G-FINDER | 2015

POLICYCURES

NEGLECTED DISEASE RESEARCH AND DEVELOPMENT: **THE EBOLA EFFECT**

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EXECUTIVE SUMMARY

The survey

The eighth G-FINDER survey reports on 2014 global investment into research and development (R&D) of new products for neglected diseases, and identifies trends and patterns across the eight years of global G-FINDER data. In all, 198 organisations completed the survey in 2014, which covered:

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

In 2014, following a review by our Advisory Committee, the survey expanded to include Ebola and additional hepatitis C genotypes (5 and 6).

Findings

In 2014, a reported $3,377m was invested in neglected disease R&D, consisting of $3,197m from repeat survey participants (called year-on-year – YOY – funders) and $179m from irregular survey participants.

Total YOY funding for neglected disease R&D increased by $150m (up 4.9%), but this was entirely the result of significant new investment in Ebola R&D in response to the 2014 West African Ebola epidemic. Without Ebola, YOY funding for neglected disease R&D would have been essentially unchanged from 2013 (down $14m, -0.4%).

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 ($2,278m, 68%). Overall funding to the top tier rose in 2014, largely due to increased investment in malaria R&D (up $56m, 11%). TB funding was also slightly higher (up $13m, 2.3%), with funding for HIV/AIDS essentially flat (down $5.6m, -0.5%).

The 'second tier' diseases include diarrhoeal diseases, kinetoplastids, helminth infections, dengue, bacterial pneumonia & meningitis, salmonella infections, hepatitis C (genotypes 4, 5 and 6), and Ebola, which was included in the survey for the first time. Funding for this tier increased by $146m (up 23%) on the back of $165m in new Ebola R&D investment, as well as increased funding for kinetoplastids (up $16m, 14%) and dengue (up $12m, 16%). This was enough to offset reduced funding for the remaining second tier diseases, with the most significant drops for diarrhoeal diseases (down $18m, -9.4%) and bacterial pneumonia & meningitis (down $15m, -20%), followed by salmonella infections (down $6.1m, -11%), hepatitis C (down $3.6m, -8.5%) and helminth infections (down $3.3m, -3.8%). As in previous years, the 'third tier' diseases – leprosy, trachoma, cryptococcal meningitis, Buruli ulcer, leptospirosis and rheumatic fever – each received less than 0.5% of global R&D funding.

Without Ebola, funding for neglected disease R&D would have been essentially unchanged from 2013

Industry investment in non-Ebola neglected disease R&D increased sharply

Funding for platform technologies halved in 2014 (down $22m, -50%), and core funding – non-earmarked funds given to organisations working on multiple neglected diseases – also fell (down $14m, -13%).

FUNDERS

The public sector continued to play a key role in neglected disease R&D, providing close to two-thirds of funding ($2,165m, 64%), almost all of which came from high-income country (HIC) governments and multilaterals ($2,101m, 97%). The philanthropic sector provided 20% ($678m), and industry the remaining 16% ($534m) – the largest-ever industry contribution in the history of the G-FINDER survey.

Although public funding for neglected disease R&D increased by $55m in 2014 (up 2.7%), this was entirely the result of new Ebola R&D investment, with public funding for all other neglected diseases actually falling by $62m overall (-3.1%).

As in previous years, the top three public funders in 2014 were the US, the UK and the European Commission (EC), and once again the US contributed over two-thirds of global public R&D investment ($1,529m, 71%). Ebola was the driver behind the increase in US public funding (up $71m, 4.9%), while Australia was the only other country to significantly increase funding (up $13m, 47%), reflecting the first disbursements under the country's new three-year funding commitment for product development partnerships (PDPs). Notable drops in public funding came from France (down $15m, -17%) and India (down $13m, -24%).

The biggest sectoral funding change came from industry (up $98m, 28%) – essentially all from multinational pharmaceutical companies (MNCs). Unlike HIC public funders, this was not entirely due to Ebola – industry investment in non-Ebola neglected disease R&D also increased sharply (up $64m, 18%), driven by MNC investments in malaria and HIV/AIDS. Philanthropic funding remained essentially unchanged (down $3.2m, -0.5%), reflecting a cyclical funding drop from the Wellcome Trust (down $8.8m, -6.4%) and slightly increased investment from the Bill & Melinda Gates Foundation (the Gates Foundation, up $5.8m, 1.1%).

FUNDING FLOWS

Close to three-quarters of all neglected disease R&D funding in 2014 was external investment in the form of grants ($2,444m, 72%). Three-quarters of this funding went directly to researchers and developers ($1,849, 76% of external investment), $526m (22%) went to PDPs, and the remaining $69m (2.8%) was channelled through other intermediary organisations. This meant that direct funding to researchers and developers was essentially unchanged (down $23m, -1.3%), despite the addition of $108m in new grant funding for Ebola R&D.

Funding to PDPs increased for the second year in a row (up $42m, 9.1%), this time reflecting increased investment from the Gates Foundation. Funding to other intermediary organisations also rose (up $6.7m, 12%).

Internal investment increased substantially in 2014 (up $124m, 17%), primarily reflecting increased industry investment in malaria, Ebola and HIV/AIDS, as well as increased intramural R&D investment by the US National Institutes of Health (NIH).

DISCUSSION

The 2014 West African Ebola outbreak resulted in rapid mobilisation of significant R&D funding, led by the US Government

- A total of $165m was invested in Ebola R&D in 2014, enough to make Ebola the fifth-highest funded of all the neglected diseases, behind only HIV/AIDS, malaria, TB and diarrhoeal diseases.
- Nearly three-quarters of all funding for Ebola R&D in 2014 came from the public sector ($118m, 71%), and all of this from HIC governments. The US Government was by far the most significant funder, providing $101m (86% of total public funding).
- The pharmaceutical industry investment of $35m represented 21% of global Ebola funding, most of which was vaccine R&D investment by MNCs ($33m, 93% of industry Ebola funding). The philanthropic sector provided a relatively modest contribution of $12m (7.3% of global Ebola R&D funding).

Public funding of R&D for all other neglected diseases approached a historical low

- Public funding for non-Ebola neglected disease R&D fell by $62m in 2014 (-3.1%), following a significant drop in 2013, primarily due to sequester-related funding cuts from the US Government.
- This meant that public funding for non-Ebola neglected disease R&D in 2014 was the lowest recorded since 2007, the first year of the G-FINDER survey.
- The US Government is the single largest funder of neglected disease R&D, and has also been the driver behind the decline in public funding. Compared to its peak in 2009, annual US Government funding for neglected disease R&D (excluding Ebola) was nearly a quarter of a billion dollars lower in 2014 (down $221m, -13%).

Industry funding increased for the first time in three years… and not only due to Ebola

- In 2014, industry reported its largest investment in neglected disease R&D in the history of the G-FINDER survey, with YOY industry funding increasing by more than a quarter (up $98m, 28%).
- The increase was not only due to Ebola – even with Ebola excluded, industry investment still rose by $64m (18%), largely due to increased investment in malaria – particularly for late-stage clinical trials of tafenoquine – and HIV/AIDS.
- However, industry investment in TB R&D continued to fall. TB accounted for less than a quarter (22%) of industry neglected disease R&D investment in 2014, compared to around 40% in 2010 and 2011, with YOY industry TB investment nearly a third lower than its 2010 peak (down $55m, -34%).

Funding to PDPs increased for the second year in a row

- Funding to PDPs had been in consistent decline since 2008, before an increase in funding from European aid agencies in 2013, particularly the UK Department for International Development (DFID).
- In 2014, funding to PDPs increased again (up $42m, 9.1%), but this time it was the Gates Foundation (up $55m, 23%) behind the change. This was the first increase in Gates Foundation funding to PDPs since 2008, but still left its total PDP commitment a quarter lower than its 2008 peak (down $96m, -25%).
- Overall public funding to PDPs in 2014 fell by $13m (-5.9%), despite a $17m increase in funding from aid agencies in Australia, the UK and Switzerland.

INTRODUCTION

Background to the G-FINDER survey

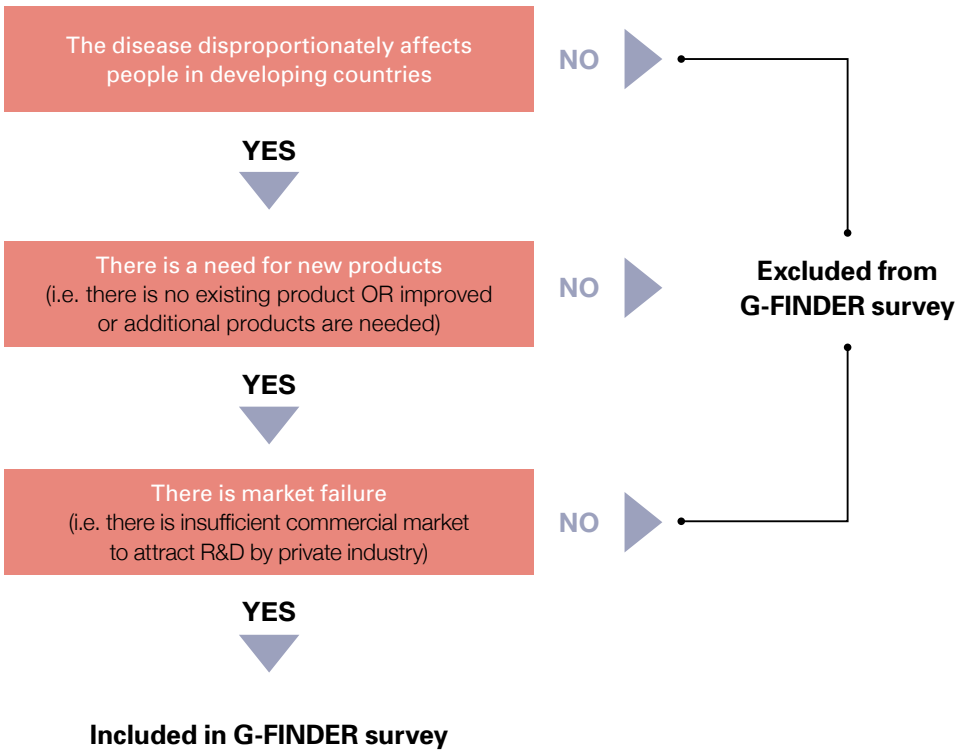
The first seven G-FINDER reports shed light on global investment into research and development (R&D) of new products to prevent, diagnose, manage or cure neglected diseases of the developing world each year since 2007. The eighth G-FINDER survey reports on 2014 investments.

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



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.

The hepatitis C category has been expanded to include genotypes 5 and 6

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 stechnologies 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 AC (Annexe 2), the survey was expanded to include three additional diseases: cryptococcal meningitis, hepatitis C genotype 4 and leptospirosis. The AC review also decided that dengue vaccines no longer fit the criteria for inclusion in the G-FINDER survey given the emergence of a significant commercial market, and dengue vaccine R&D (including all previously reported investments) was removed from the scope of the survey. This does not affect other dengue products, which continue to be included.

In response to the 2014 West African Ebola epidemic, the survey scope was expanded again in year eight to capture investments in Ebola R&D for diagnostics, drugs and preventive vaccines, as well as basic research. With some exceptions, there was negligible funding for Ebola R&D in previous years. As a result, Ebola investments for 2014 are considered to be new funding, and included in year-on-year (YOY) funding analysis. Any qualifications to this are provided in the text of the report. On the advice of the AC, the scope of the hepatitis C category was also expanded in year eight to capture investment into R&D for two additional genotypes that disproportionately affect people in developing countries (genotypes 5 and 6).

