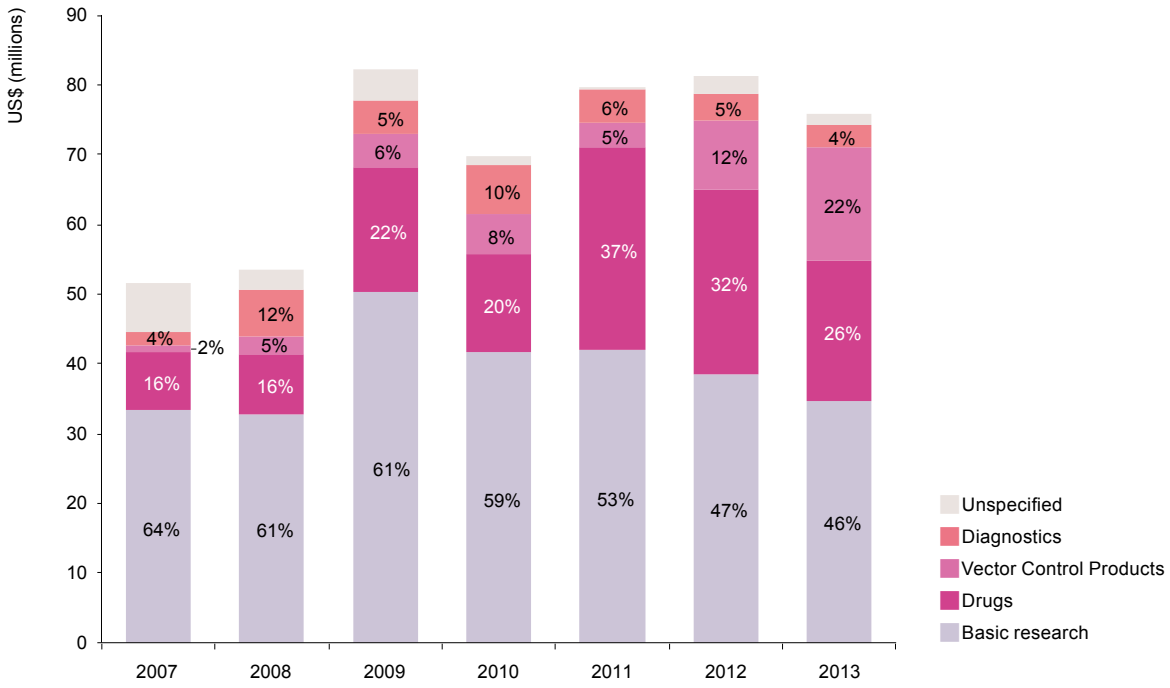
- Basic research
- Drugs
- Diagnostics
- Vector control products

Funding for eligible dengue R&D in 2013 was $76m. Dengue received $71m from YOY funders, meaning investment was relatively stable (down $1.9m, -2.6%) compared to 2012. The remaining $4.4m was provided by irregular survey participants.

Basic research accounted for nearly half of total funding ($35m, 46%), followed by drug development ($20m, 26%) and vector control products ($16m, 22%). Another $3.1m (4.1%) went to diagnostics.

Funding to vector control products from YOY survey participants more than doubled (up $8.3m, 109%) driven by a $5.8m grant from the Gates Foundation. Funding to all other product areas decreased: drug development by $6.4m (-24%), basic research by $1.3m (-3.8%) and diagnostics by $0.8m (-21%).

Figure 16. Dengue R&D funding by product type 2007-2013



The relatively stable overall YOY funding resulted from a moderate increase from the Gates Foundation (up $11m, 216%, albeit from a low base) and a very small increase from French ANR (up $0.8m, a five-fold increase from a very low base). These were balanced by a drop from the US NIH (down $8.0m, -19%, due to the US budget sequester), and smaller decreases from the Wellcome Trust (down $1.5m, -29%, due to cyclical funding disbursement) and the Australian NHMRC (down $1.5m, -44%). Investment from the remaining top 12 funders was stable.

Table 13. Top dengue R&D funders 2013

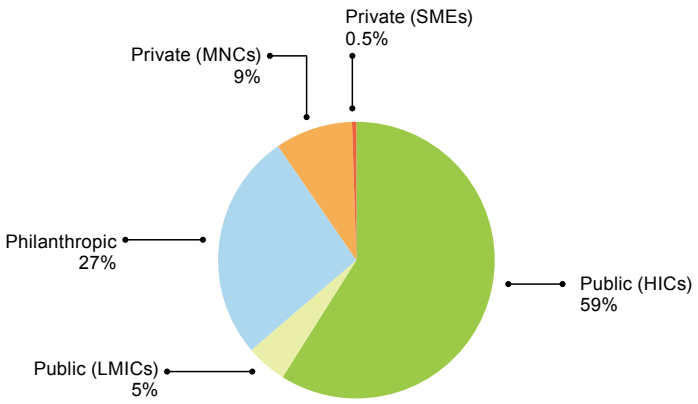
Funder	US$ (millions)							2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013		
US NIH	28	24	43	40	47	42	34	45	
Gates Foundation	1.1	2.1	1.6	1.1	0.1	5.2	16	22	
Aggregate industry	7.1	3.5	5.3	7.2	11	8.3	7.3	9.6	
Wellcome Trust	1.0	1.1	1.6	2.2	6.7	5.3	3.8	5.0	
European Commission	2.2	1.9	1.2	0.5	0.5	2.1	2.9	3.9	
Institut Pasteur	4.3	2.6	2.4	3.5	2.7	2.1	2.2	2.9	
Australian NHMRC	0.9	1.4	1.4	1.7	2.3	3.4	1.9	2.5	
Indian ICMR		0.6	1.0	1.3	1.3	1.1	1.7	2.3	
French ANR		-	0.4	1.0	1.3	0.2	1.0	1.4	
German DFG	-		0.1	0.1	<0.1	1.7	1.0	1.3	
Brazilian DECIT	2.0	1.6	7.7	1.6	0.3	1.6	0.7	1.0	
UK MRC	0.2	0.3	0.2	0.1	0.8	0.5	0.5	0.7	
Subtotal of top 12^	51	50	74	65	77	78	74	97	
Disease total	52	54	82	70	80	81	76	100	

^ Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

Almost two-thirds of dengue funding came from the public sector ($48m, 64%), of which HICs continued to contribute the vast majority ($45m, 92%). The philanthropic sector invested $20m (27%) and the pharmaceutical industry $7.3m (9.6%).

The philanthropic sector increased YOY funding by $9.4m (up 88%), entirely due to the Gates Foundation. Funding from the public sector decreased (down $10m, -19%) mostly reflecting decreases from HIC governments (down $9.0m, -17%). Funding from industry decreased slightly (down $0.9m, -11%).

Figure 17. Dengue R&D funding by sector 2013



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 (*Salmonella typhi, Salmonella 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, as well as some serotypes that almost exclusively cause disease in animals.[50]

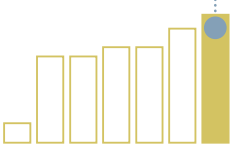
Symptoms include high fever, malaise, headache, constipation or diarrhoea, rose-coloured spots on the chest, and enlarged spleen and liver. Young children, immunocompromised patients and the elderly are the most vulnerable to severe disease.

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

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

New *S. paratyphi* vaccines are currently undergoing clinical trials, and several groups are working on conjugate *S. typhi* vaccines, including a candidate (Vi-CRM 197) that completed Phase II trials in 2012.[53] Results from this trial, reported in 2014, found the candidate to be safe and immunogenic in populations of all ages.[54]

$65.4 MILLION



TOTAL SPEND ON SALMONELLA R&D IN 2013

OF GLOBAL R&D FUNDING

R&D needed for salmonella infections includes:

- Basic research
- Drugs
- Diagnostics
- Vaccines

Salmonella infections received $65m in R&D funding in 2013. YOY funders increased their investment slightly (up $3.5m, 6.6%) to $56m. Irregular survey participants provided the remaining $9.3m in funding.

As in 2012, the majority of funding went to typhoid and paratyphoid fever ($47m, 72%), with NTS only receiving $8.1m (12%). YOY funding for typhoid and paratyphoid fever increased by $2.9m (up 8.2%) while funding for NTS dropped by $1.0m (-12%).

In 2013, the vast majority of funding went to two R&D areas: basic research ($34m, 53%) and vaccine development ($23m, 35%). Nearly two-thirds of basic research funding was allocated to typhoid and paratyphoid fever ($22m, 64%), with only $3.8m (11%) to NTS. Similarly, $20m (88%) of funding for vaccines was allocated to typhoid and paratyphoid fever, with $2.6m (11%) allocated to NTS.

Reflecting the overall increase in funding, YOY survey participants increased investment for vaccines (up $3.4m, 25%) and drugs (up $1.0m, 37%), while funding for basic research (down $0.8m, -2.5%) and diagnostics (down $0.2m, -4.8%) remained stable.

Table 14. Salmonella R&D funding 2013 (US$ millions)

Disease	Basic research	Drugs	Vaccines (Preventive)	Diagnostics	Unspecified	Total	%
Typhoid and paratyphoid fever (*S. typhi, S. paratyphi A*)	22	2.9	20	1.3	0.4	47	72
Non-typhoidal *S. enterica* (NTS)	3.8	0.5	2.6	1.1	-	8.1	12
Multiple *Salmonella* infections	8.7	0.5	0.1	1.2	-	11	16
Total	34	3.9	23	3.7	0.4	65	100

- No reported funding

Eleven of the top 12 funders provided stable or increased funding, including the Gates Foundation (up $4.2m, 81%) and French ANR (up $1.9m, the first funding for salmonella infections disbursed by this organisation since 2008). The apparent increase from the pharmaceutical industry came from irregular survey participants, with YOY industry investment largely unchanged (down <$0.1m, -0.6%). The US NIH decreased its investment slightly (down $2.3m, -6.8%, due to the US budget sequester).

Table 15. Top salmonella R&D funders 2013

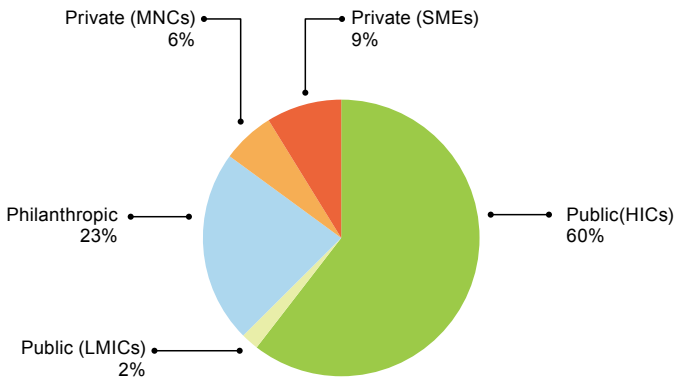
Funder	US$ (millions) 2007	2008	2009	2010	2011	2012	2013	2013 % of total	2007-2013 trend
US NIH	9.1	23	29	30	25	33	31	47	
Aggregate industry	-	14	3.9	3.2	5.0	4.4	9.8	15	
Gates Foundation	-	-	1.8	3.7	4.3	5.2	9.3	14	
Wellcome Trust	-	1.0	2.0	2.8	4.8	5.6	5.2	8.0	
Institut Pasteur	-	1.6	1.7	1.7	2.7	1.6	1.9	2.9	
French ANR		0.6	-	-	-	-	1.9	2.9	
UK MRC	0.9	1.2	0.9	0.7	1.6	1.3	1.5	2.3	
German DFG	-		0.6	1.4	1.4	1.0	1.5	2.3	
Chilean FONDECYT				0.1	0.8	0.8	0.8	1.2	
Swedish Research Council		0.5	0.4	0.6	0.6	0.6	0.6	1.0	
Australian NHMRC	-	0.6	0.7	0.6	0.2	0.3	0.6	0.9	
Science Foundation Ireland						0.5	0.5	0.7	
Subtotal of top 12^	10	44	44	48	48	56	64	98	
Disease total	10	44	44	49	49	58	65	100	

^ Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

Public funding accounted for nearly two-thirds of investment ($41m, 63%) with the majority coming from the US NIH ($31m, 75%), as in previous years. The philanthropic sector provided a further $15m (23%).

The entirety of the 2013 YOY funding increase for salmonella R&D came from the philanthropic sector, whose funding rose by $3.8m (up 35%). As above, the apparent increase from the pharmaceutical industry was from irregular survey participants.

Figure 18. Salmonella R&D funding by sector 2013



HEPATITIS C GENOTYPE 4

A review of the neglected disease R&D landscape in 2013 advised that G-FINDER should be expanded to include hepatitis C genotype 4. As with all diseases in the G-FINDER report, only DC-specific R&D has been reported, including R&D that is only focused on hepatitis C genotype 4 as well as R&D that is directed towards all genotypes including hepatitis C genotype 4. (We note the possibility of under-reporting since this was the first time funders were asked to collect hepatitis C data for the G-FINDER survey.)

Hepatitis C is a blood-borne virus that causes inflammation of the liver. Hepatitis C genotype 4 is most common in the Middle East and Africa where it accounts for 80% of hepatitis C infections, compared with only 1-3% in most of Europe and the US.[55,56] There are an estimated 11-12 million people infected with hepatitis C genotype 4 worldwide.[iv] [57–59] However, due to its low prevalence in the US and Europe it is significantly under-researched compared with other hepatitis C genotypes, and diagnostic, treatment and prevention tools are far less developed.