Investments in Ebola R&D have been included in this year's report for the first time

The scope of G-FINDER neglected diseases, products and technologies included in year eight 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		
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
TB		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			
Ebola		Y	Y	Y	Y			
Kinetoplastids	Chagas' disease	Y	Y	Y	Y		Y	Y
	Leishmaniasis	Y	Y	Y	Y		Y	
	Sleeping sickness	Y	Y	Y	Y			Y
	Multiple diseases	Y	Y	Y	Y		Y	Y
Helminth infections	Roundworm (ascariasis)	Y	Y					
	Hookworm (ancylostomiasis & necatoriasis)	Y	Y	Y				
	Whipworm (trichuriasis)	Y	Y					
	Strongyloidiasis & other intestinal roundworms	Y	Y	Y	Y			
	Lymphatic filariasis (elephantiasis)	Y	Y		Y			Y
	Onchocerciasis (river blindness)	Y	Y	Y	Y			Y
	Schistosomiasis (bilharziasis)	Y	Y	Y	Y			Y
	Tapeworm (cysticercosis/taeniasis)	Y	Y					Y
	Multiple diseases	Y	Y	Y	Y			Y
Dengue		Y	Y		Y			Y
Bacterial pneumonia & meningitis	*S. pneumoniae*			R	Y			
	N. meningitidis			R	Y			
	Both bacteria				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 (genotypes 4, 5 & 6)			R	Y	Y			
Leprosy		Y	Y		Y			
Trachoma				Y	Y			
Cryptococcal meningitis			Y					
Buruli ulcer		Y	Y	Y	Y			
Leptospirosis					R			
Rheumatic fever				Y				

	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. 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 eighth G-FINDER survey was open for a six-week period from April to June 2015, during which intensive follow-up and support for key recipients led to a total of 9,342 entries being recorded in the database for financial year 2014.

With the exception of grants from major key funders, in particular the US NIH, all entries over $0.5m (i.e. any grant over 0.01% of total funding) were 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 small pharmaceutical and biotechnology companies (SMEs) in order to protect their confidentiality.

WHO WAS SURVEYED?

In 2014, 198 organisations participated in the G-FINDER survey (including 17 with no investment to report), compared to 197 in 2013.

G-FINDER is primarily a survey of funding, and thus of funders. In its eighth year, 135 funders in 28 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)
- Public funders in three Innovative Developing Countries (IDCs) (Brazil, India and South Africa)
- Public funders in an additional five middle-income countries (MICs) (Argentina, Colombia, Ghana, Mexico and Thailand)
- Private sector funders in two MICs (Brazil and India).

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 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 eighth G-FINDER survey collected data on financial year 2014 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 2014, year eight of the survey).

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 eight due to dropouts (i.e. loss to follow-up).

All funding is reported in constant 2014 US dollars

As in previous G-FINDER reports, all funding data has been adjusted for inflation and converted to US dollars (US$) to eliminate artefactual effects caused by inflation and exchange rate fluctuations, thus allowing accurate comparison of YOY changes. In line with the new approach to financial reporting implemented last year, the base year of the survey for inflation adjustment purposes has been updated to the current financial year of the survey, and so all funding data is reported in 2014 US$. As a result of this rebasing, historical G-FINDER data for the years 2007 to 2013 presented in this report will differ from the figures published in previous G-FINDER reports.

Unless noted otherwise, all DALY (disability-adjusted life year) and mortality figures in the report specifically represent low- and middle-income country (LMIC) figures and are taken from the Global Burden of Disease Study 2013 (GBD 2013),[1] which represent the most comprehensive and recent figures available. We note that some of the GBD 2013 methodologies have been updated compared to previous GBD studies,[2] so the figures quoted in this report may not be directly comparable to the figures published in previous G-FINDER reports. Due to the level of detail in GBD 2013, figures for bacterial pneumonia & meningitis reflect only DALYs and mortality related to pathogens that are within G-FINDER scope. In some cases, GBD 2013 estimates are different from 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 (Brazil, India and South Africa) who participated in the G-FINDER survey. MNCs are defined as multinational pharmaceutical companies with revenues of over $10bn *per annum*.

Around 2.2% ($74m) 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 3.1% ($104m) was given as core funding to R&D organisations that work in multiple disease areas, for example, the European and Developing Countries Clinical Trials Partnership (EDCTP) and 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 2014, there was a reported total of $3,377m invested in R&D for neglected diseases. Of this, $3,197m was reported by repeat survey participants (called year-on-year – YOY – funders) and an additional $179m was reported by irregular survey participants.

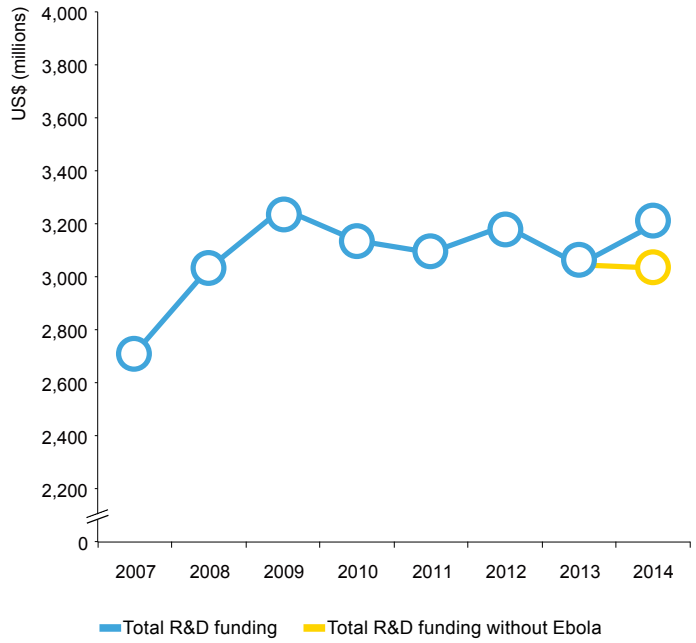
Total YOY funding for neglected disease R&D increased by $150m (up 4.9%), but this was entirely a result of significant new investment in Ebola R&D in response to the 2014 West African Ebola epidemic. Without Ebola, YOY funding for neglected disease R&D would have been essentially flat (down $14m, -0.4%).

A total of $165m was invested globally in R&D for Ebola in 2014; only HIV/AIDS, malaria, TB and diarrhoeal diseases received more R&D funding.

This is the first year that Ebola R&D investment has been tracked by the G-FINDER survey, with its inclusion a response to the 2014 West African Ebola epidemic and the subsequent mobilisation of significant new financial resources for Ebola R&D. For the purpose of this report, all Ebola R&D investment in 2014 has been treated as new funding.

A number of organisations – most notably US Government agencies and a handful of MNCs – were funding pre-existing research programmes in Ebola and other filoviruses prior to 2014. With the exception of a $20m grant from the US National Institutes of Health (NIH) to Crucell in 2010 to advance its Ebola vaccine candidate, annual investment in these programmes was relatively low. Precise figures for industry are unknown, but reported global public investment was only around $10m annually, predominantly from the US NIH, US Department of Defense (DOD) and US Department of Health and Human Services (HHS).

Figure 2. Total R&D funding 2007-2014



Neglected diseases fall into three distinct tiers according to the amount of funding they receive. The 'top tier' diseases – HIV/AIDS, TB and malaria – collectively received over two-thirds ($2,278m, 68%) of total global neglected disease R&D funding, with HIV/AIDS receiving 32%, malaria 18% and TB 17%. A sharp increase in funding for malaria R&D (up $56m, 11%) was the only major change for this tier, with funding slightly higher for TB (up $13m, 2.3%) and essentially flat for HIV/AIDS (down $5.6m, -0.5%).

'Second tier' diseases are those that receive between 1% and 10% of total funding. This group includes diarrhoeal diseases, kinetoplastids, helminth infections, dengue, bacterial pneumonia & meningitis, salmonella infections and hepatitis C (genotypes 4, 5 & 6), as well as Ebola, which was included in the G-FINDER survey for the first time in 2014 and received $165m. Other than Ebola, the only second tier diseases to receive increased YOY funding were kinetoplastids (up $16m, 14%) and dengue (up $12m, 16%). Funding fell for each of the five remaining diseases, with diarrhoeal diseases (down $18m, -9.4%) and bacterial pneumonia & meningitis (down $15m, -20%) most affected, followed by salmonella infections (down $6.1m, -11%), hepatitis C (down $3.6m, -8.5%) and helminths (down $3.3m, -3.8%).

Table 2. R&D funding by disease 2007-2014^

Disease or R&D area	US$ (millions)								2014 % of total
	2007	2008	2009	2010	2011	2012	2013	2014	
HIV/AIDS	1,228	1,323	1,292	1,218	1,171	1,209	1,109	1,080	32.0
Malaria	521	611	670	606	624	609	562	610	18.1
Tuberculosis	463	504	622	645	593	569	586	589	17.4
Diarrhoeal diseases	130	151	205	181	173	173	204	180	5.3
Ebola								165	4.9
Kinetoplastids	139	157	183	165	147	152	126	149	4.4
Helminths (worms & flukes)	58.6	76.2	90.3	83.9	91.8	95.7	96.1	97.3	2.9
Dengue	52.4	54.2	82.9	70.7	81.3	82.6	77.3	87.4	2.6
Bacterial pneumonia & meningitis	36.1	103	77.6	106	110	113	107	80.8	2.4
Salmonella infections	10.3	44.8	44.7	49.7	49.9	59.2	66.8	67.5	2.0
Hepatitis C (genotypes 4, 5 & 6)							47.0	39.6	1.2
Leprosy	6.5	11.4	12.4	10.5	8.8	15.2	13.1	10.5	0.3
Trachoma	1.7	2.4	2.0	5.2	11.0	9.9	6.1	6.8	0.2
Cryptococcal meningitis							3.4	5.8	0.2
Buruli ulcer	2.7	2.2	2.0	6.2	6.5	6.9	7.3	4.1	0.1
Leptospirosis							0.4	1.4	<0.1
Rheumatic fever	2.0	2.6	3.5	2.1	1.0	1.0	0.9	1.4	<0.1
Platform technologies	11.2	18.1	25.2	31.2	19.4	50.5	44.6	23.0	0.7
General diagnostic platforms	5.7	5.9	9.9	10.8	11.6	17.6	17.2	10.2	0.3
Adjuvants and immunomodulators	3.3	2.6	6.4	10.4	5.9	27.9	21.3	8.4	0.2
Delivery technologies and devices	2.2	9.6	9.0	10.0	2.0	5.0	6.1	4.4	0.1
Core funding of a multi-disease R&D organisation	123	112	81.4	84.2	101	120	124	104	3.1
Unspecified disease	59.2	85.3	85.8	54.7	74.3	115	94.0	74.4	2.2
Disease total	2,844	3,258	3,480	3,320	3,265	3,383	3,273	3,377	100

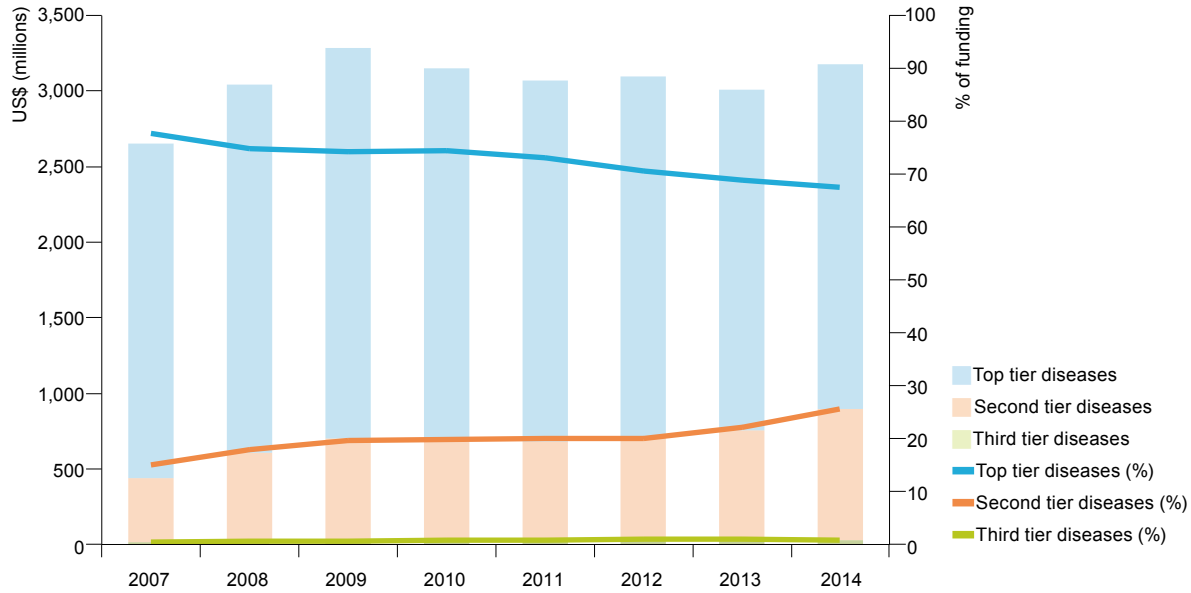
^ Please note that some of the diseases listed are actually groups of diseases, such as the diarrhoeal illnesses and helminth infections. This reflects common practice and also the shared nature of research in some areas. For example, *Streptococcus pneumoniae* R&D is often targeted at both pneumonia and meningitis

New disease added to G-FINDER in 2013 or 2014

'Third tier' diseases each receive less than 0.5% of global funding, making them the most poorly funded of the neglected diseases covered in this report. These include leprosy, trachoma, cryptococcal meningitis, Buruli ulcer, leptospirosis and rheumatic fever. Because of the small numbers of funders and grants these diseases receive in any given year it is not possible to meaningfully comment on YOY funding trends.

YOY funding for the second tier diseases increased considerably (up $146m, 23%) in 2014, outstripping the increase to top tier diseases (up $63m, 2.9%). On the face of it, this was further confirmation of the trend towards a rebalancing of funding between the tiers; top tier diseases received 68% of total funding (down from 69% in 2013) and second tier diseases 26% (up from 22%). But without the $165m in new funding for Ebola R&D, funding to second tier diseases would have fallen by $18m (-2.8%), and the rebalancing trend would have reversed for the first time. The share of funding given to third tier diseases remained unchanged: collectively, these six diseases once again received less than one cent of every dollar invested in neglected disease R&D (0.9%).

Figure 3. Funding distribution 2007-2014^



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

Non-disease-specific investment fell sharply in 2014 (down $36m, -24%). There was a total of $23m invested in platform technologies – tools that can potentially be applied to a range of areas, but which are not yet focused on a specific product or disease. This was only half the funding these technologies received in 2013 (down $22m, -50%), with this cut evident across the spectrum of platform technologies; adjuvants and immunomodulators saw the biggest drop (down $13m, -61%), followed by diagnostic platforms (down $7.1m, -42%) and delivery technologies and devices (down $2.0m, -33%). Almost all ($20m, 90%) of this decrease came from the US NIH (down $16m, -76%) and the Bill & Melinda Gates Foundation (Gates Foundation, down $4.0m, -27%).

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 – fell $14m (-13%) to $104m. This reflected reduced funding from the Wellcome Trust (down $15m, -46%), Gates Foundation (down $6.5m, -93%) and the EC (down $3.6m, -12%).

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 opportunistic infections.

HIV/AIDS was responsible for 67 million DALYs and 1.3 million deaths in the developing world in 2013, 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] There are now several vaccines in Phase I and II development, aiming to either block the infection through antibody response or clear the infection via cell-mediated immunity.

Antiretroviral (ARV) drugs are available, but many are not adapted for DC use, and FDCs and paediatric formulations are needed. Although the paediatric formulation of LPV/r pellets, currently in late-stage development, has many advantages, its poor taste will be a barrier.[5] Current methods for early diagnosis and support of HIV treatment are also often unsuitable for DCs, especially for infants, although there has been progress towards robust, simple, rapid point-of-care (POC) diagnostics, with several promising candidates in preclinical and clinical development. 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]

Several microbicide candidates have failed in Phase II/III trials (PRO 2000®, BufferGel® and VivaGel®). Most recently, tenofovir gel's Phase III FACTS 001 trial was unable to replicate promising results from an earlier late-stage trial.[7] All eyes are therefore now on the Phase III results of a long-acting dapivirine ring, due in early 2016.[8] However, potential resistance to the ARV components of microbicides and its impact on treatment is a growing concern.[9]

TOTAL SPEND ON HIV/AIDS R&D IN 2014

OF GLOBAL R&D FUNDING

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

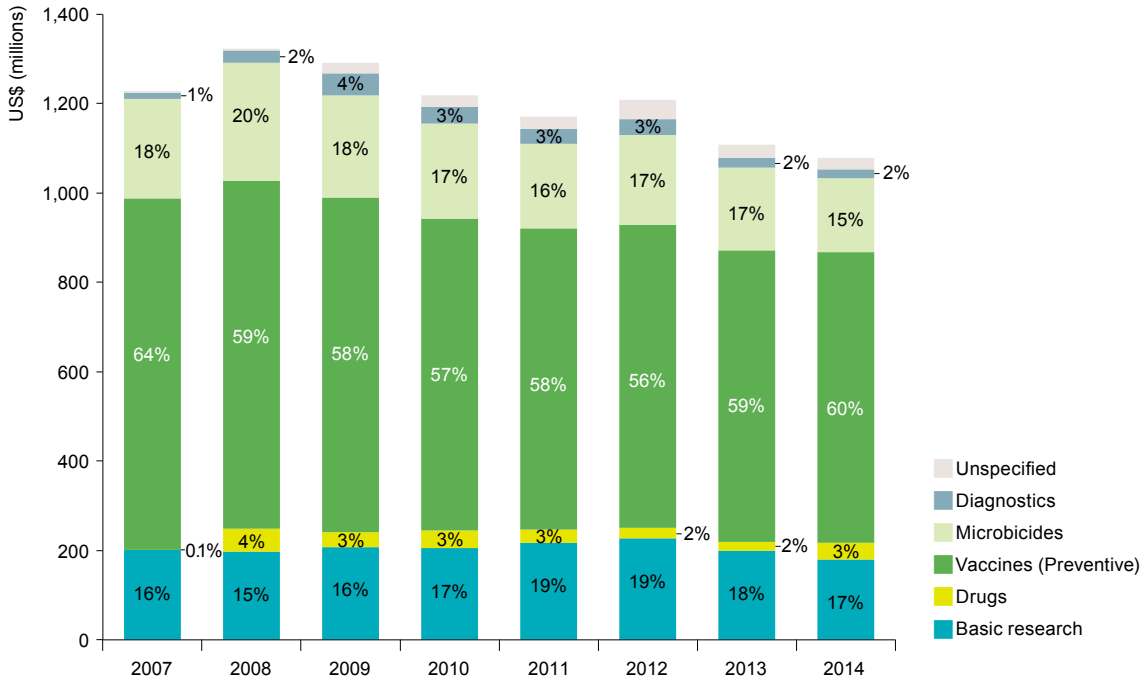
- Basic research
- Drugs specific to DC needs
- Preventive vaccines
- Diagnostics
- Microbicides

A total of $1,080m was invested in HIV/AIDS R&D in 2014, with YOY funding essentially stable (down $5.6m, -0.5%). As in previous years, HIV/AIDS received close to one-third (32%) of all neglected disease R&D investment.

As in preceding years, more than half of this investment was directed towards vaccine development ($652m, 60%). Basic research and microbicides received $179m (17%) and $165m (15%) respectively, with modest amounts invested in developing world-focused drug development ($37m, 3.4%) and diagnostics ($21m, 1.9%).

In 2014, YOY funding increased for drug development (up $18m, 109%), vaccines (up $15m, 2.4%) and diagnostics (up $0.5m, 2.7%). These modest increases were balanced by decreased investment in basic research (down $18m, -9.4%) and microbicides (down $16m, -8.9%). The Gates Foundation and US Agency for International Development (USAID) both provided less funding for microbicide R&D in 2014, partially due to the winding down of the tenofovir gel trial (FACTS 001).

Figure 4. HIV/AIDS R&D funding by product type 2007-2014



The top 12 funders were responsible for 96% of total HIV/AIDS R&D funding in 2014, up from 93% the previous year. The US NIH remained by far the largest funder, contributing almost two-thirds ($666m, 62%) of total investment in 2014, despite investing less in 2014 than in any previous year of the G-FINDER survey.

The biggest change in HIV/AIDS R&D funding in 2014 came from industry, which quadrupled its 2013 investment (up $33m from a relatively low base). There were smaller increases from the US DOD (up $6.2m, 11%), the UK Department for International Development (DFID, up $4.5m, 60%) and the Wellcome Trust (up $2.5m, 11%). All of this increased funding was cancelled out by reduced funding from most of the remaining top 12 funders, including the Gates Foundation (down $11m, -9.2%), the US NIH (down $10m, -1.5%), USAID (down $7.7m, -12%), the EC (down $3.7m, -20%), the Dutch Ministry of Foreign Affairs (DGIS, down $1.5m, -18%) and the French National Institute of Health and Medical Research (Inserm, down $1.5m, -11%).

Table 3. Top HIV/AIDS R&D funders 2014

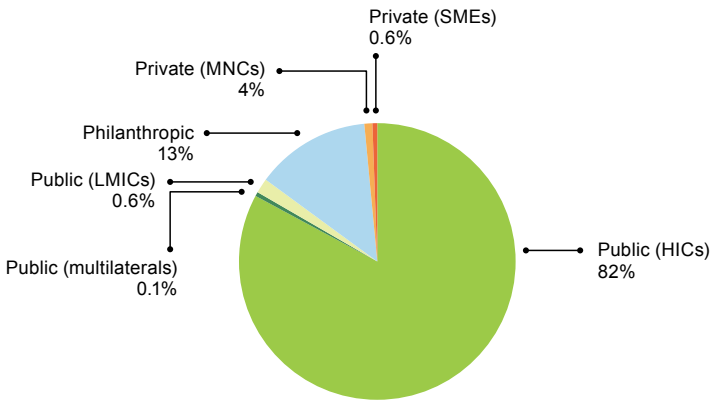
Funder	US$ (millions)								2014 % of total	2007-2014 trend
	2007	2008	2009	2010	2011	2012	2013	2014		
US NIH	778	738	789	753	722	743	676	666	62	
Gates Foundation	105	184	137	136	127	125	122	111	10	
US DOD	32	28	39	36	48	53	56	62	5.8	
USAID	77	78	78	78	74	73	66	58	5.4	
Aggregate industry	22	53	40	34	26	23	17	47	4.4	
Wellcome Trust	7.0	9.8	9.9	12	17	28	23	25	2.3	
European Commission	27	29	30	21	21	16	19	15	1.4	
Inserm	0.4	1.3	14	15	15	15	14	13	1.2	
UK DFID	31	30	41	21	17	22	7.5	12	1.1	
Canadian CIHR	3.8	2.1	6.0	9.5	8.8	8.5	8.9	9.1	0.8	
UK MRC	13	12	12	12	6.8	5.3	6.4	7.5	0.7	
Dutch DGIS	14	9.8	8.0	4.3	6.7	4.4	8.7	7.1	0.7	
Subtotal of top 12^	1,148	1,216	1,211	1,140	1,095	1,125	1,031	1,034	96	
Disease total	1,228	1,323	1,292	1,218	1,171	1,209	1,109	1,080	100	

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014

Public HIC funders continued to provide the vast majority ($887m, 82%) of developing country-relevant HIV/AIDS R&D funding in 2014, with three-quarters of this coming from just one organisation: the US NIH ($666m, 75%). Philanthropic funders again provided the second largest share of funding ($137m, 13%), despite the fact that both the public (down $29m, -3.2%) and philanthropic (down $9.1m, -6.3%) sectors reduced their funding in 2014.