There is no vaccine for hepatitis C, and current vaccine R&D is focused on hepatitis C genotype 1. There are a number of new treatments for hepatitis C genotype 4 in development based on drugs initially developed for hepatitis C genotype 1. Interim results of a Phase III trial of simeprevir + peginterferon/ribavirin showed comparable efficacy in patients with hepatitis C genotype 4 as those with hepatitis C genotype 1.[60] A Phase IIb study of the dual oral regimen sofosbuvir + ribavirin found that the combination provided rapid and consistent antiviral suppression in people of Egyptian descent with hepatitis C genotype 4.[61] A Phase IIa trial of telaprevir in combination with peginterferon/ribavirin showed antiviral activity in patients with hepatitis C genotype 4 infection.[62] However, current diagnostic tools were developed for detection of hepatitis C genotype 1, making accurate epidemiological studies in countries with heavy hepatitis C genotype 4 burdens challenging. Diagnostics specific to hepatitis C genotype 4 are needed.

$50.6 MILLION

TOTAL SPEND ON HEPATITIS C GENOTYPE 4 R&D IN 2013

OF GLOBAL R&D FUNDING

R&D needed for hepatitis C genotype 4 includes:

- Drugs
- Diagnostics
- Preventive vaccines

[iv] Based on estimates provided by the Emerging Diseases Epidemiology Unit, Institut Pasteur

Table 16. Hepatitis C genotype 4 R&D funding by product type 2013

Product	US$ (millions)	2013 % of total
	2013	
Drugs	44	87
Vaccines (Preventive)	4.2	8.3
Diagnostics	1.2	2.4
Unspecified	1.0	2.0
Total	51	100

Table 17. Top hepatitis C genotype 4 R&D funders 2013

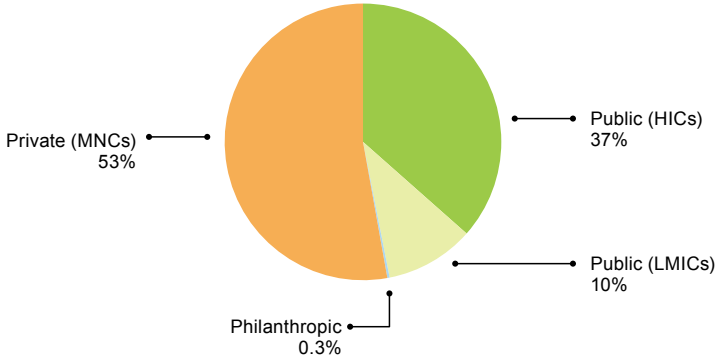
Funder	US$ (millions)	2013 % of total
	2013	
Aggregate industry	27	53
US NIH	10	20
French ANRS	6.7	13
Cairo University	4.0	7.9
Indian DBT	1.1	2.2
European Commission	0.7	1.3
UK MRC	0.4	0.8
Australian NHMRC	0.3	0.7
Thailand GPO	0.1	0.2
Burnet Institute	0.1	0.2
Wellcome Trust	0.1	0.2
Swiss SNSF	0.1	0.2
Subtotal of top 12	50	99.6
Total	51	100

Hepatitis C genotype 4 received $51m in 2013. The majority of this funding was for drug development ($44m, 87%), with only small amounts for other product areas.

Twelve organisations provided virtually all (99.6%) funding for hepatitis C genotype 4, with the appearance of Cairo University in the top 12 funders being a likely reflection of the high burden of hepatitis C genotype 4 in Egypt.

The private and public sectors provided roughly equal contributions, with the pharmaceutical industry investing $27m (53%), all from MNCs; and public funders providing $24m (47%).

Figure 19. Hepatitis C genotype 4 R&D funding by sector 2013



MOST NEGLECTED DISEASES

The most poorly funded neglected diseases, or 'third tier' diseases, are defined as those that receive less than 0.5% each of global funding for neglected disease R&D. These include leprosy, Buruli ulcer, trachoma and rheumatic fever. A review by the G-FINDER AC in 2013 led to the addition of two additional 'third tier' diseases to the G-FINDER survey – cryptococcal meningitis and leptospirosis.

These most neglected diseases cannot be analysed in the same way as better-funded diseases, simply because they receive so few grants from so few funders in any given year. As a result, completion or initiation of even one grant by one funder can lead to large annual swings in reported funding, making analysis of funding trends meaningless. Trend analysis has therefore not been done for these micro-funded diseases.

The table below summarises the R&D needs for the most neglected diseases.

EACH DISEASE RECEIVES

<0.5%

OF TOTAL GLOBAL FUNDING

Table 18. R&D needs for the most neglected diseases

Disease	Basic research	Drugs	Vaccines (Preventive)	Diagnostics
Leprosy	Y	Y		Y
Buruli ulcer	Y	Y	Y	Y
Trachoma			Y	Y
Cryptococcal meningitis		Y		
Rheumatic fever			Y	
Leptospirosis				R

'R' denotes a restricted category where only some investments are eligible, as defined in the neglected disease R&D scope document
'Y' denotes a category where a disease or product is included in the survey

LEPROSY

Leprosy is caused by *Mycobacterium* bacteria transmitted via droplets from the nose and mouth of untreated patients. Leprosy mainly affects the skin and nerves, and if left untreated causes nerve damage that leads to muscle weakness and wasting, as well as permanent disabilities and deformities.

Leprosy was responsible for 6,047 DALYs in 2010. A successful leprosy eradication programme, which has resulted in improved diagnosis and treatment with multidrug therapy (MDT), means that incidence is decreasing. Nevertheless, around a quarter of a million new cases are still recorded each year.[63]

The current MDT regimen for leprosy has been standard treatment for 30 years and, although highly effective, it requires 6-12 months of treatment.[64] Further research is needed to improve and simplify drug regimens, to provide products for the management of nerve function, and to develop and improve leprosy diagnostics.[65,66]

$12.8 MILLION

TOTAL SPEND ON LEPROSY R&D IN 2013

Funding for leprosy R&D in 2013 was $13m. The vast majority of leprosy R&D funding ($12m, 93%) in 2013 went to basic research. A further $0.9m (6.8%) was allocated to product development, with diagnostics receiving $0.7m and drugs $0.2m.

Table 19. Leprosy R&D funding by product type 2007-2013

Product \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2013 % of total
Basic research	5.1	6.6	7.3	5.1	7.1	10	12	93
Diagnostics	0.7	0.6	1.4	1.4	1.2	1.4	0.7	5.2
Drugs	<0.1	0.8	1.1	1.1	0.3	0.5	0.2	1.6
Unspecified	0.8	3.2	2.4	2.7	-	2.7	0.1	0.6
Total	6.6	11	12	10	8.6	15	13	100

- No reported funding

Three funders (the US NIH, the Indian ICMR and Brazilian FAPEAM) provided 81% ($10m) of funding. The majority ($11m, 84%) of leprosy R&D funding came from the public sector, with over half of this ($5.8m, 54%) from the US NIH. Just under a third ($3.3m, 31%) was from the Indian government and a further $1.5m (14%) from the Brazilian government. The philanthropic sector provided $2.0m (16%); and a very small amount (<$0.1m, 0.6%) was provided by MNCs.

Table 20. Top leprosy R&D funders 2013

Funder \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2013 % of total
US NIH	2.2	3.5	5.7	3.6	4.3	10	5.8	45
Indian ICMR		3.2	1.9	2.8	2.3	0.7	3.3	26
Brazilian FAPEAM							1.3	10
TLMI				0.3	0.4	0.4	0.6	4.9
Turing Foundation				0.7		0.6	0.3	2.3
NLR			0.1	0.7	0.4	0.3	0.3	2.1
ALM	0.7	0.7	0.6	0.5	0.5	0.3	0.2	1.7
Brazilian DECIT	1.8	2.8	2.2	-	0.1	1.5	0.2	1.4
FRF				0.2	0.2	0.2	0.2	1.3
Renaissance HSC						0.2	0.2	1.3
Institut Pasteur	0.1	0.2	0.2	0.2	0.1	0.2	0.1	0.9
DAHW			<0.1	0.1	0.1	0.1	0.1	0.8
Subtotal of top 12^	6.6	11	12	10	8.6	15	13	98
Disease total	6.6	11	12	10	8.6	15	13	100

^ Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

BURULI ULCER

Buruli ulcer begins as a painless lump that becomes an ulcer that can lead to disfiguration and functional impairment. It typically affects the rural poor, with the greatest number of cases in children under 15. Emerging evidence suggests that HIV co-infection may increase the risk for Buruli ulcer, and render the disease more aggressive.[67]

Buruli ulcer occurs in more than 33 countries, predominantly in Western Africa. No DALY figures are available, although the WHO estimates that Buruli ulcer affects more than 7,000 people each year,[67] with almost 5,000 new cases reported each year.[68]

Treatment options including antibiotics and surgery are effective if the disease is diagnosed early. The BCG vaccine (designed for TB) provides short-term protection, but this is insufficient. Combination antibiotics (oral and injectable) are effective but cumbersome, as they must be given daily for eight weeks. Treatment failure and resistance are emerging issues, 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.[67]

A new simple rapid diagnostic field test is currently in development. Buruli ulcer vaccines are also in early development but are still many years away from being approved for human use.[69]

$7.21 MILLION

TOTAL SPEND ON BURULI ULCER R&D IN 2013

Funding for Buruli ulcer R&D in 2013 was $7.2m. More than half of funding went to basic research ($3.9m, 54%), with product development receiving $2.5m (34%). Within product development, each area received less than $1.0m.

Table 21. Buruli ulcer R&D funding by product type 2007-2013

Product \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2013 % of total
Basic research	1.0	1.6	1.1	1.4	0.9	1.9	3.9	54
Vaccines (Preventive)	-	<0.1	0.2	2.4	2.2	2.2	0.9	13
Diagnostics	<0.1	0.1	0.3	0.8	0.3	1.1	0.8	12
Unspecified	1.7	0.3	0.1	0.8	2.4	1.0	0.8	11
Drugs	-	0.2	0.3	0.8	0.7	0.7	0.7	10
Total	2.7	2.2	2.0	6.1	6.5	6.8	7.2	100

- No reported funding

Public funders provided almost two-thirds of Buruli ulcer funding ($4.5m, 62%), with European funders providing over three-quarters of this ($3.5m, 79%). The philanthropic sector provided the remaining $2.7m (38%). There was no industry investment in Buruli ulcer in 2013.

Table 22. Buruli ulcer R&D funders 2013

Funder \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2013 % of total
German DFG	-		-	-	-	-	2.2	31
UBS Optimus Foundation		0.2	0.1	1.2	2.1	2.3	1.8	25
US NIH	0.7	0.5	0.9	1.2	1.3	1.0	1.0	13
European Commission	0.8	0.7	0.2	2.2	2.1	2.0	0.8	11
Institut Pasteur	0.7	0.3	0.4	0.5	0.3	0.5	0.4	5.3
Wellcome Trust	-	<0.1	<0.1	<0.1	0.3	0.3	0.3	4.0
Medicor Foundation				0.4	0.1	0.2	0.2	3.0
FRF				-	-	0.2	0.2	3.0
UK MRC	-	-	-	-	-	-	0.2	2.3
ALM	-	-	-	-	-	<0.1	0.2	2.1
Volkswagen-Stiftung					0.1	<0.1	<0.1	0.5
DAHW				-	-	<0.1	<0.1	0.3
Disease total	2.7	2.2	2.0	6.1	6.5	6.8	7.2	100

- No reported funding

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

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.[70]

Trachoma is endemic in 57 countries with an estimated 7.6 million people severely visually impaired or blind from the disease.[71] Trachoma was responsible for 334,401 DALYs in 2010, making it the twelfth highest cause of morbidity from neglected diseases. However, mortality was zero because, although debilitating, trachoma is not a fatal disease.[72]

Current treatment involves either surgery (which has low acceptance and high recurrence rates) or treatment with azithromycin (where over-reliance on a single drug increases the risk of drug 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 diagnostic test has shown promise in early trials.[73] 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.[74]

$5.94 MILLION

TOTAL SPEND ON TRACHOMA R&D IN 2013

Funding for trachoma R&D was $5.9m in 2013. We note that the only trachoma investments tracked by G-FINDER are for vaccine and diagnostics R&D, with funding fairly evenly distributed between these.

Table 23. Trachoma R&D funding by product type 2007-2013

Product \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2013 % of total
Vaccines (Preventive)	-	1.1	1.4	2.1	4.1	4.6	2.9	49
Diagnostics	0.9	0.1	0.4	3.0	6.7	4.6	2.5	42
Unspecified	0.7	1.1	0.1	-	-	0.5	0.5	9.2
Total	1.6	2.3	2.0	5.1	11	9.7	5.9	100

- No reported funding

Only four organisations funded trachoma R&D in 2013, with the US NIH and the Wellcome Trust accounting for the vast majority ($5.6m, 94%) of funding. The public sector provided 92% of funding ($5.5m), driven by US NIH investment ($5.1m). The remaining 8.0% ($0.5m) was provided by philanthropic funders. There was no industry investment for trachoma in 2013.