Total industry investment in HIV/AIDS R&D in 2014 was $47m. This represented a quadrupling of YOY investment (up $33m from a low base, largely for vaccines), and meant industry's share of total funding grew to 4.4%, up from 1.5% in 2013. MNCs were the source of most industry investment ($41m, 87%), with SMEs providing the remaining $6.3m (13%).

Figure 5. HIV/AIDS R&D funding by sector 2014



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 (78% of malaria deaths are in children under five years of age[10]).

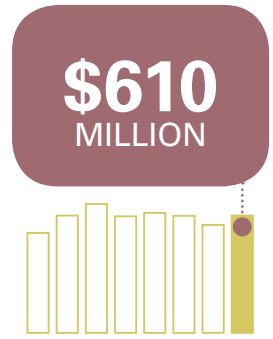
Malaria caused 65 million DALYs and at least 854,600 deaths in the developing world in 2013, making it the third highest cause of morbidity and fourth highest cause of mortality from neglected diseases. *P. falciparum* is by far the most deadly species, and in 2010 accounted for 98% of malaria cases in Africa.[11] Although *P. vivax* only accounts for about 8% of global cases, this proportion increases to 47% outside the African continent.[10]

New malaria drugs and insecticides are needed in response to the emergence of resistance to artemisinin-based combination therapies (ACTs) and pyrethroids. Cheap, sensitive and specific Rapid Diagnostic Tests (RDTs) are available, but their quality and heat stability can be problematic.[12] New diagnostics are particularly needed for non-*falciparum* species, to distinguish between malaria and other febrile illnesses, and to detect asymptomatic infections.[12]

Final Phase III trial results of the most advanced malaria vaccine candidate, RTS,S, showed a 36% and 26% decrease in clinical malaria cases in children and infants respectively over 3-4 years of follow-up.[13] RTS,S is currently being reviewed by the European Medicine Agency (EMA), with a positive decision together with a potential World Health Organization (WHO) recommendation anticipated by the end of 2015.[14] The next most advanced malaria vaccine candidates are in earlier stage clinical trials (Phase IIb).[15]

One synthetic artemisinin drug candidate, ozonide arterolane maleate/PQP, gained regulatory approval in several African countries in late 2014.[16] Others are in late-stage clinical trials, including OZ439/PQP which is undergoing Phase IIb trials and has shown potential as a one-dose cure.[17] Work is ongoing on two paediatric formulations of existing drugs for *P. falciparum*, with Pyramax® paediatric currently being reviewed by regulatory bodies.[18] A Phase III trial for tafenoquine, which is in development for the treatment and relapse of *P. vivax* malaria, is currently underway.[19]

The availability of a field molecular assay (LAMP test) has greatly reduced the time to diagnosis.[20] Diagnostic technologies in the pipeline include a urine dipstick malaria test (currently in clinical evaluation[21]).



TOTAL SPEND ON MALARIA R&D IN 2014

OF GLOBAL R&D FUNDING

Malaria R&D is needed in many areas including:

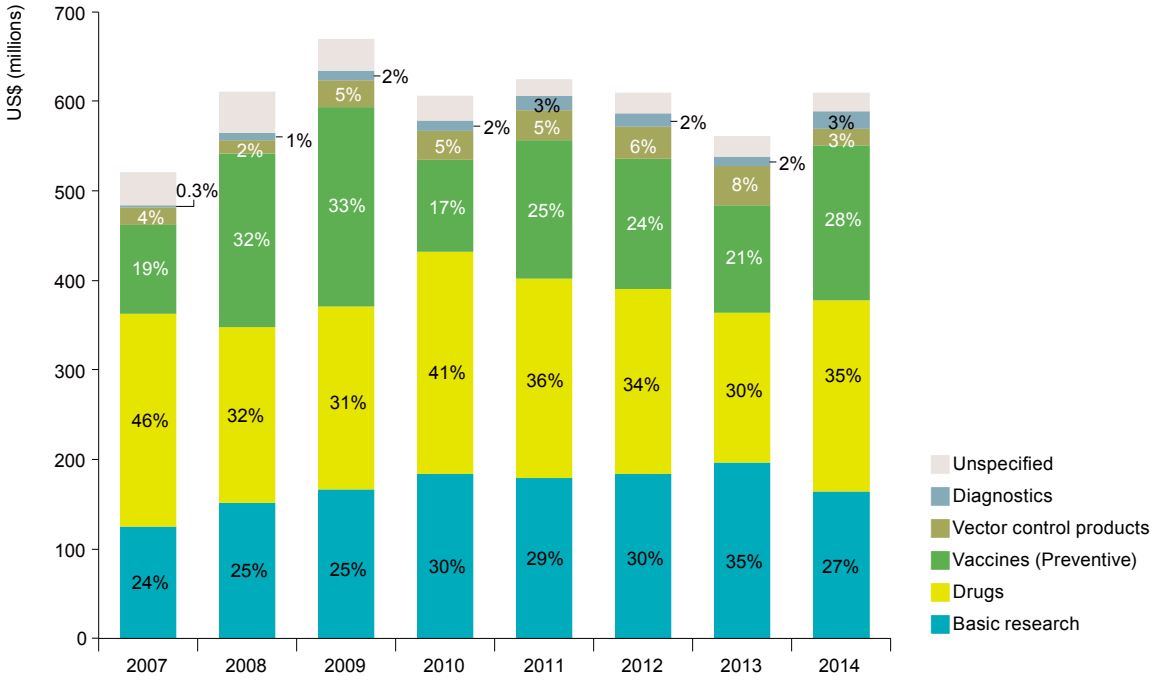
- Basic research
- Drugs
- Preventive vaccines
- Diagnostics
- Vector control products

Global funding for malaria R&D in 2014 was $610m. YOY funding increased by $56m (up 11%) to $588m, with irregular survey participants providing the remaining $23m. This was just the second increase in malaria R&D funding since its peak in 2009, and followed two consecutive years of declining investment.

Malaria funding was much more focused on product development than in 2013, in particular for drugs ($214m, 35%) and vaccines ($173m, 28%). Basic research received $164m, which represented 27% of all malaria R&D investment, compared to 35% in 2013. Significantly smaller amounts were invested in R&D for diagnostics ($19m, 3.0%) and vector control products ($18m, 3.0%).

The most significant increase in funding was for vaccine development (up $53m, 44%), largely driven by the Gates Foundation. Funding for drug development also increased significantly (up $42m, 26%), in large part due to GlaxoSmithKline's (GSK) investment in Phase III trials of tafenoquine, and there was also more money for diagnostics (up $10m from a low base). Funding fell for vector control products $25m (-64%) and basic research $24m (-13%), with the drop in vector control funding reflecting the lack of any disbursement from the Gates Foundation to the NIH Vector-based Control of Transmission: Discovery Research (VCTR) programme in 2014.

Figure 6. Malaria R&D funding by product type 2007-2014



As in previous years, funding for malaria R&D in 2014 remained highly concentrated. The top 12 funders accounted for 93% of total malaria funding, with the top four funders alone – the US NIH, the Gates Foundation, aggregate industry and the Wellcome Trust – collectively contributing three-quarters (75%) of total funding.

It was also the funders already investing most heavily in malaria R&D who were responsible for the jump in malaria funding in 2014. Each of the top three funders of malaria R&D increased their investment in 2014, with YOY funding from industry up by $51m (up 62%), the Gates Foundation by $21m (up 17%) and the US NIH by $8.3m (up 5.9%). If these three funders hadn't collectively invested $80m more in 2014 than they did in 2013, funding for malaria R&D would have actually fallen by $24m (-4.5%), continuing its downward trend of recent years.

UNITAID was the only other top 12 funder to increase investment in 2014, with an additional $2.5m (up 44%), enough to see them enter the top 12 for the first time. Funding was down from all of the remaining top 12 funders, although the largest drop (UK DFID, down $8.4m, -28%) was most likely cyclical, after major new disbursements in 2013. There were smaller reductions from US DOD (down $3.2m, -14%), the Wellcome Trust (down $3.2m, -11%) and the UK Medical Research Council (MRC, down $2.5m, -13%).

Table 4. Top malaria R&D funders 2014

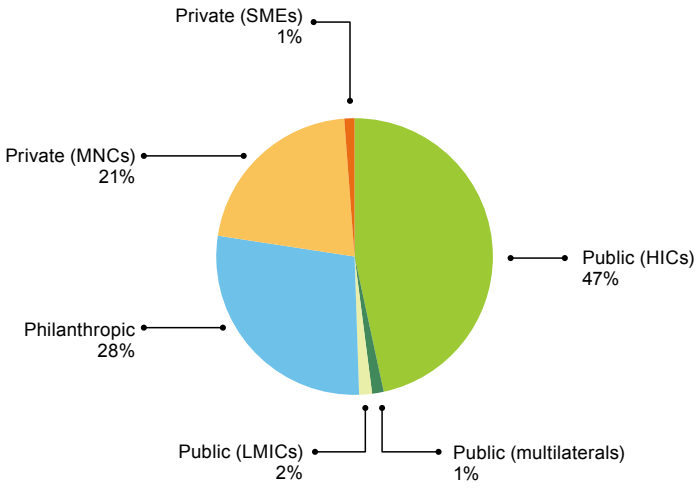
Funder	US$ (millions) 2007	2008	2009	2010	2011	2012	2013	2014	2014 % of total	2007-2014 trend
US NIH	97	120	133	152	140	173	141	149	24	
Gates Foundation	143	199	209	100	166	132	122	143	23	
Aggregate industry	97	99	109	134	108	123	87	138	23	
Wellcome Trust	28	28	29	34	32	32	29	26	4.3	
European Commission	24	28	28	28	24	16	24	23	3.8	
UK DFID	4.0	3.9	3.8	24	21	6.9	30	21	3.5	
US DOD	38	35	43	26	21	11	22	19	3.1	
UK MRC	19	20	21	23	21	19	19	16	2.7	
Australian NHMRC	10	12	13	13	15	18	14	13	2.1	
UNITAID							5.7	8.2	1.3	
Indian ICMR		10	7.0	5.0	5.0	6.7	7.5	7.0	1.1	
USAID	11	9.4	9.4	10	8.9	11	6.5	5.4	0.9	
Subtotal of top 12^	492	573	615	558	569	555	512	569	93	
Disease total	521	611	670	606	624	609	562	610	100	

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014

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

Half of all malaria funding came from public funders ($302m, 50%), with the remaining half split relatively evenly between the philanthropic sector ($170m, 28%) and industry ($138m, 22%). HICs provided the vast majority of public funding ($284m, 94%), of which the US NIH provided half ($149m, 52%), and MNCs were similarly responsible for most industry funding ($131m, 95%). YOY industry investment increased significantly (up $51m, 62%), reflecting the cost of late-stage clinical trials. Philanthropic funding also rose (up $17m, 11%), while public sector funding was slightly lower (down $12m, -4.1%).

Figure 7. Malaria R&D funding by sector 2014



TUBERCULOSIS

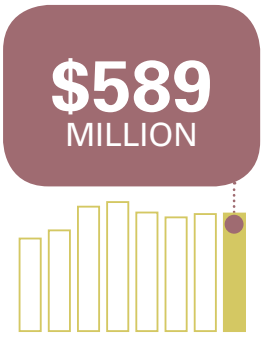
Tuberculosis (TB) is a bacterial disease that usually affects the lungs, and is spread by air droplets. After infection, TB may remain latent with no symptoms. However, if it progresses to active disease, it causes coughing, night sweats, fever and weight loss. TB is a leading cause of death among people with HIV/AIDS. TB was responsible for 49 million DALYs and 1.3 million deaths in the developing world in 2013. 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 against disseminated TB in children, but not against primary infection or reactivation.[22] A new vaccine is needed that is more effective, but as safe as, BCG. Current TB treatment regimens are complex and last 6-24 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. Although significant DC discounts are in place for Cepheid's nucleic detection device Xpert® MTB/RIF, its cost remains a barrier to access.[23] There is a general need for more effective and accessible POC tests,[24] tests that can diagnose TB in children, and assessments of drug susceptibility.[25]

There are several vaccine candidates in clinical development, mostly targeting the same antigens.[24] VPM1002, which is based on the BCG vaccine and specifically developed for infants in endemic areas, started a Phase II trial in HIV-exposed newborns in mid-2015.[26] A Phase IIb trial for M72+AS01E in adults is underway, while Phase II results of this candidate in infants are currently being analysed.[27] Another promising candidate being developed in a BCG prime-boost regimen (H4/AERAS-404 + IC31) started Phase II trials in 2014.[28] However, there have been some set-backs, with trials being downscaled[29] and products showing inadequate efficacy in infants.[30]

Despite being given conditional approval for MDR-TB in recent years, access to two novel drugs (delamanid and bedaquiline) is minimal.[24] A recently announced bedaquiline donation programme may improve access[31] and both drugs are in Phase III clinical trials designed to finalise their approval status. Bedaquiline is also in development in several combinations, the most advanced being in Phase III trials for MDR- and XDR-TB.[32] Another novel drug (pretomanid) is also being tested in different combinations, with the most advanced being the PaMZ regimen for TB and MDR-TB in Phase III.[33]

The development of new diagnostics has been slow, with the WHO unable to recommend the use of Eiken's TB-LAMP and Hain Lifescience's MTB DRs/ tests in 2013 due to insufficient evidence.[34,35]



TOTAL SPEND ON TB R&D IN 2014

OF GLOBAL R&D FUNDING

R&D needs for TB include:

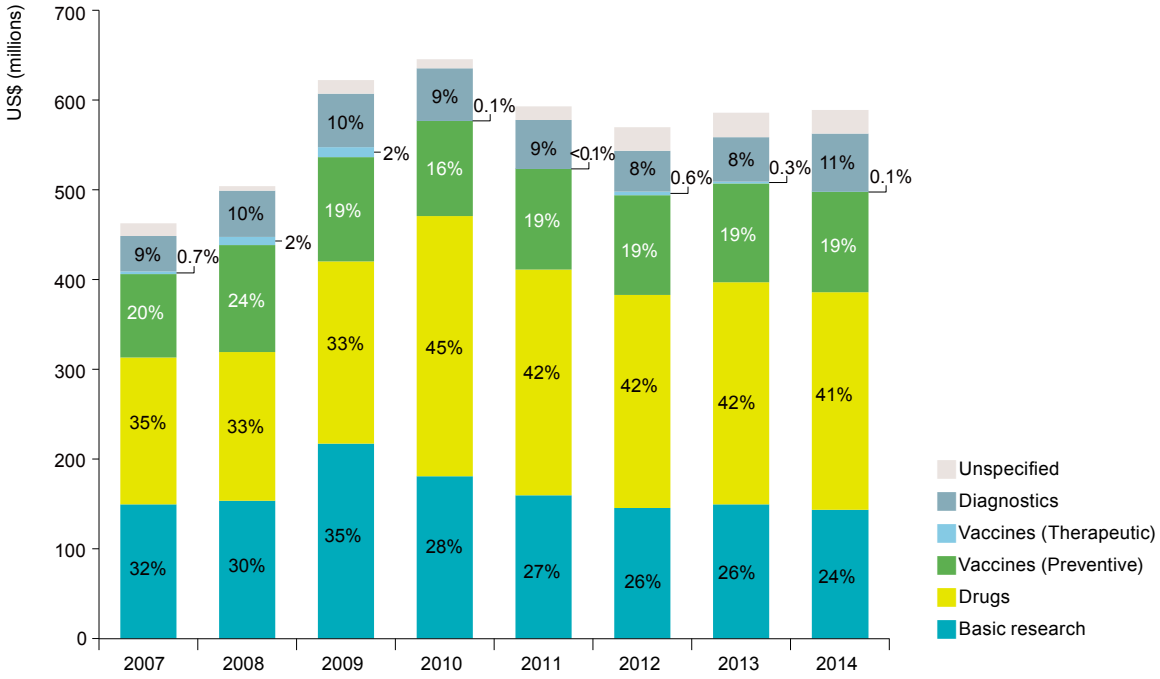
- Basic research
- Drugs
- Diagnostics
- Preventive vaccines
- Therapeutic vaccines

A total of $589m was invested in TB R&D in 2014, $559m of which was reported by YOY funders, with irregular survey participants providing the remaining $30m. Following a similar increase the preceding year, the slight growth in YOY funding in 2014 (up $13m, 2.3%) confirmed the end of a trend towards annually declining TB R&D investment, although funding in 2014 remains 7.5% ($46m) below its 2010 peak.

Investments in drug development ($243m, 41%) were the biggest contributor to total funding for TB R&D in 2014 – as has been the case for most of the years since G-FINDER began – followed by basic research ($143m, 24%) and preventive vaccines ($112m, 19%). A further $64m (11%) was invested in diagnostic R&D, and just $0.5m (0.1%) in therapeutic vaccines.

YOY funding increased for diagnostics (up $9.3m, 20%), driven by increased investment from the Gates Foundation, and for drugs (up $8.7m, 3.8%). Vaccine funding was virtually flat (up $1.3m, 1.2%), while there was a marginal decrease in funding for basic research (down $4.8m, -3.6%) and therapeutic vaccines (down $1.0m, -68%).

Figure 8. TB R&D funding by product type 2007-2014



The top funders accounted for 91% of total TB R&D funding in 2014, with almost three-quarters of total funding coming from the US NIH, industry and the Gates Foundation (collectively $437m, 74%).

Seven of the top 12 funders increased their TB R&D investment in 2014, with the largest increase coming from the US NIH (up $20m, 12%), followed by the US Centers for Disease Control (CDC, $8.5m, from zero reporting in 2013), the Gates Foundation (up $5.9m, 4.6%) and USAID (up $4.0m, 47%). The German Federal Ministry of Health (BMG) made it into the top 12 funders of TB R&D for the first time with investment of $4.4m.

The largest cuts came from industry (down $10m, -8.7%), with much smaller reductions from the EC (down $3.2m, -16%), the UK MRC (down $1.8m, -13%) and the Wellcome Trust (down $1.2m, -8.0%).

Table 5. Top TB R&D funders 2014

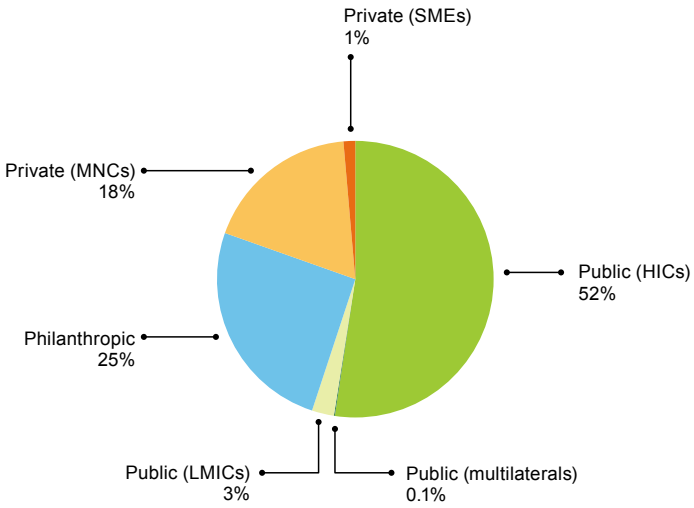
Funder	US$ (millions)								2014 % of total	2007-2014 trend
	2007	2008	2009	2010	2011	2012	2013	2014		
US NIH	139	129	187	180	174	181	168	188	32	
Gates Foundation	133	151	111	117	98	104	128	134	23	
Aggregate industry	74	98	140	179	170	147	123	115	20	
European Commission	23	31	32	24	20	13	20	16	2.8	
UK DFID	1.8	3.5	18	23	13	1.7	15	16	2.8	
Wellcome Trust	2.6	5.7	8.7	14	13	14	15	14	2.3	
USAID	4.5	7.5	9.3	9.6	9.3	9.9	8.6	13	2.2	
UK MRC	13	13	13	15	16	16	13	11	1.9	
US CDC	13	10	17	10	9.7	-	-	8.5	1.4	
Indian ICMR		1.0	2.1	3.4	3.5	6.8	8.2	8.2	1.4	
German BMBF	4.8	0.4	5.5	4.7	4.4	5.6	5.7	6.8	1.2	
German BMG				-	-	4.0	4.2	4.4	0.7	
Subtotal of top 12^	436	463	561	595	539	512	519	535	91	
Disease total	463	504	622	645	593	569	586	589	100	

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014
- 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 R&D funding ($324m, 55%), the philanthropic sector a quarter ($149m, 25%) and industry the remaining fifth ($115m, 20%). Public funding was dominated by HICs ($308m, 95%), with the US NIH alone providing 61% ($188m) of all HIC funding. MNCs continued to contribute the vast majority (93%) of industry funding, with SMEs providing the remaining 7.0%.

The public (up $18m, 6.3%) and philanthropic sectors (up $5.0m, 3.5%) both increased their TB R&D funding in 2014, but another cut in industry investment (down $10m, 8.7%) – entirely from MNCs – represented even greater industry pullback from the disease, and meant that the stabilisation of TB R&D funding since 2012 was entirely due to public and philanthropic investment.

Figure 9. TB R&D funding by sector 2014



DIARRHOEAL DISEASES

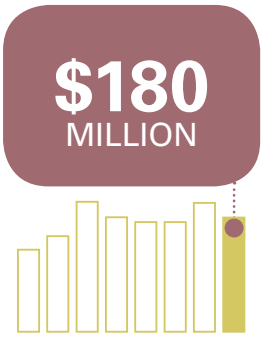
Diarrhoeal diseases are a group of illnesses caused by viruses, bacteria or protozoa, that all present with fever and diarrhoea. They range from rotavirus and *E. coli*, which are relatively common in the West; to cholera and *Shigella*, which are mostly prevalent in DC settings. Diarrhoeal diseases 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 71 million DALYs and 1.2 million deaths in the developing world in 2013, making them the highest cause of neglected disease morbidity and third highest cause of mortality from neglected diseases.

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.[36] New rapid diagnostic tests capable of distinguishing between diarrhoeal diseases are also required.[37]

Several vaccine candidates are in Phase II and III trials, including ACE527 for enterotoxigenic *E. coli* (ETEC) and WRSS1 for *Shigella*.[38] A new $1 rotavirus vaccine (ROTAVAC®) was launched in India's private market in early 2015, with the government planning to add it to its Universal Immunization Program (UIP), making it free for all infants.[39] Other advanced candidates include BRV-TV, a rotavirus vaccine currently studied in a Phase III trial in Indian infants.[40]

A low-cost and portable chip-scale microscope diagnostic test capable of distinguishing between causes of diarrhoeal diseases is also in development.[41]



TOTAL SPEND ON DIARRHOEAL DISEASE R&D IN 2014

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 $180m in R&D funding in 2014. YOY funding was down by $18m (-9.4%) to $169m, with irregular survey participants providing the remaining $11m.

As in 2013, the distribution of funding was weighted towards rotavirus, cholera and *Shigella*, which collectively accounted for $107m (60%) of total diarrhoeal disease investment. YOY funding decreased for *Shigella* (down $7.6m, -26%) and rotavirus (down $1.3m, -2.8%), but increased for *Cryptosporidium* (up $2.1m, 39%) and cholera (up $2.1m, 7.7%), with minimal changes to the other diarrhoeal diseases.

There were evident differences in the focus of R&D funding between each of the diseases for which all product types are in scope (cholera, *Shigella* and *Cryptosporidium*). Cholera funding was heavily focused on basic research ($21m, 72%), with just $3.7m (13%) going to vaccine R&D. *Shigella* funding was more balanced, with $11m (49%) for vaccines and $8.4m (38%) for basic research; there was minimal investment in drugs for either disease. *Cryptosporidium* funding was spread much more evenly between drugs ($3.3m, 45%), basic research ($2.3m, 31%) and vaccines ($1.3m, 18%).