Table 24. Trachoma R&D funders 2013

Funder \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2013 % of total
US NIH	-	1.2	1.9	2.9	6.2	9.1	5.1	86
Wellcome Trust	1.4	-	-	-	-	0.6	0.5	8.0
German DFG	-		-	-	-	-	0.2	3.5
Institut Pasteur	-	<0.1	-	<0.1	<0.1	-	0.1	2.2
Brazilian DECIT	-	0.2	-	-	-	-	-	-
SSI	-	0.8	-	-	-	-	-	-
TI Pharma					0.2			
Swedish Research Council		<0.1	0.1	-	-	-	-	-
Aggregate industry	0.1	0.1	-	2.1	4.4	-	-	-
Disease total	1.6	2.3	2.0	5.1	11	9.7	5.9	100

- No reported funding

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

CRYPTOCOCCAL MENINGITIS

Cryptococcal meningitis is an infection that causes inflammation of the tissue covering the brain and spinal cord. It is caused by *Cryptococcus*, a fungus found in soil. The disease predominantly affects people with weakened immune systems, such as those with HIV/AIDS. Approximately 1 million new cases occur each year, resulting in 625,000 deaths, mostly in countries with a high burden of HIV/AIDS.[75]

Cryptococcal meningitis can be effectively treated with amphotericin B (AmB) and flucytosine, but these are poorly suited to DC use. AmB is expensive and requires hospital administration, and flucytosine requires careful blood monitoring. As a result, cryptococcal meningitis in DCs is usually treated with fluconazole, which is only partially effective.[76]

A new long-acting azole-like compound (VT-1129) is currently being developed and several oral formulations of AmB are in early stages of development.[77]

$3.21 MILLION

TOTAL SPEND ON CRYPTOCOCCAL MENINGITIS R&D IN 2013

Table 25. Cryptococcal meningitis R&D funders 2013

Funder	US$ (millions)	2013 % of total
	2013	
UK MRC	1.5	45
US NIH	1.4	42
Wellcome Trust	0.3	9.1
Australian NHMRC	0.1	2.4
Fondation Mérieux	<0.1	0.6
Disease total	3.2	100

Cryptococcal meningitis R&D funding in 2013 totalled $3.2m. We note that the only cryptococcal meningitis investments tracked by G-FINDER are for drug R&D.

Five organisations funded cryptococcal meningitis R&D in 2013, with none providing more than $1.5m. Two public HIC funders (the UK MRC and the US NIH) accounted for 88% ($2.8m) of total funding; this also meant that the public sector provided the majority of funding ($2.9m, 90%). The philanthropic sector provided $0.3m (9.7%). There was no industry investment for cryptococcal meningitis in 2013.

RHEUMATIC FEVER

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

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

Acute rheumatic fever can be treated using currently available drugs, although post-infection prophylaxis requires multiple dosing with antibiotics; however treatment of rheumatic heart disease often requires surgery. The main R&D need is development of a vaccine.

Several vaccines are in progress, including a Queensland Institute of Medical Research (QIMR) vaccine, which is currently in Phase I trials.[78]

$0.92
MILLION

TOTAL SPEND ON RHEUMATIC FEVER R&D IN 2013

Rheumatic fever received $0.9m in R&D funding in 2013. We note that the only rheumatic fever product area tracked by G-FINDER is preventive vaccine development.

Table 26. Rheumatic fever R&D funding by product type 2007-2013

Product	US$ (millions)							2013 % of total
	2007	2008	2009	2010	2011	2012	2013	
Vaccines (Preventive)	1.7	2.3	3.3	2.2	0.8	0.9	0.9	100
Unspecified	0.3	0.3	0.2	-	0.2	0.2	-	-
Total	2.0	2.6	3.5	2.2	1.0	1.0	0.9	100

- No reported funding

There were two funders of rheumatic fever R&D in 2013, both from the public sector. The US NIH provided three-fifths of funding ($0.6m, 61%), with the Australian NHMRC providing the remainder ($0.4m, 39%). There was no funding for rheumatic fever from the philanthropic sector or industry.

Table 27. Rheumatic fever R&D funders 2013

Funder \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2013 % of total
US NIH	1.4	0.7	0.8	0.9	0.4	0.5	0.6	61
Australian NHMRC	0.5	0.5	0.8	0.9	0.4	0.4	0.4	39
Australian Department of Industry		0.1	-	-	-	-	-	-
Australia - India SRF				0.1				
Australian NHF		0.1	0.1	0.2				
Fondazione Cariplo		-	0.1	-				
Swedish Research Council		0.1	0.1	-	0.2	0.2	-	-
Aggregate industry	-	1.1	1.6	-	-	-	-	-
Disease total	2.0	2.6	3.5	2.2	1.0	1.0	0.9	100

- No reported funding

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

LEPTOSPIROSIS

Leptospirosis is an infection caused by *Leptospira* bacteria, transmitted by the urine of domestic or wild animals. It typically affects those living in tropical climates, involved in animal husbandry or living in slums.[79] Experts estimate that approximately 1 million people contract leptospirosis annually, resulting in nearly 60,000 deaths per year.[80]

The flu-like symptoms of leptospirosis make diagnosis difficult, with diagnostic tests limited to specialised laboratories. There is an urgent need to develop new, easy to use techniques for quick diagnosis at the acute stage of the disease.

$0.44 MILLION

TOTAL SPEND ON LEPTOSPIROSIS R&D IN 2013

Table 28. Leptospirosis R&D funders 2013

Funder	US$ (millions) 2013	2013 % of total
Institut Pasteur	0.4	99
ALRA	<0.1	0.9
Disease total	0.4	100

Funding for DC-specific leptospirosis R&D was $0.4m in 2013. We note that the only leptospirosis investments tracked by G-FINDER are for diagnostics.

Only two organisations funded leptospirosis R&D in 2013, with the Institut Pasteur providing 99% of total funding.

Table 29. Disease and product R&D funding 2013 (US$ millions)

Disease or R&D area	Basic research	Drugs	Vaccines (Preventive)	Vaccines (Therapeutic)	Microbicides	Vector control products	Diagnostics	Unspecified	Total
HIV/AIDS	195.56	19.12	641.69		179.78		21.68	30.75	1,088.58
Tuberculosis	146.86	247.76	108.42	1.56		-	48.63	26.55	579.77
Malaria	192.64	162.04	118.60			42.07	10.91	22.57	548.84
P. falciparum	100.08	60.49	87.28			4.66	1.76	3.51	257.77
P. vivax	16.87	34.13	10.18			0.31	0.23	0.36	62.09
Other and/or unspecified malaria strains	75.69	67.41	21.15			37.10	8.92	18.71	228.98
Diarrhoeal diseases	45.01	12.89	115.65				5.56	20.64	199.75
Rotavirus			59.19					1.06	60.25
Shigella	9.81	0.20	16.23				1.19	2.75	30.18
Cholera	19.23	0.61	3.15				0.57	3.64	27.20
Enterotoxigenic *E.coli* (ETEC)			8.79				0.27	0.40	9.47
Cryptosporidium	2.65	1.67	0.11				0.76	-	5.20
Giardia							0.28	0.28	0.56
Enteroaggregative *E.coli* (EAggEC)			0.09				-	-	0.09
Multiple diarrhoeal diseases	13.32	10.41	28.09				2.48	12.51	66.81
Kinetoplastids	55.82	53.14	3.98	0.64		0.33	7.69	1.95	123.55
Sleeping sickness	22.26	12.95	-			0.20	3.65	-	39.07
Leishmaniasis	19.50	8.60	3.78	0.54			0.61	1.73	34.78
Chagas' disease	9.99	15.97	0.20	0.09		0.04	1.56	0.22	28.07
Multiple kinetoplastids	4.06	15.60	-	-		0.10	1.87	-	21.64
Bacterial pneumonia & meningitis			81.35				2.50	20.98	104.83
S. pneumoniae			63.10				1.88	3.63	68.61
N. meningitidis			18.25				0.39	1.23	19.87
Both bacteria							0.23	16.11	16.34
Helminths (worms & flukes)	43.46	24.63	10.96			0.25	8.80	5.99	94.09
Schistosomiasis (bilharziasis)	10.80	3.19	3.25			-	3.48	4.10	24.82
Lymphatic filariasis (elephantiasis)	7.63	5.75				0.02	0.46	1.39	15.26
Onchocerciasis (river blindness)	3.09	5.95	0.68			-	4.19	0.47	14.37
Hookworm (ancylostomiasis & necatoriasis)	2.94	0.46	3.66					-	7.06
Tapeworm (cysticercosis/taeniasis)	1.59	0.07				0.18		-	1.84
Strongyloidiasis & other intestinal roundworms	1.13	0.02	0.01				0.06	0.02	1.24
Whipworm (trichuriasis)	0.87	0.04						-	0.91
Roundworm (ascariasis)	0.48	0.10						-	0.58
Multiple helminths	14.94	9.04	3.36			0.05	0.61	-	28.00
Dengue	34.78	19.92				16.40	3.08	1.66	75.83
Salmonella infections	34.49	3.86	22.94				3.67	0.40	65.37
Typhoid and paratyphoid fever (*S. typhi, S. paratyphi A*)	21.97	2.87	20.18				1.35	0.40	46.77
Non-typhoidal *S. enterica* (NTS)	3.85	0.48	2.63				1.14	-	8.09
Multiple *Salmonella* infections	8.67	0.51	0.14				1.18	-	10.51

Disease or R&D area	Basic research	Drugs	Vaccines (Preventive)	Vaccines (Therapeutic)	Microbicides	Vector control products	Diagnostics	Unspecified	Total
Hepatitis C genotype 4		44.15	4.22				1.23	1.02	50.62
Leprosy	11.88	0.20					0.67	0.08	12.83
Buruli ulcer	3.93	0.75	0.90				0.83	0.81	7.21
Trachoma			2.89				2.51	0.55	5.94
Cryptococcal meningitis		3.21							3.21
Rheumatic fever			0.92					-	0.92
Leptospirosis							0.44		0.44
Core funding of a multi-disease R&D organisation									119.99
Unspecified disease									93.10
Platform technologies	Adjuvants and immunomodulators			General diagnostic platforms			Delivery technologies and devices		
	20.95			16.95			5.96		43.86
Total R&D funding									**3,218.74**

- No reported funding

Category not included in G-FINDER

NEGLECTED DISEASE FUNDERS

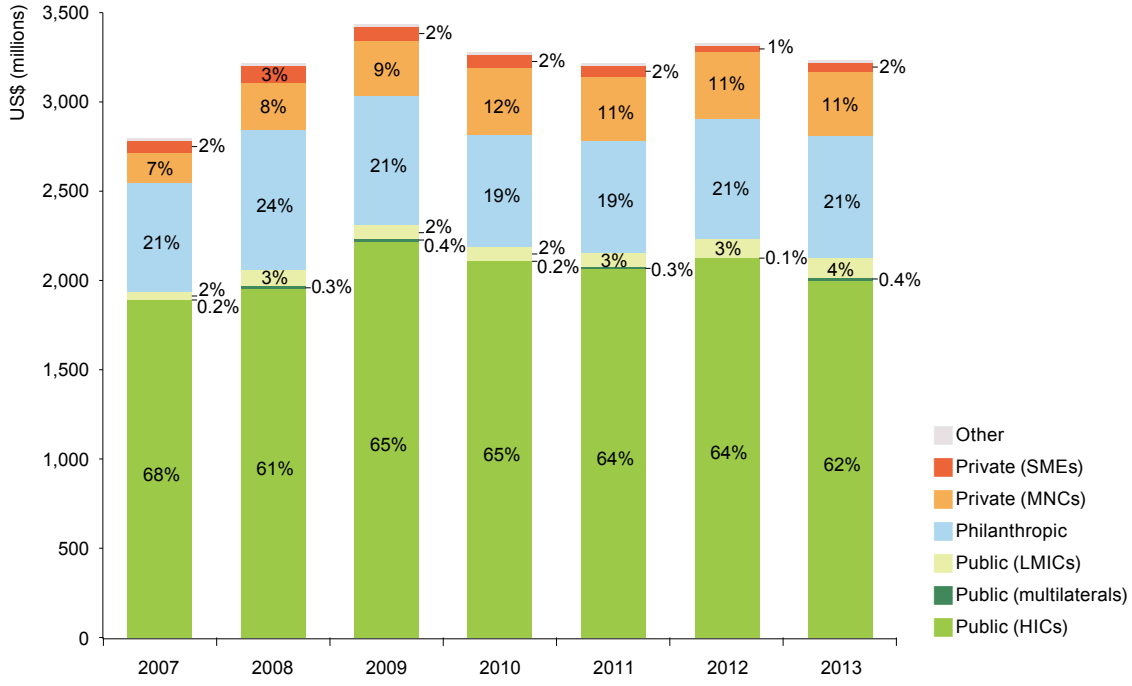
FUNDER OVERVIEW

Please note that reported industry funding for all years is substantially lower than published figures in previous G-FINDER reports, since dengue vaccine R&D has been fully excluded. This is an area in which industry had significant investments (see Private sector funders).

The public sector continued to play a key role in neglected disease R&D, providing two-thirds ($2,128m, 66%) of global funding, compared to $2,232m (67%) in 2012. The vast majority of public funding ($2,001m, 94%) again came from HIC governments. The philanthropic sector accounted for 21% ($688m) and industry for 12% ($401m) of funding.

Both public and private sector funding dropped in 2013, leading to an overall $193m (-6.2%) YOY downturn in neglected disease R&D funding. Public funders had the largest decrease (down $159m, -7.6%), mostly from HICs (down $148m, -7.2%). Industry funding fell by $38m (-11%), entirely due to cuts in MNC investment. A small increase from the philanthropic sector (up $5.1m, 0.8%) was not enough to offset these public and industry funding decreases.