Funding per product type was down almost across the board, including drugs (down $6.8m, -52%), basic research (down $6.0m, -14%) and vaccines (down $5.9m, -5.7%). The only exception was funding for diagnostic R&D, which grew by $3.2m (up 57%).

Table 6. Diarrhoeal disease R&D funding 2014 (US$ millions)^

Disease	Basic Research	Drugs	Vaccines (Preventive)	Diagnostics	Unspecified	Total	%
Rotavirus			55		1.2	**56**	31
Cholera	21	0.6	3.7	0.4	3.5	**29**	16
Shigella	8.4	-	11	0.9	2.1	**22**	12
Enterotoxigenic *E. coli* (ETEC)			9.4	0.1	-	**9.4**	5.2
Cryptosporidium	2.3	3.3	1.3	0.4	-	**7.4**	4.1
Giardia				0.3	0.2	**0.5**	0.3
Enteroaggregative *E.coli* (EAggEC)			0.3	-	0.1	**0.4**	0.2
Multiple diarrhoeal diseases	6.6	2.5	27	7.1	11	**55**	31
Total	38	6.4	108	9.2	19	180	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

The top 12 funders in 2014 provided 98% of overall funding for diarrhoeal disease R&D, and the top three funders over two-thirds ($124m, 69%), with the US NIH contributing $43m (24%), the Gates Foundation $41m (23%) and industry $41m (23%).

These top three funders were also responsible for the largest reductions in diarrhoeal disease R&D investment, with the Gates Foundation funding down by $10m (-20%), industry down $7.3m (-19%) and the US NIH down $4.5m (-9.4%). Increases were few and modest, with the largest coming from UK DFID (up $5.5m from a low base).

Table 7. Top diarrhoeal disease R&D funders 2014

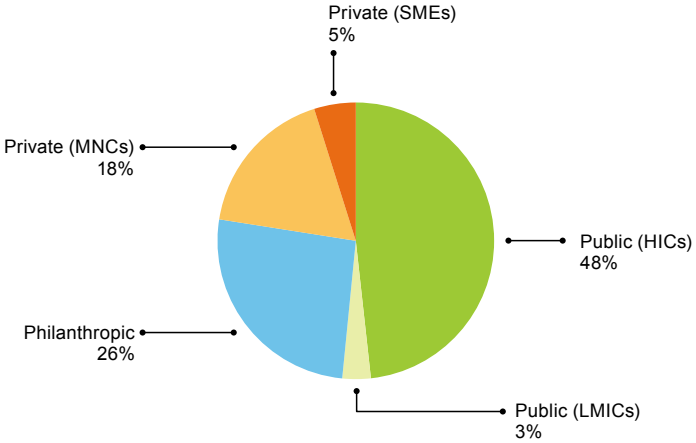
Funder	US$ (millions) 2007	2008	2009	2010	2011	2012	2013	2014	2014 % of total	2007-2014 trend
US NIH	36	45	70	58	60	55	47	43	24	
Gates Foundation	51	31	54	51	35	40	51	41	23	
Aggregate industry	15	27	42	35	30	32	45	41	23	
Inserm	0.3	0.4	1.6	1.9	9.5	10	15	13	7.0	
UK DFID	-	-	2.9	5.5	3.1	-	3.9	9.4	5.2	
US DOD	6.2	6.8	13	6.8	5.5	8.4	9.3	9.3	5.2	
Wellcome Trust	1.0	0.4	0.3	0.5	0.5	4.5	3.4	5.7	3.1	
Indian ICMR		4.4	3.8	4.7	2.8	2.7	4.7	4.6	2.5	
Institut Pasteur	3.7	4.2	5.7	4.7	4.7	4.5	4.4	4.5	2.5	
European Commission	0.8	0.6	0.6	0.9	3.2	3.3	3.6	3.7	2.0	
UK MRC	0.4	1.0	0.8	0.7	0.4	1.1	1.9	1.8	1.0	
US CDC	0.3	0.5	0.3	0.6	-	0.1	-	1.0	0.6	
Subtotal of top 12^	128	143	199	174	165	166	197	177	98	
Disease total	130	151	205	181	173	173	204	180	100	

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014
- 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 provided just over half ($93m, 52%) of all diarrhoeal disease R&D funding in 2014, with the philanthropic sector ($47m, 26%) and industry ($41m, 23%) contributing around another quarter each. Almost all public sector funding came from HIC governments ($87m, 94%) – nearly half of which ($43m, 49%) was from the US NIH. In contrast, SMEs were responsible for nearly a quarter ($9.0m, 22%) of industry investment in diarrhoeal disease R&D, with MNCs providing the remaining $32m (78%).

Reductions in YOY funding for diarrhoeal disease R&D came primarily from the philanthropic sector (down $8.0m, -15%) and industry (down $7.3m, -19%), with a small drop in public sector funding (down $2.3m, -2.5%).

Figure 10. Diarrhoeal disease R&D funding by sector 2014



EBOLA

In response to the 2014 West African Ebola outbreak, investments in Ebola R&D were included in the G-FINDER survey scope for the first time. As with all diseases in the G-FINDER report, only DC-specific R&D has been reported. We note the possibility of under-reporting since this is the first time funders were asked to collect Ebola data for the G-FINDER survey.

Ebola, or Ebola virus disease (EVD), is a severe and often fatal disease caused by infection with one of five known species of Ebola virus (a member of the *Filoviridae* family, which also includes Marburg virus). Sporadic outbreaks have been recorded across Sub-Saharan Africa since the virus was discovered there in 1976. Fruit bats are believed to be the natural reservoir host, although this remains unconfirmed. The virus is introduced into the human population through contact with infected wild animals, and then spreads through the human population via contact with bodily fluids from an infected person.

The 2014 West African Ebola outbreak was the largest ever, with more cases and deaths than in all other Ebola outbreaks combined. The most severely affected countries in the 2014 outbreak were Sierra Leone, Liberia and Guinea, with over 28,000 cases and more than 11,000 deaths in total.[42]

No licensed drugs or vaccines exist, meaning that treatment is restricted to supportive and symptomatic therapy, and outbreak containment relies on prevention and control strategies. Both re-purposed and novel Ebola-specific drugs are currently being evaluated, including favipiravir and the monoclonal antibody cocktail ZMapp™ (both in Phase II).[43] There are also several vaccine candidates in clinical development, the most advanced of these being VSV-EBOV (Phase III) and ChAd3-ZEBOV (Phase II).[43] However, despite the fact that clinical trials were fast-tracked during the recent outbreak, the lack of new cases presents a challenge for ongoing clinical development.

Early diagnosis is critical for both successful treatment and epidemic control, but is hampered by the lack of appropriate tests. The first ever rapid POC screening tests for Ebola were given emergency approval at the height of the recent epidemic, but laboratory confirmation is still required.[44] There is a need for inexpensive but accurate rapid POC tests for screening, as well as smaller, faster, more mobile molecular tests suitable for the African setting.[45]

$165 MILLION

TOTAL SPEND ON EBOLA R&D IN 2014

OF GLOBAL R&D FUNDING

R&D needed for Ebola includes:

- Basic research
- Drugs
- Diagnostics
- Preventive vaccines

A total of $165m was invested in Ebola R&D globally in 2014. This was 4.9% of all neglected disease R&D funding for the year, and meant that the only diseases to receive more R&D funding than Ebola in 2014 were the 'big three' of HIV/AIDS, malaria and TB, along with diarrhoeal diseases.

Reflecting the rapid emergence of Ebola as a significant public health threat and the urgent need for new tools, the vast majority ($146m, 89%) of Ebola R&D funding in 2014 went to product development. Basic research ($18m, 11%) made up a smaller share of funding than for any other G-FINDER disease.

Table 8. Ebola R&D funding by product type 2014

Product	US$ (millions)	2014 % of total
	2014	
Drugs	70	43
Vaccines (Preventive)	69	42
Basic research	18	11
Diagnostics	6.4	3.9
Total	165	100

Table 9. Top Ebola R&D funders 2014

Funder	US$ (millions)	2014 % of total
	2014	
US NIH	64	39
Aggregate industry	35	21
US HHS	26	16
Gates Foundation	12	7.2
US DTRA	11	6.6
Inserm	6.4	3.9
French ANRS	2.7	1.6
Canadian DFATD	2.6	1.6
European Commission	2.3	1.4
UK DFID	1.6	1.0
Public Health England	0.5	0.3
Institut Pasteur	0.4	0.2
Subtotal of top 12	164	99.7
Total	165	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

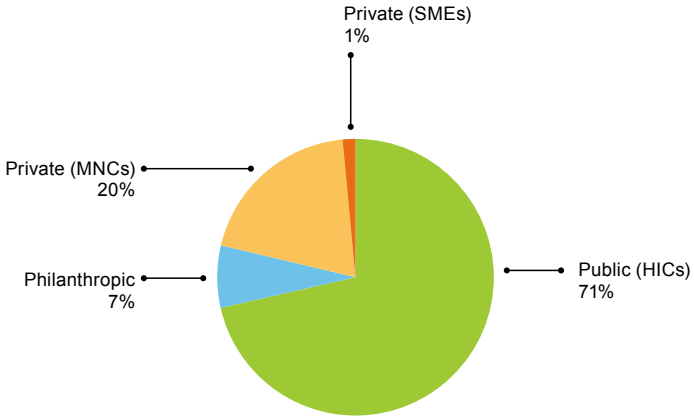
Most Ebola R&D funding went towards drugs ($70m, 43%) and vaccines ($69m, 42%). Drug development was heavily reliant on the public sector, which contributed 90% ($64m) of this funding – $59m of which came from the US Government. In contrast, vaccine development efforts were funded equally by industry ($34m, 49%) and the public sector ($33m, 48%). Despite the lack of appropriate diagnostic tests hampering treatment and containment efforts, just $6.4m (3.9%) was invested in diagnostic R&D. Interestingly, this was the only product area for which philanthropic organisations provided the bulk of funding.

Virtually all reported funding for Ebola R&D in 2014 came from the top 12 funders ($164m, 99.7%). Apart from aggregate industry and the Gates Foundation, all of these were public sector institutions from North America and Europe. Three of the top five were US Government agencies: the US NIH ($64m, 39%), the US HHS ($26m, 16%), and the US Department of Defense: Defense Threat Reduction Agency (DTRA, $11m, 6.6%). Collectively, these three US organisations provided 78% of all non-industry investment in Ebola R&D.

Close to three-quarters ($118m, 71%) of total reported funding for Ebola R&D came from the public sector, with the vast majority of this ($101m, 86%) coming from US Government agencies. More than half of all public sector funding ($64m, 54%) was for drug development, nearly double the amount it invested in vaccines ($33m, 28% of public sector funding).

Industry provided a fifth ($35m, 21%) of all investment in Ebola R&D; 93% of this was from MNCs, and virtually all of it ($34m, 97%) was for vaccine development. The philanthropic sector contribution was relatively modest ($12m, 7.3%), although the $3.1m it gave to diagnostic development represented nearly half (48%) of all funding for diagnostic R&D.

Figure 11. Ebola R&D funding by sector 2014



KINETOPLASTIDS

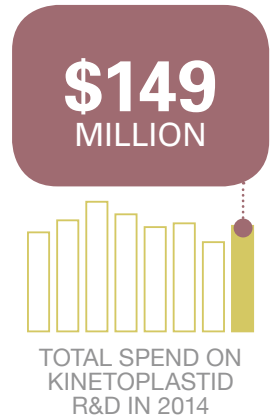
Kinetoplastid infections include three diseases: Chagas' disease, leishmaniasis and human African trypanosomiasis (HAT), also known as African sleeping sickness. Sleeping sickness initially presents with similar symptoms to a viral illness, but eventually infects the brain where it causes confusion, 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 2013, kinetoplastid diseases were responsible for 5.0 million DALYs and 79,930 deaths in the developing world. They ranked as the ninth highest cause of mortality and tenth highest cause of morbidity from neglected diseases.

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. The two drugs currently used (benznidazole and nifurtimox) are toxic, lack specificity and require multiple dosing for several months, increasing the likelihood of non-compliance and drug resistance.[46] A paediatric benznidazole formulation was registered in Brazil in 2011,[47] and the only drug in clinical development is an azole/benznidazole combination for chronic Chagas' disease.[5] A urine-based diagnostic is in Phase II development for the detection of congenital Chagas' disease,[48] while several vaccine candidates are in pre-clinical stages.

Sleeping sickness needs new, safe, oral drugs that are active against both stages of the disease to replace the injectable treatments now used,[49] as well as a vaccine. There are some promising sleeping sickness drug candidates, with fexinidazole, the first drug for the treatment of advanced-stage sleeping sickness in 30 years, currently in Phase II/III clinical trials in Africa.[5] However, there is only one other drug in clinical development (SCYX-7158 in Phase I)[5] and there are no vaccine candidates for sleeping sickness.

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. At least one vaccine candidate in clinical development is being evaluated for prophylactic and therapeutic indications[50] and there are several diagnostic tests in development for resource-limited settings. There are no novel leishmaniasis drugs on the immediate horizon and the only candidate currently in clinical trials is a topical formulation of amphotericin B for cutaneous leishmaniasis.[5]



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 2014 was $149m. YOY investment increased slightly (up $16m, 14%) to $129m, with irregular survey participants providing the remaining $20m.

Funding within the kinetoplastid family was dominated in equal parts by sleeping sickness ($48m, 33%) and leishmaniasis ($47m, 32%), while Chagas' disease received $22m (15%). This division was helped by an increase in 2014 R&D investment for sleeping sickness (up $9.4m, 26%), and to a lesser extent leishmaniasis (up $2.3m, 7.0%), coupled with reduced funding for Chagas' disease (down $4.9m, -21%).

In 2014, YOY funding increased significantly for drug development (up $15m, 30%) driven by the Gates Foundation and the EC. Sleeping sickness received three-quarters of the increase in drug investment ($11m). Funding for other product areas was marginally higher – including preventive vaccines (up $1.5m, 38%), diagnostics (up $1.3m, 17%) and therapeutic vaccines (up $0.8m from a low base) – but basic research funding fell by $1.5m (3.1%).

Table 10. Kinetoplastid R&D funding 2014 (US$ millions)

Disease	Basic Research	Drugs	Vaccines (Preventive)	Vaccines (Therapeutic)	Vector control products	Diagnostics	Unspecified	Total	%
Sleeping sickness	22	24	-		-	2.7	-	48	33
Leishmaniasis	23	15	5.1	1.6		1.1	1.0	47	32
Chagas' disease	8.3	12	0.6	0.2	-	1.4	0.2	22	15
Multiple kinetoplastids	3.9	23	-	-	-	3.8	-	31	21
Total	57	75	5.7	1.8	-	8.9	1.2	149	100

- No reported funding
Category not included in G-FINDER

In 2014, the top 12 funders accounted for 91% of total kinetoplastid R&D funding, and just four – the US NIH, industry, the Gates Foundation and the Wellcome Trust – provided close to two-thirds (64%).

The majority of funders increased their investments in kinetoplastid R&D, most notably the Gates Foundation (up $10m from a low base) and the EC (up $8.1m from a low base), as well as the Wellcome Trust (up $3.2m, 27%) and the German Federal Ministry of Education and Research (BMBF, up $1.6m, 33%). Four of the top funders decreased their funding: the US NIH (down $4.5m, -9.9%), industry (down $3.5m, -24%), the Dutch DGIS (down $1.0m, -18%) and the Indian Council of Medical Research (ICMR, down $0.6m, -13%). Funding from other organisations was stable.

Table 11. Top kinetoplastid R&D funders 2014

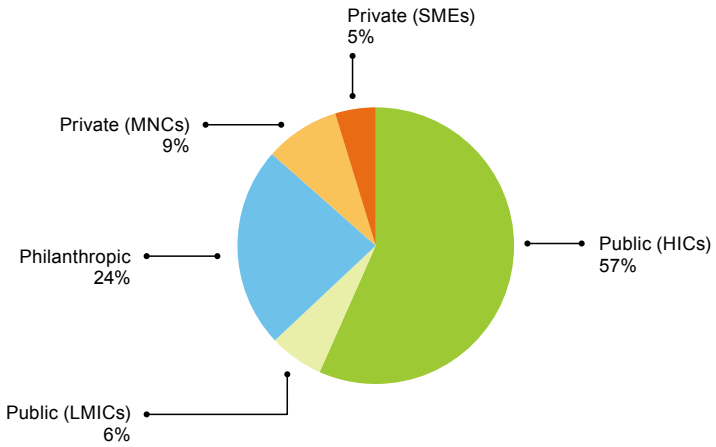
Funder	US$ (millions)							2014 % of total	2007-2014 trend
	2007	2008	2009	2010	2011	2012	2013	2014	
US NIH	32	56	60	64	54	52	46	41	28
Aggregate industry	5.3	3.2	5.6	12	14	20	17	20	13
Gates Foundation	52	33	41	23	12	9.1	8.9	19	13
Wellcome Trust	15	13	12	9.7	11	13	12	15	10
European Commission	3.2	5.1	11	9.9	8.1	6.7	4.4	13	8.4
German BMBF			-	-	0.9	6.3	4.7	6.3	4.2
German DFG	0.1		-	4.4	1.7	3.6	2.4	4.6	3.1
Dutch DGIS	-	-	-	1.4	4.4	2.7	5.3	4.4	2.9
Indian ICMR		-	0.1	2.0	3.7	3.3	4.8	4.2	2.8
UK MRC	2.9	3.6	2.6	2.8	2.4	1.7	2.5	3.4	2.3
Institut Pasteur	-	3.2	3.5	6.5	5.5	3.4	2.9	3.0	2.0
Swiss SNSF				0.7	2.4	1.0	1.8	2.4	1.6
Subtotal of top 12^	137	142	165	150	130	137	113	136	91
Disease total	139	157	183	165	147	152	126	149	100

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014
- 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 2014, close to two-thirds of kinetoplastid funding came from the public sector ($94m, 63%), close to a quarter came from the philanthropic sector ($35m, 24%), and industry invested the remaining $20m (13%). Public funding was dominated by HICs ($84m, 90%), with the US NIH contributing about half of this ($41m, 49% of HIC funding). Most industry funding was from MNCs ($13m, 65%); however SMEs contributed a sizeable share ($7.1m, 35%).

Both philanthropic (up $13m, 62%) and public (up $6.3m, 8.2%) funding for kinetoplastid R&D rose in 2014, on the back of funding increases from the Gates Foundation and the EC, respectively. In contrast, MNC investment was down by almost a quarter (down $3.5m, -24%).

Figure 12. Kinetoplastid R&D funding by sector 2014



HELMINTH INFECTIONS

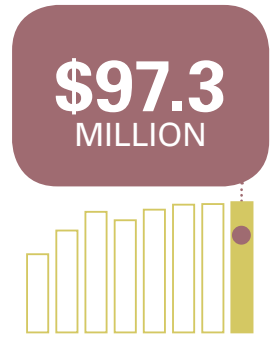
Helminths are parasitic worms and flukes that can infect humans. Helminth infections include ancylostomiasis and necatoriasis (hookworm), ascariasis (roundworm), trichuriasis (whipworm), strongyloidiasis and cysticercosis/taeniasis (tapeworm), collectively referred to as soil-transmitted helminths. Other 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 eighth highest cause of morbidity from neglected diseases globally and the tenth highest cause of mortality; they were responsible for 11 million DALYs and 10,666 deaths in 2013.

There is no vaccine against any of the above helminth infections and with the increase in mass drug administration programmes, drug resistance is a real concern.[51] Current diagnostic products for detection of some helminths are also outdated, meaning new effective diagnostics that are able to measure infection intensity and detect drug resistance are needed.[51]

Three drug candidates are in Phase II clinical trials for helminth infections: Moxidectin for onchocerciasis, Co-Arinate FDC for schistosomiasis and Oxantel pamoate for trichuriasis. Development of an orodispersible praziquantel tablet for children from three months to six years old is also underway, with a Phase II trial planned for early 2016.[52] There are several schistosomiasis vaccines in development, the most advanced being Bilhvax in Phase III.[53] There are two vaccine candidates against human hookworm infection in Phase I and II against onchocerciasis in pre-clinical stages. There are several diagnostic tests in development for helminth diseases, including a UCP-LF CAA assay for schistosomiasis diagnosis in low-prevalence settings (clinical development)[54] and a dual-detection POC test for onchocerciasis and lymphatic filariasis (pre-clinical development).[55]



TOTAL SPEND ON HELMINTH R&D IN 2014

OF GLOBAL R&D FUNDING

Helminth R&D is needed in many areas 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 2014 was $97m. Funding from YOY survey participants marginally decreased (down $3.3m, -3.8%) to $83m; irregular survey participants provided the remaining $14m.

Just over a quarter of total helminth funding went to schistosomiasis ($28m, 29%), followed by lymphatic filariasis ($21m, 22%), onchocerciasis ($9.5m, 9.8%) and hookworm ($7.0m, 7.1%). All remaining helminth infections together received less than $7.4m (7.6%) of total funding.

In 2014, YOY funding increased significantly for lymphatic filariasis (up $6.1m, 41%) and strongyloidiasis (up $2.2m from a low base); marginal increases in funding were observed for hookworm (up $0.7m, 12%), tape worm ($0.6m, 31%) and whipworm ($0.4m, 42%). These increases were offset by decreased funding for onchocerciasis (down $4.2m, -31%) and schistosomiasis (down $3.3m, -13%).

One third of helminth funding went to drug development ($33m, 34%), which was also the area that saw the largest increase in YOY funding (up $7.5m, 31%). Investment for vaccines also increased by $2.0m (32%). Basic research received $35m (36%), with YOY funding down by $6.7m (-16%).

Table 12. Helminth R&D funding 2014 (US$ millions)

Disease	Basic Research	Drugs	Vaccines (Preventive)	Vector control products	Diagnostics	Unspecified	Total	%
Schistosomiasis (bilharziasis)	11	3.3	7.7	-	2.9	3.6	28	29
Lymphatic filariasis (elephantiasis)	5.3	14		<0.1	0.2	1.4	21	22
Onchocerciasis (river blindness)	1.1	8.3	<0.1	<0.1	0.1	-	9.5	9.8
Hookworm (ancylostomiasis & nectoriasis)	1.1	0.7	5.1	-		0.1	7.0	7.1
Strongyloidiasis & other intestinal roundworms	2.9	0.1	<0.1		0.2	0.2	3.5	3.6
Tapeworm (cysticercosis/taeniasis)	1.6	0.7		0.2		-	2.4	2.5
Whipworm (trichuriasis)	1.1	0.2				0.1	1.4	1.4
Roundworm (ascariasis)	<0.1	<0.1				<0.1	0.1	0.1
Multiple helminths	11	5.8	7.2	-	<0.1	<0.1	24	25
Total	35	33	20	0.2	3.5	5.4	97	100

- No reported funding
Category not included in G-FINDER

In 2014, the top 12 funders accounted for 96% of total funding for helminth R&D, with the US NIH, the Gates Foundation and industry contributing close to three-quarters of total investment (72%). None of the top funders had any major change to their funding in 2014. The Wellcome Trust (down $2.8m, -35%) and YOY industry funders (down $1.5m, -19%) provided less funding in 2014 than in the preceding year, while there was a small increase from the Gates Foundation (up $1.7m, 7.7%). All of the remaining organisations had less than $1.0m change from the previous year. The Carolito Foundation made it to the top funders for the first time in 2014, with an investment of $0.9m.