Figure 20. Total R&D funding by sector 2013



PUBLIC FUNDERS

As in the past six years, the top three public funders were the US, the EC and the UK. The US contributed two-thirds of global public funding ($1,432m, 67%), with an investment over 11 times that of the next largest public funder (the EC).

YOY public funding decreased by $159m (-7.6%) in 2013. This fall was driven by the US (down $184m, -11%) with a significant drop from the US NIH (down $188m, -13%) and a moderate decrease from USAID (down $13m, -14%). Six other top 12 government funders also reduced their funding, including Australia (down $16m, -36%) and Germany (down $15m, -46%). Underlying German funding was essentially stable, however, with the $15m decrease in 2013 coming after a one-off $13m grant to the Global Health Investment Fund from the German Federal Ministry for Economic Cooperation and Development in 2012.

As the US NIH is by far the largest public funding agency, contributing well over half ($1,247m, 59%) of all public funding in 2013, a decrease of this size in their funding inevitably overshadows other investment trends. For instance, if US NIH investments are excluded, YOY public funding actually rose by $28m (up 4.2%) in 2013.

There were notable YOY increases from four European funders in 2013, although their impact was obscured by the US NIH cuts. Funding from the UK increased by $27m (up 31%), reflecting a $26m (up 62%) climb in UK DFID's funding, largely due to a new PDP funding stream which began in 2013. Funding from France rose by $24m (up 41%), driven by Inserm (up $17m, 38%). There were moderate increases from the EC (up $18m, 18%), the Netherlands (up $12m, 86%) and Japan (up $8.8m, 362%, albeit from a lower base).

Table 30. Top public R&D funders 2013

Country	US$ (millions)							2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013		
United States of America	1,381	1,402	1,617	1,540	1,507	1,605	1,432	67	
European Commission	132	143	130	101	117	104	123	5.8	
United Kingdom	99	101	141	155	125	88	120	5.6	
France	17	32	53	44	67	59	92	4.3	
India		38	25	39	43	43	50	2.4	
Germany	13	4.1	38	41	35	61	49	2.3	
Australia	25	34	31	34	43	54	28	1.3	
Netherlands	37	30	32	20	27	17	26	1.2	
Canada	22	26	19	11	11	20	22	1.0	
Brazil	27	29	38	13	14	25	20	0.9	
Switzerland	8.0	5.1	9.1	16	16	18	18	0.9	
South Africa	4.1	5.3	7.5	8.1	7.3	5.9	13	0.6	
Subtotal of top 12^	1,826	1,909	2,182	2,041	2,028	2,113	1,994	94	
Total public funding	1,946	2,061	2,323	2,194	2,163	2,232	2,128	100	

^ Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013

No funding organisations from this country participated in the survey for this year

[v] IDC increases or decreases in funding refer to organisations that participated in both 2012 and 2013, as IDC survey participation is inconsistent from year to year

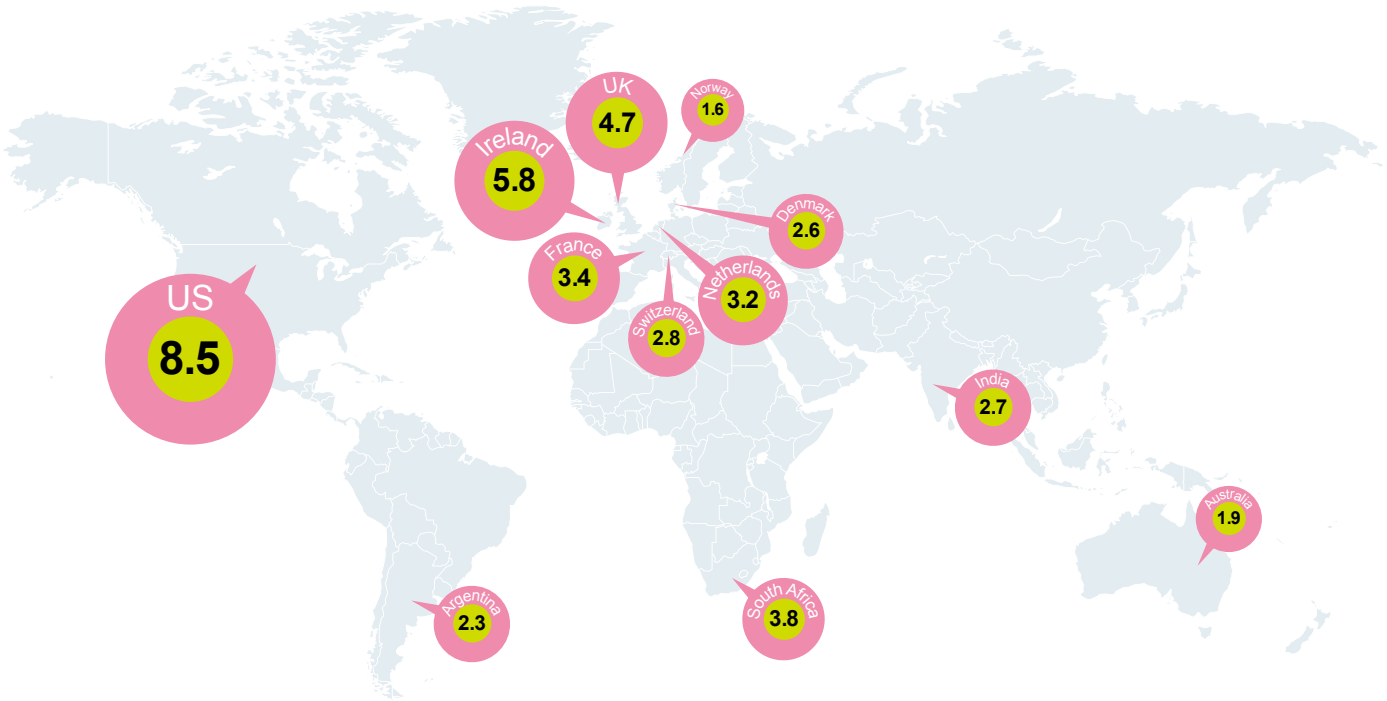
Overall IDC funding remained stable (up $2.3m, 3.7%), with decreases by Brazil (down $9.8m, -77%) being offset by increases from India and South Africa.[v] Funding from India increased by $6.2m (up 14%), in large part due to better reporting from the Indian ICMR, while South Africa more than doubled its funding from 2012 (up $5.9m, 101%).

PUBLIC FUNDING BY GDP

Absolute funding can be a misleading measure of public R&D investment, as it can underplay the contributions of smaller countries and LMICs. For this reason, we have also analysed country investments in neglected disease R&D in relation to their gross domestic product (GDP).

When analysed by GDP, compared with absolute funding, a slightly different picture emerges. Four countries that are not ranked in the top 12 funders by absolute funding appear in the top 12 when ranked by contribution relative to GDP: Ireland, Denmark, Argentina and Norway, with Ireland reporting the second highest ratio of public funding to GDP in 2013 after the US. In contrast, three countries ranked in the top 12 funders by absolute funding amount – Germany, Canada and Brazil – drop out of the list when GDP is factored in. However the majority of countries remain in the top 12 public funders using either metric, including the US, UK, South Africa, France, the Netherlands, Switzerland, India and Australia. Colombia, who had the second highest ratio of public funding to GDP in 2012, dropped out of the list because the main funding agency from Colombia, Colciencias, did not participate in the survey in 2013.

Figure 21. Public R&D funding by GDP 2013^* (A value of 10 is equivalent to an investment of 0.01% of GDP)



^ GDP figures taken from International Monetary Fund (IMF) World Economic Outlook database
* Figure provides ratio of US$ funding/ GDP (1/100,000)

HIGH-INCOME COUNTRIES AND MULTILATERALS

In 2013, HICs and multilaterals invested $2,015m (95% of public funding) in neglected disease R&D, with YOY funding falling by $147m (-7.2%). This decrease was driven by the US budget sequester, which led to large funding cuts by the US NIH.

As in previous years, the top three diseases (HIV/AIDS, malaria and TB) received almost three-quarters of funding ($1,477m, 73%).

Four diseases saw significant funding decreases in 2013. HIV/AIDS had the most substantial funding decrease (down $82m, -8.4%), due to drops by the US NIH (down $66m, -9.0%) and UK DFID (down $14m, -66%). Kinetoplastid funding fell $18m (-20%), along with dengue (down $9.0m, -17%) and helminth infections (down $7.8m, -15%). The only funding increase was for bacterial pneumonia & meningitis (up $8.6m, 51%), due to increased Inserm funding (up $11m, 210%). Funding was stable for TB, diarrhoeal diseases, malaria and salmonella infections.

Table 31. Public (HICs and multilaterals) R&D funding by disease 2007-2013

Disease or R&D area	US$ (millions)							2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013		
HIV/AIDS	1,038	1,025	1,069	994	956	984	907	45	
Malaria	239	259	294	316	295	291	292	14	
Tuberculosis	243	231	343	313	283	279	278	14	
Diarrhoeal diseases	49	68	102	84	93	86	89	4.4	
Kinetoplastids	50	88	105	105	96	93	76	3.8	
Helminths (worms & flukes)	42	37	53	51	49	60	52	2.6	
Dengue	40	43	57	51	57	54	45	2.2	
Salmonella infections	10	29	36	37	33	40	40	2.0	
Bacterial pneumonia & meningitis	11	11	14	18	28	17	29	1.4	
Hepatitis C genotype 4							18	0.9	
Leprosy	4.0	4.0	6.9	3.9	4.4	10	5.9	0.3	
Trachoma	<0.1	2.0	2.0	2.9	6.2	9.1	5.5	0.3	
Buruli ulcer	2.5	1.7	1.7	4.1	3.8	3.8	4.5	0.2	
Cryptococcal meningitis							2.9	0.1	
Rheumatic fever	2.0	1.4	1.7	2.0	1.0	1.0	0.9	<0.1	
Leptospirosis							0.4	<0.1	
Platform technologies	3.4	6.1	7.7	11	12	26	29	1.4	
Adjuvants and immunomodulators	<0.1	0.8	2.9	4.2	2.0	18	16	0.8	
General diagnostic platforms	1.3	2.2	2.1	5.7	9.1	7.6	8.9	0.4	
Delivery technologies and devices	2.1	3.1	2.6	1.3	0.5	0.5	4.0	0.2	
Core funding of a multi-disease R&D organisation	106	96	73	76	94	73	73	3.6	
Unspecified disease	54	64	77	47	65	105	70	3.4	
Total public funding (HICs/multilaterals)	1,895	1,965	2,242	2,116	2,076	2,133	2,015	100	

New disease added to G-FINDER in 2013

LOW- AND MIDDLE-INCOME COUNTRIES

LMICs invested $113m in neglected disease R&D in 2013, accounting for 5.3% of all public funding, including $80m from YOY funders and $33m from irregular participants.[vi,vii] It must be noted that inconsistent survey participation by LMICs makes comparison of funding from year to year difficult.

Of total LMIC investment, almost three-quarters (74%) of funding came from three IDCs: India ($50m, 45%), Brazil ($20m, 17%) and South Africa ($13m, 12%).

LMIC investment remained concentrated with three diseases (TB, malaria and HIV/AIDS) receiving just over two-thirds ($77m, 68%) of funding. From regular survey participants, TB funding almost doubled (up $16m, 95%), driven by a $9.7m increase (from a small base) from the Argentinian MINCYT, mostly for TB drug development. This was accompanied by smaller increases from the South African Department of Science and Technology (DST, up $4.1m) and the Indian DBT (up $1.8m, 54%).

Diarrhoeal diseases and leprosy also saw small increases, of $1.9m (up 50%) and $1.3m (up 57%) respectively. HIV/AIDS, salmonella and bacterial pneumonia & meningitis were stable. Four diseases saw modest decreases: malaria (down $3.6m, -24%), kinetoplastids (down $2.2m, -21%), helminth infections (down $1.2m, -41%) and dengue (down $0.8m, -20%).

Table 32. Public (LMICs) R&D funding by disease 2010-2013

Disease or R&D area	US$ (millions)				2013 % of total	2010-2013 trend
	2010	2011	2012	2013		
Tuberculosis	11	17	17	36	32	
Malaria	10	13	22	22	20	
HIV/AIDS	19	19	15	19	17	
Kinetoplastids	12	11	15	9.9	8.8	
Diarrhoeal diseases	7.6	14	5.2	5.8	5.1	
Hepatitis C genotype 4				5.3	4.7	
Leprosy	3.6	2.4	2.4	4.8	4.3	
Dengue	6.7	4.7	7.9	3.6	3.2	
Helminths (worms & flukes)	1.2	2.0	3.2	1.8	1.6	
Salmonella infections	0.8	1.3	1.3	1.4	1.2	
Bacterial pneumonia & meningitis	0.4	0.1	0.3	0.2	0.1	
Platform technologies	3.4	0.5	4.5	0.6	0.5	
Delivery technologies and devices	1.9	<0.1	3.7	0.4	0.4	
Adjuvants and immunomodulators	0.6	-	0.1	0.1	0.1	
General diagnostic platforms	0.9	0.5	0.6	<0.1	<0.1	
Core funding of a multi-disease R&D organisation	1.1	0.3	-	0.4	0.4	
Unspecified disease	-	1.6	4.7	2.4	2.1	
Total public funding (LMICs)	78	88	99	113	100	

- No reported funding
New disease added to G-FINDER in 2013

[vi] Overall LMIC funding may be slightly under-estimated as Colciencias, the main Colombian public funding agency, did not participate in the survey in 2013

[vii] LMIC increases or decreases in funding refer to organisations that participated in both 2012 and 2013, as LMIC survey participation is inconsistent from year to year

PHILANTHROPIC FUNDERS

Philanthropic funders invested $688m (21% of the total) in neglected disease R&D in 2013. The two largest investors – the Gates Foundation and the Wellcome Trust – together contributed 94% of funding ($643m), the same proportion as in 2012.

YOY philanthropic funding was relatively stable in 2013 (up $5.1m, 0.8%). This marginal change was the result of a $17m (up 3.4%) increase from the Gates Foundation, partially offset by an $11m (-8.2%) decrease from the Wellcome Trust, due to cyclical funding patterns.

Table 33. Top philanthropic R&D funders 2013

Funder	US$ (millions)							2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013		
Gates Foundation	508	677	614	506	502	498	515	75	
Wellcome Trust	56	59	65	76	89	139	128	19	
GAVI	11	17		2.4		9.4	18	2.6	
MSF	7.8	8.0	5.0	5.1	5.8	6.4	6.6	1.0	
Fundació La Caixa		0.3		0.3	3.7	3.1	3.4	0.5	
UBS Optimus Foundation	0.6	1.2	1.2	8.0	6.0	3.6	3.0	0.4	
MMRF						0.3	2.9	0.4	
amfAR	0.5	0.4	0.2	0.3	0.2	2.1	1.8	0.3	
Medicor Foundation			0.6	0.9	0.7	0.6	0.8	0.1	
Funds raised from the general public	2.2	1.4	0.5	0.3	0.5	0.4	0.8	0.1	
TLMI				0.3	0.4	0.4	0.6	<0.1	
All other philanthropic organisations	8.2	16	17	18	15	18	6.8	1.0	
Total philanthropic funding	595	780	704	618	624	681	688	100	

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

The overall stable funding masked some significant fluctuations in funding per disease, including a drop in funding for bacterial pneumonia & meningitis (down $29m, -64%), largely due to a $19m (-74%) decrease in funding from the Gates Foundation for pneumococcal vaccine R&D. Malaria funding decreased by $12m (-7.7%), due to a $9.7m (-7.5%) decrease from the Gates Foundation and a smaller $2.7m (-8.9%) decrease from the Wellcome Trust. TB funding climbed $24m (up 21%), mostly because of increased funding from the Gates Foundation for TB drugs and diagnostics, which rose $16m (up 33%) and $11m (up 179%, albeit from a low base) respectively. Funding for diarrhoeal diseases rose $10m (up 23%) due to increased Gates Foundation funding for *Shigella* and ETEC vaccines.

Table 34. Philanthropic R&D funding by disease 2007-2013

Disease or R&D area	US$ (millions)							2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013		
Malaria	170	224	235	135	197	165	150	22	
HIV/AIDS	114	195	148	150	149	158	146	21	
Tuberculosis	133	155	120	133	114	119	141	21	
Diarrhoeal diseases	62	47	53	51	35	48	61	8.8	
Helminths (worms & flukes)	12	29	24	22	30	26	32	4.7	
Bacterial pneumonia & meningitis	6.8	30	25	49	39	51	27	3.9	
Kinetoplastids	73	53	59	32	24	22	21	3.0	
Dengue	2.2	3.2	3.2	4.7	7.0	11	20	2.9	
Salmonella infections	0.1	1.0	3.8	7.4	9.8	13	15	2.1	
Buruli ulcer	-	0.2	0.3	2.0	2.7	3.0	2.7	0.4	
Leprosy	0.7	1.2	1.1	2.7	1.6	2.3	2.0	0.3	
Trachoma	1.4	-	-	-	0.2	0.6	0.5	0.1	
Cryptococcal meningitis							0.3	<0.1	
Hepatitis C genotype 4							0.1	<0.1	
Leptospirosis							<0.1	<0.1	
Rheumatic fever	-	0.1	0.2	0.2	-	-	-	-	
Platform technologies	2.3	9.2	16	14	6.8	19	14	2.1	
Adjuvants and immunomodulators	2.2	3.1	7.7	4.0	1.6	9.0	8.0	1.2	
Delivery technologies and devices	-	1.5	2.5	5.5	3.7	9.1	4.8	0.7	
General diagnostic platforms	0.1	4.6	6.1	4.9	1.4	0.7	1.6	0.2	
Core funding of a multi-disease R&D organisation	15	11	6.2	6.6	5.7	43	44	6.4	
Unspecified disease	3.6	20	8.4	7.3	3.2	2.3	11	1.5	
Total philanthropic funding	**595**	**780**	**704**	**618**	**624**	**681**	**688**	**100**	

- No reported funding
New disease added to G-FINDER in 2013

PRIVATE SECTOR FUNDERS

Please note that reported industry funding for all years is substantially lower than published figures in previous G-FINDER reports, since we have excluded all funding for dengue vaccines (an area in which industry had significant investments). To demonstrate the impact of this change: in 2012, industry funding including dengue vaccines was $582m, but excluding dengue vaccines was $401m. Similarly, industry's share of 2012 global neglected disease R&D funding was 17% if dengue vaccines are included, but only 12% when they are excluded. All figures below, and in this report, have dengue vaccine R&D excluded.

The private sector contributed $401m (12% of total funding) to neglected disease R&D in 2013, with MNCs accounting for $350m (87%) and SMEs contributing $51m (13%). SMEs' share of industry funding increased significantly, up from 8.7% in 2012.

In 2013, industry decreased its YOY investment in neglected disease R&D (down $38m, -11%), entirely due to a drop in MNC funding. This continued the downward trend of the preceding two years.

MULTINATIONAL PHARMACEUTICAL COMPANIES

In 2013, over two-thirds ($235m, 67%) of MNC investment in neglected disease R&D went to three diseases (TB, malaria, diarrhoeal diseases). Bacterial pneumonia & meningitis dropped out of the top three diseases in 2013 due to decreased funding, replaced by diarrhoeal diseases which had significant increases in funding. Hepatitis C genotype 4, included in the survey for the first time in 2013, also received a significant portion of MNC funding $27m (7.6%).

YOY investment from MNCs dropped for most diseases in 2013, in contrast to 2012 when the majority of diseases saw increases. The biggest decreases were to malaria (down $33m, -30%) and TB (down $16m, -12%). There were smaller drops in funding to bacterial pneumonia & meningitis (down $5.6m, -15%), HIV/AIDS (down $5.1m, -33%) and dengue (down $0.8m, -11%), while salmonella investment remained stable (down <$0.1m, -0.6%). In 2013, as in previous years, almost all third tier diseases including trachoma, Buruli ulcer and rheumatic fever, as well as the newly included leptospirosis and cryptococcal meningitis, did not receive any MNC funding. Leprosy received $0.1m (<0.1% of MNC funding).

Only two diseases received increases in YOY funding from MNCs. Diarrhoeal diseases rose by $9.9m (up 35%), and helminth infections by $5.4m (up 227%, albeit from a low base).

Table 35. MNC R&D funding by disease 2007-2013

Disease or R&D area	US$ (millions)							2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013		
Tuberculosis	57	83	122	160	155	139	119	34	
Malaria	83	86	87	117	96	111	78	22	
Diarrhoeal diseases	12	25	36	34	24	29	38	11	
Bacterial pneumonia & meningitis	17	35	28	29	36	38	32	9.1	
Hepatitis C genotype 4							27	7.6	
Kinetoplastids	5.0	1.3	3.9	10	9.7	18	16	4.7	
HIV/AIDS	8.6	22	20	18	14	15	10	2.9	
Helminths (worms & flukes)	0.1	4.4	9.1	3.6	2.7	3.4	8.1	2.3	
Dengue	4.7	3.3	4.2	6.6	10	7.8	6.9	2.0	
Salmonella infections	-	1.3	2.0	3.0	4.9	4.0	4.0	1.1	
Leprosy	-	-	-	-	-	-	0.1	<0.1	
Buruli ulcer	-	0.1	-	-	-	-	-	-	
Trachoma	0.1	0.1	-	-	-	-	-	-	
Rheumatic fever	-	1.1	1.6	-	-	-	-	-	
Core funding of a multi-disease R&D organisation	-	-	-	-	-	-	2.5	0.7	
Unspecified disease	-	-	-	-	3.4	1.6	7.5	2.2	
Total MNC funding	186	263	314	382	357	366	350	100	

- No reported funding
New disease added to G-FINDER in 2013

SMALL PHARMACEUTICAL AND BIOTECHNOLOGY FIRMS

SME funding totalled $51m (13% of industry funding) in 2013. IDC firms contributed the majority ($29m, 57%) for the first time, with firms in developed countries providing the remaining $22m (43%). This was a significant increase in SME funding from 2012 (up $17m, 68%), however this was mainly due to one firm's increased investment.[viii]

Several diseases saw increased SME funding, including bacterial pneumonia & meningitis (up $12m), salmonella infections (up $5.7m) and diarrhoeal diseases (up $5.2m), all from a relatively low base. The only significant decrease in 2013 was in HIV/AIDS funding (down $5.7m, -78%). There was no SME investment in third tier diseases or in hepatitis C genotype 4.

Table 36. SME R&D funding by disease 2007-2013

Disease or R&D area	US$ (millions)							2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013		
Bacterial pneumonia & meningitis	0.6	21	8.7	7.4	5.7	5.2	17	34	
Malaria	11	11	20	12	8.1	8.1	6.7	13	
HIV/AIDS	13	31	20	15	11	7.4	6.1	12	
Diarrhoeal diseases	3.3	2.3	5.2	0.6	5.0	2.6	6.0	12	
Salmonella infections	-	13	1.9	0.2	0.1	0.3	5.8	11	
Tuberculosis	17	15	18	19	15	8.9	5.0	9.8	
Kinetoplastids	<0.1	1.9	1.5	1.6	3.9	0.9	0.7	1.4	
Dengue	2.4	0.2	1.1	0.7	0.6	0.5	0.4	0.7	
Helminths (worms & flukes)	0.8	1.2	0.5	4.1	6.7	0.7	0.1	0.2	
Buruli ulcer	<0.1	0.2	-	-	-	-	-	-	
Leprosy	-	-	-	0.1	0.1	-	-	-	
Trachoma	-	-	-	2.1	4.4	-	-	-	
Platform technologies	<0.1	0.3	0.9	1.7	0.2	0.2	<0.1	-	
Adjuvants and immunomodulators	-	-	0.9	-	-	0.1	<0.1	-	
General diagnostic platforms	<0.1	-	-	-	0.2	0.1	-	-	
Delivery technologies and devices	-	0.3	<0.1	1.7	-	-	-	-	
Unspecified disease	0.7	-	-	-	-	<0.1	3.1	6.0	
Total SME funding	50	96	77	65	61	35	51	100	

- No reported funding

IN-KIND CONTRIBUTIONS

In addition to their direct R&D spend, companies conducting neglected disease R&D incur a range of other costs, such as infrastructure costs and costs of capital. These costs have not been included in G-FINDER due to the difficulty of accurately quantifying or allocating them to neglected disease programmes.

[viii] SME increases or decreases in funding refer to organisations that participated in both 2012 and 2013, as SME survey participation is inconsistent from year to year

Companies also provide in-kind contributions that are specifically targeted to neglected disease R&D, but cannot easily be captured in dollar terms. Although difficult to quantify, these inputs are of substantial value to their recipients and a significant cost to companies.

We note that while some companies have nominated areas where they provide such contributions, others wished to remain anonymous.

Table 37. Typical industry in-kind contributions 2013

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 Janssen (Johnson & Johnson company) MSD Novartis Otsuka Sanofi
Provision of expertise	• Supporting clinical trials • Collaboration of scientists, sharing trial results and facilitating parallel, concurrent testing • Participation on scientific advisory or management boards of external organisations conducting neglected disease R&D • Providing expertise in toxicology/ADME and medicinal chemistry • Evaluating new compounds proposed by external partners • Allowing senior staff to take sabbaticals working with neglected disease groups	AbbVie Eisai GSK Janssen (Johnson & Johnson company) MSD Novartis Otsuka Pfizer Sanofi
Teaching and training	• In-house attachments offered to 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	GSK Janssen (Johnson & Johnson company) MSD Novartis Otsuka Pfizer Sanofi
Intellectual property	• Access to proprietary research tools and databases • Sharing compound libraries with WHO or with researchers who can test and screen them for possible treatments • Providing public and non-for-profit groups with information on proprietary compounds they are seeking to develop for a neglected disease indication • Forgoing license or providing royalty-free license on co-developed products	AbbVie Eisai GSK Janssen (Johnson & Johnson company) MSD Novartis Pfizer Sanofi
Regulatory assistance	• Allowing right of reference to confidential dossiers and product registration files to facilitate approval of generic combination products • Covering the cost of regulatory filings • Providing regulatory expertise to explore optimal registration options for compounds in development	GSK Janssen (Johnson & Johnson company) Sanofi

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

FUNDING BY ORGANISATION

Neglected disease R&D funding continued to rely heavily on a handful of funders, with 12 funders again contributing 88% of total funding. The US NIH, the Gates Foundation and the pharmaceutical industry were collectively responsible for two-thirds ($2,164m, 67%) of global R&D funding, although this was a slight drop from 2012 ($2,323m, 70% of all funding).

Despite remaining the top global funder, US NIH funding fell by a significant $188m (-13%). Other notable decreases were from the Australian NHMRC (down $13m, -33%), USAID (down $13m, -14%) and the Wellcome Trust (down $11m, -8.2%, due to cyclical funding patterns).

UK DFID had the largest increase in funding (up $26m, 62%), alongside moderate increases from the EC (up $18m, 18%), Inserm (up $17m, 38%) and the Gates Foundation (up $17m, 3.4%).

After an increase of $12m (up 53%) in neglected disease R&D funding, the Indian ICMR entered the list of top 12 funders for the first time in 2013. This increase was due to both better reporting and increased funding.

Table 38. Top neglected disease R&D funders 2013

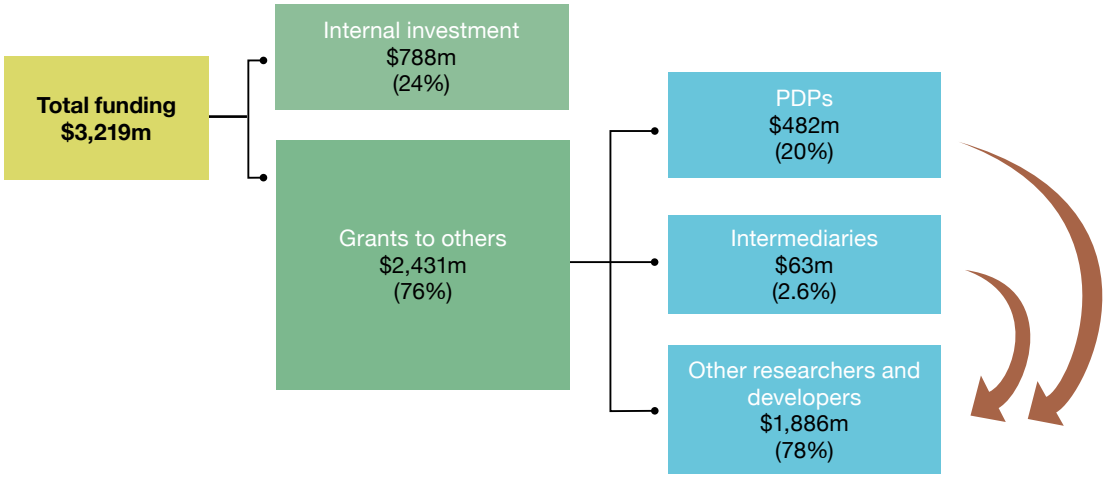
Funder	US$ (millions)							2013 % of total	2007-2013 trend
	2007	2008	2009	2010	2011	2012	2013		
US NIH	1,186	1,206	1,394	1,350	1,318	1,424	1,247	39	
Gates Foundation	508	677	614	506	502	498	515	16	
Aggregate industry	236	359	391	447	418	401	401	12	
Wellcome Trust	56	59	65	76	89	139	128	4.0	
European Commission	132	143	130	101	117	104	123	3.8	
US DOD	83	76	103	73	81	79	93	2.9	
USAID	91	94	95	97	91	92	80	2.5	
UK DFID	45	42	84	92	71	43	69	2.1	
Inserm	1.9	3.4	30	22	42	44	61	1.9	
UK MRC	49	51	51	58	51	45	47	1.5	
Indian ICMR		23	18	22	21	22	34	1.1	
Australian NHMRC	21	25	27	26	36	40	27	0.8	
Subtotal of top 12^	2,482	2,790	3,017	2,895	2,852	2,934	2,827	88	
Total R&D funding	2,793	3,201	3,419	3,259	3,206	3,321	3,219	100	

^ Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013
Funding organisation did not participate in the survey for this year.

FUNDING FLOWS

Funding agencies disburse neglected disease R&D investments in two main ways: by investing in their own in-house research (internal investment); or through grants to others (external investment). External investment includes direct grants to researchers and developers, and funding via PDPs[ix] and other intermediaries. Some organisations invest only internally (for example, most pharmaceutical companies); others, such as the Wellcome Trust, only invest externally (i.e. they do not conduct R&D themselves). Other organisations, such as the US NIH and the Indian ICMR use a mixed model, providing external grants to others in addition to funding their own internal research programmes.

Figure 22. R&D funding flows 2013



A key point to note when analysing funding flows is that different types of funders generally invest in different types of recipients. Thus, science and technology (S&T) agencies are the main funders of researchers and developers (usually providing around three-quarters of their funding); while philanthropic and aid agency funders provide the vast majority of PDP funding (usually over 90%). By contrast, intermediary organisations generally have a broad funding base, supported by S&T agencies and development agencies, as well as by philanthropic funders.

As a result, a cut in S&T funding is more likely to impact on researchers and developers; a cut in aid agency funding is more likely to impact on PDPs; and intermediary organisations are least vulnerable to cuts in one or other donor funding stream. These varying impacts were very clear in 2013.

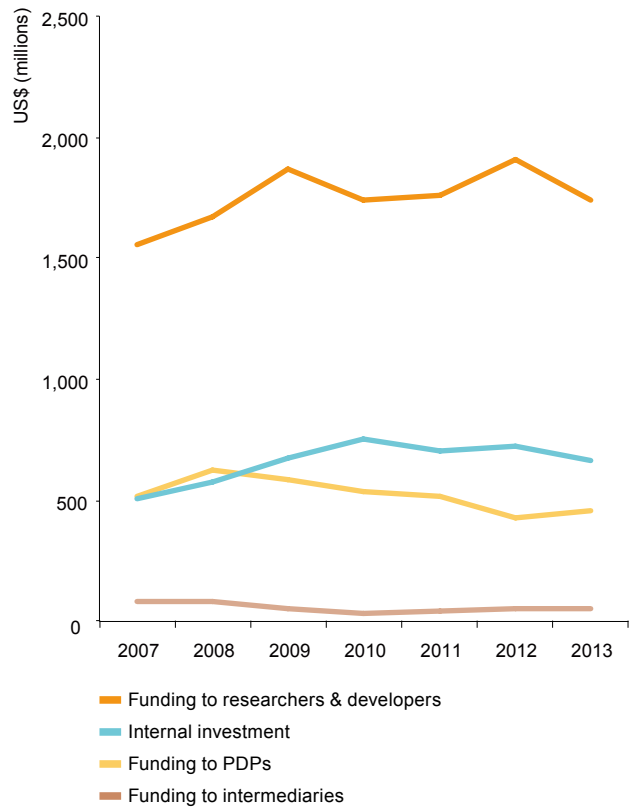
[ix] PDPs are defined as public health driven, not-for-profit organisations that typically use private sector management practices to drive product development in conjunction with external partners. PDPs tend to focus on one or more neglected diseases and aim to develop products suitable for DC use. 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

FUNDING FLOW TRENDS

Grant funding was $2,431m in 2013, with $1,432m (59%) from S&T agencies, $688m (28%) from philanthropy, $205m (8.5%) from aid agencies and $106m (4.4%) from other funders. This was a decrease of $132m (-5.5%) on 2012, due to large cuts from the US NIH, the world's largest S&T agency (external grants down $138m, -12%), with additional reductions from the Australian NHMRC (down $13m, -33%), USAID (down $13m, -14%) and the German Federal Ministry for Economic Cooperation and Development, which had no grant funding in 2013 (after providing a one-off $13m grant to the Global Health Investment Fund in 2012).

S&T agencies were, as usual, the main providers of grants to researchers and developers ($1,375m, 73%), with the remainder mostly coming from philanthropic funders ($422m, 22%). Cuts from S&T agencies to researchers and developers (down $164m, -11%) wholly accounted for the overall drop in this funding flow (down $160m, -8.4%). The US NIH had the largest impact on this trend, with its grants to researchers and developers down by $141m (while their other external funding increased by $2.9m). Cuts from S&T agencies were partly softened by a small increase to researchers and developers from the philanthropic sector (up $10m, 2.6%).

Figure 23. R&D funding trends 2007-2013



Philanthropic funders ($258m, 53%) and aid agencies ($180m, 37%) collectively provided 91% of PDP funding in 2013, with the remainder mostly coming from S&T agencies and multilaterals ($37m, 7.6%). The increase in aid agency funding to PDPs (up $34m, 24%) accounted for the overall rise in PDP funding (up $28m, 6.5%); offset by a small decrease from the philanthropic sector (down $7.8m, -3.1%). The net result was the first increase in PDP funding since 2008, slightly reversing the previous four years of funding cuts.

As noted, intermediary organisations had stable funding (up $0.5m, 1.0%), due to their broad funding base.

PRODUCT DEVELOPMENT PARTNERSHIPS

PDPs received $482m of neglected disease R&D funding in 2013. This represented 15% of total funding and a fifth (20%) of global grant funding.

However, the central role of PDPs is somewhat obscured by the "NIH factor". The US NIH – the largest funder of neglected disease R&D – allocated only a small portion ($11m, 0.9%) of its funding to PDPs in 2013. If the US NIH is excluded, the role of PDPs in product development for neglected diseases becomes clearer, with PDPs collectively managing over a third (35%) of global grant funding in 2013.

The top four PDPs – PATH, Medicines for Malaria Venture (MMV), International AIDS Vaccine Initiative (IAVI) and the TB Alliance – accounted for over half of all funding to PDPs ($261m, 54%).

The primary beneficiary of increased PDP funding in 2013 was MMV (up $16m, 32%), following a decrease of $27m (-36%) in 2012. Other notable increases were to the Innovative Vector Control Consortium (IVCC, up $12m, 137%) and the TB Alliance (up $8.4m, 21%). Where funding decreases occurred, they were small: no PDP experienced a cut greater than $6.7m.

Table 39. Funds received by PDPs 2007-2013

PDPs \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2013 % of total
PATH	43	125	139	75	98	83	81	17
MMV	84	51	46	74	76	52	68	14
IAVI	89	95	78	71	65	63	60	12
TB Alliance	44	38	39	52	38	45	52	11
Aeras	45	72	59	43	43	39	40	8.4
DNDi	31	24	35	36	39	34	37	7.8
IPM	51	67	38	33	15	24	31	6.4
CONRAD	17	16	23	18	25	31	26	5.3
FIND	26	34	22	27	23	24	24	5.1
IVCC	-	11	15	16	<0.1	10	22	4.6
IVI	15	2.4	13	9.5	5.7	8.0	9.4	1.9
EVI	8.5	4.8	4.3	5.7	8.4	2.4	7.2	1.5
Sabin Vaccine Institute	8.6	16	9.9	4.2	8.9	6.3	6.7	1.4
TBVI	-	-	0.1	4.5	4.2	5.5	6.1	1.3
IDRI	9.1	16	19	13	23	11	5.8	1.2
FHI 360	14	19	18	19	12	5.8	4.4	0.9
OWH[A]	31	32	17	23	11	7.1	-	-
WHO/TDR[B]	36	41	38	31	34	-	-	-
Total funding to PDPs	549	663	613	555	529	452	482	100

[A] As of 2013, OWH funding is included under PATH

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

- No reported funding

FUNDERS OF PDPs

Philanthropic organisations provided more than half ($258m, 53%) of PDP funding in 2013, with HIC governments providing $212m (44%), mostly from aid agencies ($180m, 37% of PDP funding). This was a modest change on 2012, when philanthropic organisations provided 58% ($263m) of PDP funding, and HIC governments provided 41% ($185m).

Three organisations provided three-quarters (76%) of PDP funding in 2013. By far the largest funder was the Gates Foundation ($234m, 49%), followed by UK DFID ($69m, 14%) and USAID ($61m, 13%).

Overall, 2013 presented a more positive picture of PDP funding. Unlike previous years, many organisations increased their investment in PDPs. UK DFID had the largest increase (up $26m, 62%), reflecting the first disbursement of their $216m five-year PDP funding stream.[81] There was also a moderate increase from the Dutch DGIS (up $12m, 86%), although this was largely due to cyclical grant disbursement, and smaller increases from the US NIH (up $3.2m, 41%) and Irish Aid (up $2.6m, 38%).

While some organisations cut their PDP funding in 2013, these decreases were generally small. USAID had the largest decrease (down $13m, -17%), followed by the Gates Foundation (down $7.3m, -3.0%). We note that the Gates Foundation's PDP funding has been decreasing consistently, with a drop of $148m (-39%) since 2008. There were smaller drops from the German BMBF (down $1.1m, -17%) and the Japanese Government, who gave no PDP funding in 2013 after a $2.4m investment in 2012.

Table 40. Top funders of PDPs 2013

Funder	US$ (millions)							2013 % of org's funds given to PDPs	% of 2013 total PDP funding
	2007	2008	2009	2010	2011	2012	2013		
Gates Foundation	261	382	320	284	255	241	234	45	49
UK DFID	31	27	77	92	71	43	69	100	14
USAID	76	76	77	77	74	74	61	77	13
Dutch DGIS	35	22	21	17	23	14	25	100	5.2
US NIH	4.7	3.7	8.5	2.8	20	7.8	11	0.9	2.3
Irish Aid	26	7.5	5.8	7.1	6.9	6.7	9.3	100	1.9
UNITAID			6.6			0.4	8.4	76	1.7
MSF	7.8	8.0	5.0	5.1	5.5	6.4	6.6	100	1.4
European Commission[A]	4.4	-	1.6	8.6	7.9	5.5	6.3	5.1	1.3
GAVI	11	17				1.1	5.7	32	1.2
German BMBF			-	-	1.4	6.8	5.7	33	1.2
Norwegian NORAD	15	14	13	10	7.6	2.6	5.1	100	1.1
Subtotal top 12 PDP funders[^]	502	606	564	522	489	422	447		
Total PDP funding	549	663	613	555	529	452	482		
% of total PDP funding (top 12)	91	91	92	94	92	93	93		

[A] EC funding to PDPs is disbursed as part of FP7 funding
[^] Subtotals for 2007–2012 top 12 reflect the top funders for those respective years, not the top 12 for 2013
- No reported funding
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

DISCUSSION

The US budget sequester had a significant impact on neglected disease R&D funding in 2013

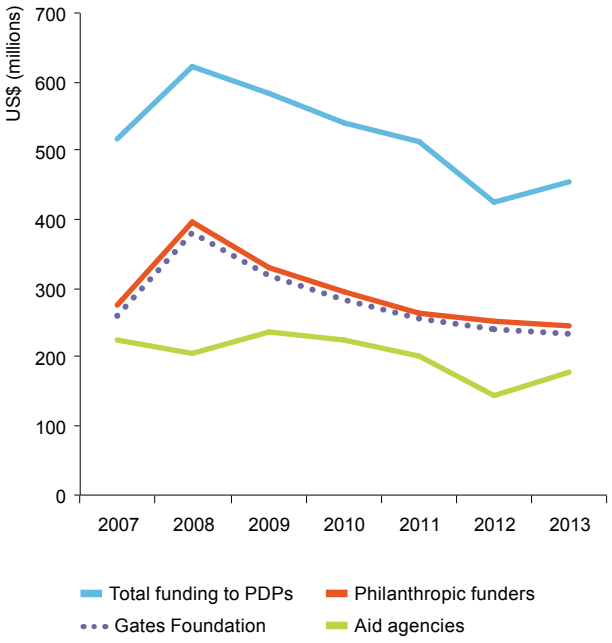
Total YOY neglected disease R&D funding dropped by $193m (-6.2%) in 2013, primarily as a result of the 2013 US budget sequester. The sequester lowered the US NIH's budget across all health and research areas by $1.6 billion,[82] with its neglected disease R&D funding seeing a $188m (-13%) funding cut. The sequester was also responsible for a $6.6m drop in USAID funding. Combined, these cuts were equivalent to the total global decrease in YOY funding. While other funders increased or decreased funding, these changes were not enough to offset the sizeable sequester effect.

US NIH funding for HIV/AIDS R&D saw the biggest decrease (down $66m, -9.0%), followed by malaria (down $32m, -19%) and TB (down $13m, -7.2%). USAID's R&D funding for HIV/AIDS saw a cut of $6.6m (-9.2%).

Since the US Government generally contributes almost half of total global neglected disease R&D funding – for instance, it contributed $1,432m (45%) in 2013 even after the sequester effect – any changes in its funding patterns or government policy have a substantial impact on global trends. This was the case with the 2009 peak in global funding, which was largely due to an infusion of US Government funds, including from the American Recovery and Reinvestment Act, following the global financial crisis.

European public funders partly offset the impact of the US sequester, increasing their YOY funding by $46m (up 13%) in 2013. This somewhat reversed the $101m (-22%) decrease from European funders from 2009 to 2012. In 2013, the major increases were from the UK (up $27m, 31%), France (up $24m, 41%), the EC (up $18m, 18%) and the Netherlands (up $12m, 86%). Whilst a positive development, these increases were not enough to offset the impact of the US sequester.

Figure 24. Funding to PDPs 2007-2013



2013 saw the first increase in funding to PDPs in five years

Funding for PDPs comes from two main sources: philanthropic funders and government aid agencies, which together provide over 90% of funding to PDPs. However, funding from both sources has been declining for several years. YOY aid agency funding to PDPs dropped by $92m (-39%) between 2009 and 2012 as a result of the global financial crisis. Philanthropic funding to PDPs, virtually all from the Gates Foundation, has also decreased by $152m (-38%) since 2008, despite a peak in 2008 and 2009 which largely reflected disbursement of two large grants for Phase III trials of the RTS,S malaria vaccine candidate.

In a positive trend, 2013 saw the first increase in funding to PDPs since 2008, entirely due to an increase in aid agency funding (up $34m, 24%). These increases were largely from European funders, in particular UK DFID, up $26m (up 62%) due to the first disbursement of a new, five-year funding stream to PDPs. Other European funding increases came from the Dutch DGIS (up $12m, 86%), Irish Aid (up $2.6m, 38%) and the Royal Norwegian Ministry of Foreign Affairs (NORAD, up $2.5m, 97%).

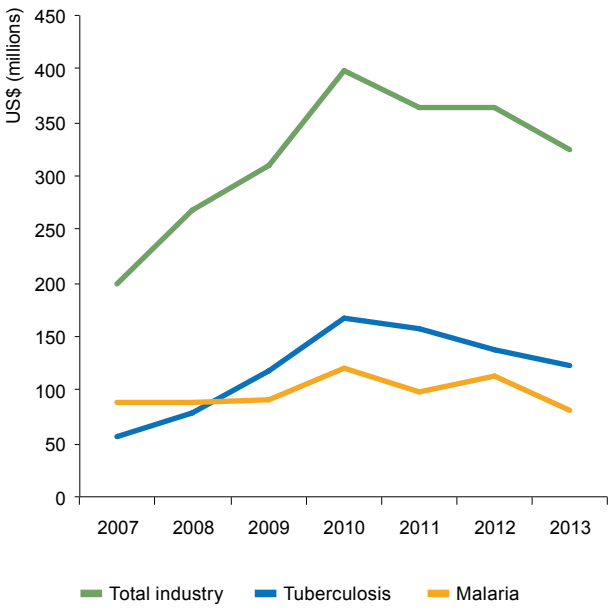
The net result was a slight YOY upturn (up $28m, 6.5%) in investment into PDPs in 2013, although funding was still down 12% (down $63m) on 2007 levels. Sustained and increased funding will be needed as products from PDPs come into large late-stage trials, such as the PaMZ TB drug trials in 2015.

Industry funding is low and declining

The removal of dengue vaccines, an increasingly commercial area, from G-FINDER in 2013 has allowed trends in industry investment into neglected disease R&D to be seen more clearly. With dengue vaccine funding excluded, industry contributed only 12% of global funding for neglected disease R&D, compared to 17% in 2012 when dengue vaccine investments were included. At 12%, industry's contribution is low relative to that of other sectors.

Industry funding has also been declining since 2010, with a YOY drop of $74m (-19%) between 2010 and 2013 – mostly due to falls in malaria and TB funding. The malaria funding fluctuations appear to reflect normal changes in the pipeline, including the conclusion of Phase II clinical trials for ferroquine and tafenoquine.[83,84] We would expect a future funding rise for Phase III trials, but this will need to be watched.

Figure 25. Industry funding patterns 2007-2013



However, TB R&D presents a different story. YOY industry TB funding decreased by over a quarter (down $45m, -27%) from 2010 to 2013, almost entirely due to decreased investment in the early drug pipeline (discovery and preclinical development). Three companies reported no investment in early stage drug development in 2013, some for the second or third consecutive year; while one additional company reported substantially decreased funding. It was also unclear whether companies with late-stage drugs were continuing to fill their early TB drug pipeline.

Several companies announced their complete withdrawal from TB drug development, in some cases following a winding down of investment in previous years. In 2013, Pfizer licensed its Phase II sutezolid candidate to Sequella[85] as part of a reported closure of its TB programme. In 2014, Novartis announced the transfer of its TB drug compounds to the TB Alliance;[86] and

Astra Zeneca announced closure of their Bangalore R&D site, including its TB drug discovery program.[87,88]

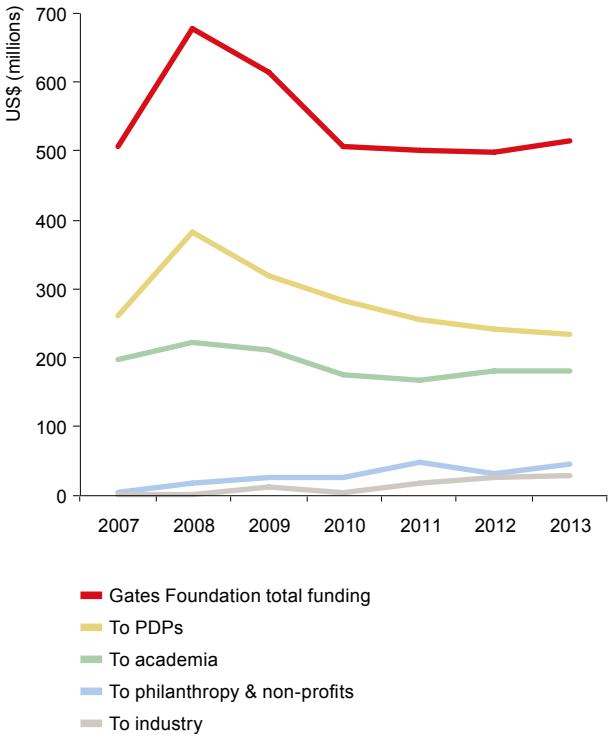
Changing funding patterns from the Gates Foundation

The Gates Foundation is the second largest funder of neglected disease R&D, contributing over half a billion dollars ($515m, 16%) of global funding and three-quarters of all philanthropic funding in 2013. Although still far from their highest level of funding in 2008, 2013 saw the first increase in overall funding by the Gates Foundation in five years (up $17m, 3.4%), largely due to greater investments in industry and other mechanisms.

The Gates Foundation remains the largest funder of PDPs, with a 2013 investment of $234m (45% of Gates Foundation funding). Since the 2008 funding peak, there has been a decrease of $148m (-39%) in Gates Foundation funding to PDPs, meaning that their PDP funding has dropped to levels lower than in 2007. This could be attributed to a shift from largely core funding to PDPs to project-based funding, and the lack of advancements in late-stage trials in recent years.

Although still a small percentage of its investments, Gates Foundation funding to industry, and other philanthropic and non-profit organisations more than tripled (up $54m) from 2008 to 2013. Half of this increase went to pharmaceutical companies, with SME funding up $18m and funding to MNCs increasing from nil to $9.3m. As a result, Gates Foundation funding to industry increased from $2.6m in 2008 to $30m 2013.

Figure 26. Gates Foundation funding trends 2007-2013



The other half of this increase went to other philanthropic and non-profit organisations (up $27m, 146%) from 2008 to 2013, with the majority (83%) of 2013 funding going to foundations associated with major research institutes or universities, including the Foundation for the National Institutes of Health (FNIH) and the University of Georgia Research Foundation, Inc. In particular, Gates Foundation funding to the FNIH for the Grand Challenges in Global Health initiative increased from nil in 2008 to $31m in 2013. The University of Washington Foundation also received significant Gates Foundation funding (between $4.1m and $20m per year) from 2008 to 2012, although it did not receive any funding in 2013.

Gates Foundation funding directly to academia drifted downwards between 2008 and 2013 (down $41m, -18%), but this trend was nowhere near as marked as the other shifts noted.

ANNEXE CONTENTS

REPORT ANNEXES

ONLINE ANNEXES

To access the online annexes, please go to: **http://policycures.org/g-finder2014.html**

ANNEXE 1

ACRONYMS

ACTs	Artemisinin-based combination therapies
AC	Advisory Committee
ADME	Absorption, distribution, metabolism and excretion
Aggregate industry	Aggregate pharmaceutical and biotechnology companies
AIDS	Acquired Immune Deficiency Syndrome
ALM	American Leprosy Missions
ALRA	Austrian Leprosy Relief Association
AmB	Amphotericin B
AMC	Advance market commitment
amfAR	The Foundation for AIDS Research
Argentinian MINCYT	Argentinian Ministry of Science, Technology and Productive Innovation
ARV	Antiretroviral
AusAid	Australian Agency for International Development
Australia - India SRF	Australia - India Strategic Research Fund
Australian DFAT	Australian Department of Foreign Affairs and Trade (formerly AusAID)
Australian NHF	Australian National Heart Foundation
Australian NHMRC	Australian National Health and Medical Research Council
Brazilian DECIT	Brazilian Ministry of Health: Department of Science and Technology
Brazilian FAPEAM	Brazilian Research Support Foundation of the State of Amazonas
Canadian CIHR	Canadian Institutes of Health Research
Chilean FONDECYT	Chilean National Fund for Scientific and Technological Development
Colombian Colciencias	Colombian Department for Science, Technology and Innovation
DAHW	German Leprosy and TB Relief Association
DALY	Disability adjusted life year
DCs	Developing countries
DNDi	Drugs for Neglected Diseases initiative
Dutch DGIS	Dutch Ministry of Foreign Affairs - Directorate General of Development Cooperation
EAG	Expert Advisory Group
EAggEC	Enteroaggregative *E. coli*
EC	European Commission: Directorate-General for Research and Innovation, and the Directorate-General for Development and Cooperation - EuropeAid
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
FP7	EU's Seventh Framework Programme for Research
French ANR	French National Research Agency
French ANRS	French National Agency for Research on AIDS and Viral Hepatitis
FRF	Fondation Raoul Follereau
Gates Foundation	Bill & Melinda Gates Foundation

ACRONYMS

GAVI	Global Alliance for Vaccines and Immunizations
GBD	Global Burden of Disease Study
GDP	Gross domestic product
German BMBF	German Federal Ministry of Education and Research
German BMZ	German Federal Ministry for Economic Cooperation and Development
German DFG	German Research Foundation
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
IMF	International Monetary Fund
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
MDR-TB	Multidrug-resistant tuberculosis
MDT	Multidrug therapy
MIC	Middle-income country
MMRF	Michelson Medical Research Foundation
MMV	Medicines for Malaria Venture
MNC	Multinational pharmaceutical company
MSF	Médecins Sans Frontières
NIAID	National Institute of Allergy and Infectious Diseases
NLR	Netherlands Leprosy Relief
Norwegian NORAD	Royal Norwegian Ministry of Foreign Affairs and/or Norwegian Agency for Development Cooperation
NTS	Non-typhoidal *Salmonella enterica*
OAR	Office of AIDS Research
OECD	Organisation for Economic Cooperation and Development
ORT	Oral rehydration therapy
OWH	OneWorld Health
PATH	Program for Appropriate Technology in Health
PDP	Product development partnership
QIMR	Queensland Institute of Medical Research
R&D	Research and development
RCDC	US NIH's Research, Condition and Disease Categorization systems
RDTs	Rapid Diagnostic Tests
Renaissance HSC	Renaissance Health Service Corporation
RePORTER	US NIH's Research Portfolio Online Reporting Tools
S&T	Science & Technology
SME	Small pharmaceutical and biotechnology firm
South African DST	South African Department of Science and Technology
SSI	Statens Serum Institute
Swedish SIDA	Swedish International Development Agency
Swiss SNSF	Swiss National Science Foundation
TB	Tuberculosis
TB Alliance	Global Alliance for TB Drug Development

ACRONYMS

TBVI	TuBerculosis Vaccine Initiative
Thailand GPO	Thailand Government Pharmaceutical Organisation
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 and Prevention
US DOD	US Department of Defense (DOD) including DOD Defense Advanced Research Projects Agency
US FDA	US Food and Drug Administration
US NIH	US National Institutes of Health
USAID	US Agency for International Development
WHO	World Health Organization
WHO/TDR	World Health Organization Special Programme for Research and Training in Tropical Diseases
XDR-TB	Extensively drug-resistant tuberculosis
YOY	Year-on-year

ANNEXE 2

Advisory Committee members & additional experts

ADVISORY COMMITTEE MEMBER	ORGANISATION	TITLE
Matthew Albert	Institut Pasteur Inserm U818	Director, Immunology Department Director of Research
Ripley Ballou	GlaxoSmithKline Biologicals	Vice President and Head, Clinical Research and Translational Science
Graeme Bilbe	Drugs for Neglected Diseases initiative (DNDi)	Research & Development Director
François Bompart	Sanofi	Vice President, Deputy Head and Medical Director, Access to Medicines
Wanderley de Souza	Brazilian National Institute of Metrology, Quality and Technology (Inmetro)	Projects Director
Darragh Duffy	Institut Pasteur Inserm U818	Researcher, Immunology Department
Alan Fenwick	Imperial College London	Professor of Tropical Parasitology
Arnaud Fontanet	Institut Pasteur	Head of the Emerging Diseases Epidemiology Unit
Lance Gordon	Bill & Melinda Gates Foundation	Director for Neglected Infectious Diseases, Global Health Program
Carole Heilman	US National Institute of Allergy and Infectious Diseases (NIAID)	Director, Division of Microbiology and Infectious Diseases
Vishwa Mohan Katoch	Indian Council of Medical Research (ICMR)	Director General
Sue Kinn	UK Department for International Development (DFID)	Team Leader and Research Manager
Angela Loyse	St. George's University London	Clinical Academic Lecturer, Infectious Diseases Specialist Registrar
Line Matthiessen	European Commission	Head of Infectious Diseases and Public Health Unit, Directorate-General for Research and Innovation
Carl Mendel	Global Alliance for TB Drug Development (TB Alliance)	Senior Vice President, Research and Development
Mathieu Picardeau	Institut Pasteur	Head of the Biology of Spirochetes Unit

ADVISORY COMMITTEE MEMBER	ORGANISATION	TITLE
Firdausi Qadri	International Centre for Diarrhoeal Disease and Research (icddr,b)	Director, Centre for Vaccine Sciences
John Reeder	World Health Organization: Special Programme for Research and Training in Tropical Diseases (WHO/TDR)	Director
Nelson Sewankambo	Makerere University College of Health Sciences	Principal (Head)
Wendy Taylor	United States Agency for International Development (USAID)	Director, Center for Accelerating Innovation and Impact
Harry Thangaraj	St. George's University London	Coordinator, Access to Pharmaceuticals Project, Infections and Immunity Research Centre, Division of Clinical Sciences
Tim Wells	Medicines for Malaria Venture (MMV)	Chief Scientific Officer
Jack Whitescarver	US National Institutes of Health (NIH)	Associate Director for AIDS Research and Director, Office of AIDS Research

ANNEXE 3

Survey respondent list

ORGANISATION NAME

- AbbVie
- Aeras
- American Leprosy Missions (ALM)
- amfAR, The Foundation for AIDS Research
- Apopo VZW
- Argentinian Ministry of Science, Technology and Productive Innovation (MINCYT)
- Argentinian National Council for Scientific and Technical Research (CONICET)
- Australian Department of Foreign Affairs and Trade (DFAT) - previously the Australian Agency for International Development (AusAID)
- Australian Department of Industry
- Australian National Health and Medical Research Council (NHMRC)
- Australian Research Council (ARC)
- Austrian Leprosy Relief Association (ALRA)
- BASF SE
- Bayer CropScience
- Baylor College of Medicine
- Belgian Ministry of Foreign Affairs
  - including data from Belgian Development Cooperation (DGDC)
- Belgian National Fund for Scientific Research (FWO)*
- Bernhard Nocht Institute for Tropical Medicine (BNI)
- Bill & Melinda Gates Foundation
- Biological E. Limited
- Brazilian Ministry of Health: Department of Science and Technology (DECIT)
- Brazilian Research Support Foundation of the State of Amazonas (FAPEAM)
- Brazilian Research Support Foundation of the State of Bahia (FAPESB)
- Brooklyn College
- Burnet Institute (previously the Macfarlane Burnet Institute for Medical Research and Public Health)
- Butantan Institute*
- Cairo University (including Faculty Of Medicine, Kasr Al Ainy)
- Cameroon Pasteur Centre
- Canadian Department of Foreign Affairs, Trade and Development (previously the Canadian International Development Agency (CIDA))
- Canadian Institutes of Health Research (CIHR)
- Carlos III Health Institute
- CDC Foundation*
- Center for Genetic Engineering and Biotechnology (CIGB)*
- Cepheid
- Chiang Mai University*
- Chilean National Fund for Scientific and Technological Development (FONDECYT)
- Chinese Center for Disease Control and Prevention*
- CONRAD
- Crucell
- Dafra Pharma International Ltd.
- Daktari Diagnostics, Inc.
- Damien Foundation (DFB)
- Dengue Vaccine Initiative (DVI)
- DesignMedix, Inc.
- Drugs for Neglected Diseases initiative (DNDi)
- Dutch Ministry of Foreign Affairs - Directorate General of Development Cooperation (DGIS)
- Dutch Organisation for Scientific Research (NWO)
- Eisai Co., Ltd.
- Eli Lilly and Company
- EpiChem Pty Ltd.
- Estonian Research Council
- European and Developing Countries Clinical Trials Partnership (EDCTP)
- European Commission
  - including data from the Directorate-General for Research and Innovation, and the Directorate-General for Development and Cooperation - EuropeAid
- European Vaccine Initiative (EVI)
- FAIRMED - Health for the Poorest
- FHI 360
- Fondation de France*
- Fondation Mérieux

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

ORGANISATION NAME

- Fondation Raoul Follereau (FRF)
- Fontilles
- Foundation for Innovative New Diagnostics (FIND)
- Francois Rabelais University, Tours
- French National Agency for Research on AIDS and Viral Hepatitis (ANRS)
- French National Research Agency (ANR)
- French University Paris-Est Creteil*
- Fundació La Caixa
- GeoVax Labs, Inc.
- 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)
- Global Alliance for Vaccines and Immunizations (GAVI)
- Global Health Innovative Technology Fund (GHIT Fund)
- Global Solutions for Infectious Diseases
- Griffith University (including the Institute for Glycomics)
- Hawaii Biotech, Inc.
- Health Protection Agency: Centre for Emergency Preparedness and Response
- Health Research Council of New Zealand (HRC)
- 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
- Indian Translational Health Science and Technology Institute*
- Industry Canada*
- Infectious Disease Research Institute (IDRI)
- Innovative Vector Control Consortium (IVCC)
- Inserm - Institute of Infectious Diseases
- Institut Pasteur
- Institute for Immunology and Infectious Diseases, Murdoch University
- 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 Federation of Anti-Leprosy Associations (ILEP)
- International Partnership for Microbicides (IPM)*
- International Union Against Tuberculosis and Lung Disease
- International Vaccine Institute (IVI)
- IRCCS San Raffaele Scientific Institute and/or IRCCS Ospedale San Raffaele*
- Irish Aid
- ISGlobal
  - including data from Spanish Clinical Foundation for Biomedical Research (FCRB) and Barcelona Centre for International Health Research (CRESIB)
- Italian Association Amici di Raoul Follerau (AIFO)
- Japanese National Institute of Infectious Diseases (NIID)*
- Johnson & Johnson
- KNCV Tuberculosis Foundation
- Korean Institute of Tuberculosis
- Lepra
- Life Assay
- Liverpool School of Tropical Medicine (LSTM)
- Ludwig Maximilians University of Munich (LMU)
- Médecins Sans Frontières (MSF)
- Medicines for Malaria Venture (MMV)

ORGANISATION NAME

- Mexican National Institute of Public Health (INSP)
- Mexico National Council of Science and Technology (CONACYT)
- Mologen AG
- Monash University
- Morehouse School of Medicine
- MSD
- Mymetics
- Netherlands Leprosy Relief (NLR)
- Norwegian Centre for International Cooperation in Higher Education (SIU)
- Norwegian Institute of Public Health
- Novartis
- Oak Foundation*
- Ontario HIV Treatment Network*
- Ortho-Clinical Diagnostics, Inc.
- Otsuka Pharmaceutical Co. Ltd.
- Ouro Fino
- Oxford-Emergent Tuberculosis Consortium (OETC)
- Pfizer
- PolyTherics Ltd.
- Population Council
- Program for Appropriate Technology in Health (PATH)
  - including data from the Meningitis Vaccine Project (MVP), Malaria Vaccine Initiative (MVI), OneWorld Health (OWH), Technology Solutions, Vaccine Development, Vaccine Access and Delivery
- Public Health Agency of Canada (PHAC)*
- Research Centre Borstel
- Research Council of Norway
- Research Council, Academy of Finland
- Royal Norwegian Ministry of Foreign Affairs
  - including data from the Norwegian Agency for Development Cooperation (NORAD)
- Royal Society of New Zealand (RSNZ)
- Russian Ministry for Health and Social Development*
- Sabin Vaccine Institute
- Sanofi
- Sanofi Pasteur
- Sasakawa Memorial Health Foundation (SMHF)
- Science Foundation Ireland
- Serum Institute of India
- Sigma-Tau
- South Africa Medical Research Council (MRC)
- South African Department of Science and Technology (DST)
  - including data from the Technology Innovation Agency
- South African National Research Foundation
- Spanish Ministry of Foreign Affairs and Cooperation for Development (MAEC)
  - including data from the Spanish Agency of International Cooperation for Development (AECID)
- Standard Diagnostics
- Statens Serum Institute (SSI)
- Sumagen*
- Swedish Research Council
- Swiss Agency for Development and Cooperation (SDC)
- Swiss National Science Foundation (SNSF)
- Swiss State Secretariat for Education, Research and Innovation (SERI)
- Swiss Tropical & Public Health Institute
- Syngenta Crop Protection AG
- Synstar Japan Co., Ltd.
- Taiwanese Ministry of Science and Technology*
- Takeda Pharmaceutical Company
- Thailand Government Pharmaceutical Organisation (GPO)
- Thailand National Science and Technology Development Agency (NSTDA)
- The Leprosy Mission International (TLMI)
- The Walter and Eliza Hall Institute of Medical Research
- The Wellcome Trust
- The William and Flora Hewlett Foundation
- Tibotec
- TuBerculosis Vaccine Initiative (TBVI)
- Turing Foundation
- UBS Optimus Foundation

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

ORGANISATION NAME

- UK Department for International Development (DFID)
- UK Medical Research Council (MRC)
- United States Agency for International Development (USAID)
- University of California Berkeley
- University of Georgia (UGA)
- University of Milan-Bicocca
- University of Nebraska Medical Center
- University of North Carolina
- University of Siena
- US Centers for Disease Control (CDC)
- US Department of Defense (DOD)
  - including data from the DOD Defense Advanced Research Projects Agency (DARPA)
- US National Institutes of Health (NIH)
- Vertex Pharmaceuticals Incorporated
- World Bank
- World Health Organization: Special Programme of Research, Development and Research Training in Human Reproduction (WHO/HRP)
- X-GEN Pharmaceuticals

ANNEXE 4

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