Table 13. Top helminth R&D funders 2014

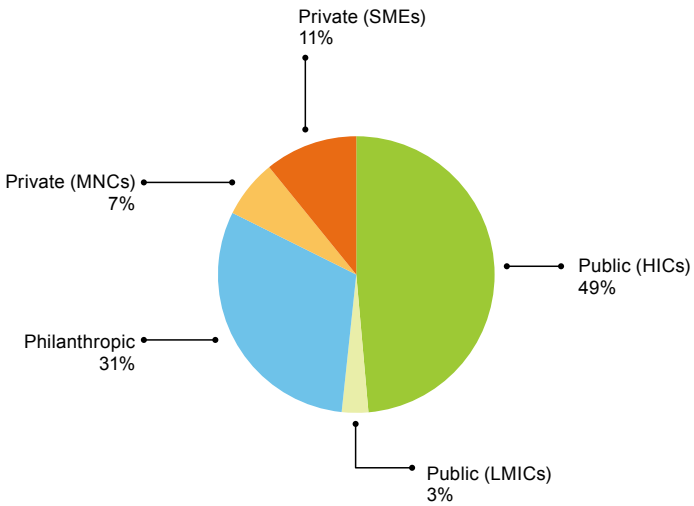
Funder	US$ (millions)								2014 % of total	2007-2014 trend
	2007	2008	2009	2010	2011	2012	2013	2014		
US NIH	32	27	32	34	27	37	29	29	30	
Gates Foundation	8.3	24	18	17	21	20	22	23	24	
Aggregate industry	0.9	5.6	9.8	7.6	9.2	4.2	8.3	17	18	
European Commission	4.7	3.5	3.3	8.7	7.4	8.5	8.2	7.8	8.0	
Wellcome Trust	3.2	4.1	5.3	5.8	8.8	6.7	8.1	5.2	5.4	
UK MRC	1.1	1.5	1.2	1.2	3.5	2.5	2.2	3.0	3.1	
Inserm	0.3	0.6	2.2	<0.1	2.1	2.3	2.6	1.8	1.9	
Dutch DGIS	-	-	-	0.6	1.8	0.3	2.2	1.8	1.8	
Indian ICMR		0.4	0.4	1.0	1.2	1.3	1.5	1.4	1.4	
Texas Children's Hospital					0.1	0.8	1.3	1.1	1.2	
Australian NHMRC	1.4	2.2	2.4	3.0	1.5	1.3	0.8	0.9	1.0	
Carolito Foundation				0.1	<0.1	0.5		0.9	1.0	
Subtotal of top 12^	58	71	86	80	86	89	91	94	96	
Disease total	59	76	90	84	92	96	96	97	100	

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014
- 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 R&D came from the public sector ($50m, 52%), and close to two-thirds of that was from the US NIH ($29m, 62%). The philanthropic sector provided close to a third of funding ($30m, 31%), and industry the remaining $17m (18%).

In 2014, YOY helminth funding decreased marginally across all sectors; industry decreased their investment by $1.5m (-19%), the philanthropic sector by $1.3m (-4.3%), and the public sector by $0.6m (-1.1%).

Figure 13. Helminth R&D funding by sector 2014



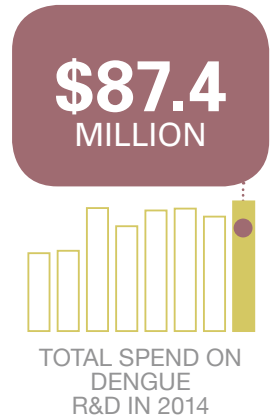
DENGUE

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 1.1 million DALYs and 8,979 deaths in 2013. It ranked as the eleventh 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 excluded from G-FINDER). A diagnostic that is able to detect early-stage disease and distinguish dengue from other causes of fever is needed.[56] There is also a need for evaluation of the currently available diagnostic kits.[56]

There is very little activity in the dengue drug pipeline, and no products have reached the clinical stage. Although a new diagnostic test that can detect the presence of all four dengue virus types was approved by the US Food and Drug Administration (FDA) in 2012 (CDC DENV-1-4), independent evaluation showed that this product has lower clinical sensitivity than initially thought.[57] This real-time reverse transcription polymerase chain reaction (RT-PCR) assay also has limited practicality in DCs.[58] A real-time RT-PCR that may be better suitable to resource-limited settings is the Liat™ Analyser (currently in clinical development), which is portable and can be used in non-laboratory settings.[59]



R&D needed for dengue includes:

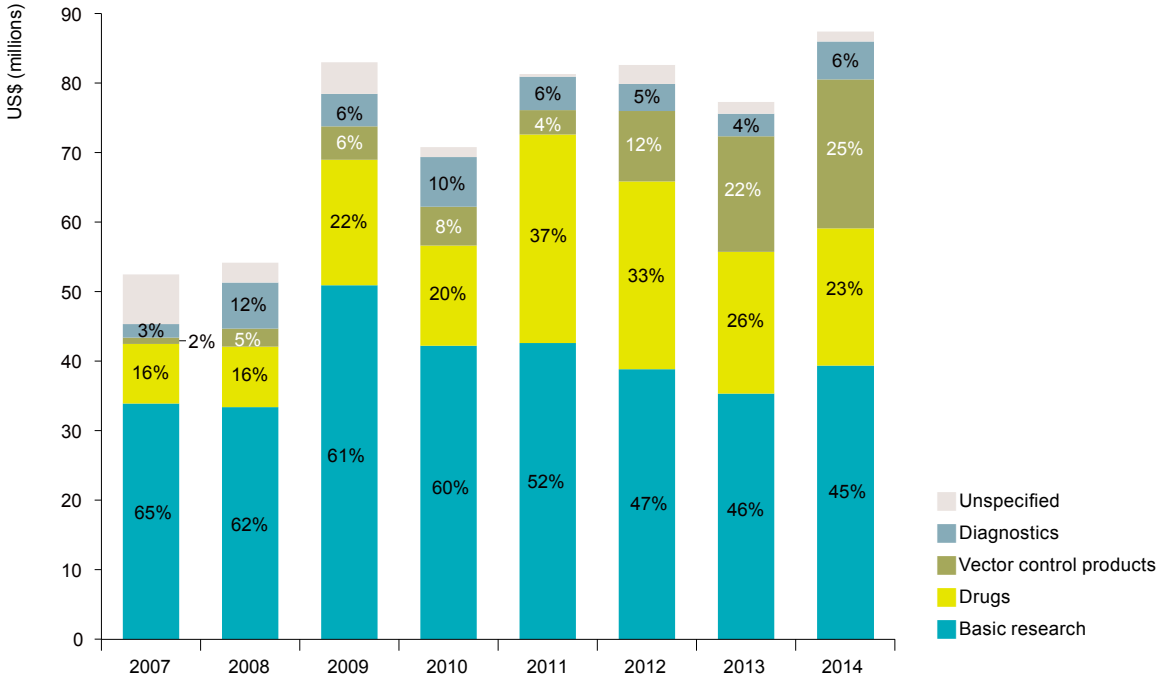
- Basic research
- Drugs
- Diagnostics
- Vector control products

Funding for eligible dengue R&D in 2014 was $87m. YOY funding increased to $86m (up $12m, 16%). Irregular survey participants provided the remaining $1.1m.

Basic research accounted for nearly half of total funding ($39m, 45%), followed by vector control products ($21m, 25%) and drug development ($20m, 23%). Another $5.4m (6.2%) went to diagnostics.

YOY funding for dengue basic research increased in 2014 (up $5.8m, 17%) after a period of declining funding, with the increase a result of additional investment from the US NIH. Funding grew for vector control products (up $4.4m, 27%) and diagnostics (up $2.4m, 80%), but declined marginally for drugs (down $0.6m, -2.9%).

Figure 14. Dengue R&D funding by product type 2007-2014



In 2014, the top 12 funders accounted for almost all (98%) of total dengue R&D investment, with the US NIH and the Gates Foundation accounting for two-thirds (67%) of global funding. The majority of top 12 funders increased their investment, most noticeably the US NIH (up $4.9m, 14%), the Wellcome Trust (up $3.1m, 77%), the Gates Foundation (up $1.8m, 11%) and the Australian National Health and Medical Research Council (NHMRC, up $1.6m, 88%). Funding from the few organisations that cut funding did so by less than $0.5m each.

Table 14. Top dengue R&D funders 2014

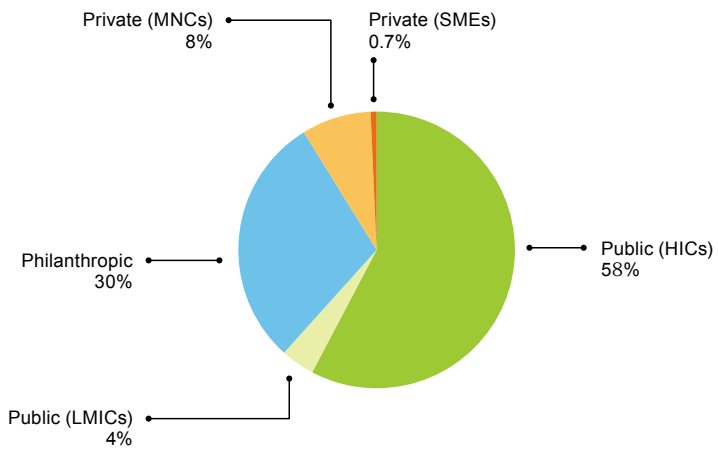
Funder	US$ (millions) 2007	2008	2009	2010	2011	2012	2013	2014	2014 % of total	2007-2014 trend
US NIH	29	24	44	41	48	43	35	40	45	
Gates Foundation	1.2	2.1	1.7	1.1	0.1	5.3	17	19	21	
Aggregate industry	7.2	3.6	5.4	7.4	11	8.5	7.4	7.7	8.8	
Wellcome Trust	1.1	1.2	1.7	2.4	7.1	5.7	4.0	7.2	8.2	
Australian NHMRC	0.8	1.3	1.3	1.6	2.2	3.3	1.8	3.5	3.9	
European Commission	2.2	1.9	1.2	0.5	0.5	2.1	2.9	2.8	3.2	
Institut Pasteur	4.3	2.6	2.4	3.5	2.8	2.1	2.2	2.2	2.5	
Indian ICMR		0.6	1.0	1.4	1.3	1.2	1.8	1.6	1.9	
UK MRC	0.2	0.3	0.2	0.1	0.8	0.5	0.5	0.9	1.0	
US CDC	-	-	1.2	1.1	-	1.2	0.5	0.7	0.8	
French ANR		-	0.4	1.0	1.3	0.2	1.0	0.6	0.7	
Indian DBT		0.1	0.5	0.5	0.1	0.2	0.1	0.6	0.7	
Subtotal of top 12^	52	51	75	66	78	79	75	86	98	
Disease total	52	54	83	71	81	83	77	87	100	

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014
- 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

Nearly two-thirds of all dengue R&D funding came from the public sector ($54m, 62%), the vast majority of which came from HICs ($50m). The philanthropic sector invested $26m (30%) and industry $7.7m (8.8%), almost all of which came from MNCs ($7.1m).

Public (up $6.6m, 14%) and philanthropic (up $5.0m, 24%) funding both increased, but industry investment remained stable (up $0.1m, 1.0%).

Figure 15. Dengue R&D funding by sector 2014



BACTERIAL PNEUMONIA & MENINGITIS

Pneumonia is a lung infection transmitted by the cough or sneeze of infected patients. It presents with coughing, 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.

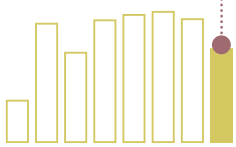
Bacterial meningitis is an infection of the fluid that surrounds the brain and spinal cord and is most commonly caused by *S. pneumoniae* and *Neisseria meningitidis*. Meningitis is transmitted from person to person through droplets of respiratory or throat secretions. Symptoms include severe headache, 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 the onset of symptoms.

Bacterial pneumonia & meningitis were responsible for 45 million DALYs and 754,074 deaths in the developing world in 2013, and ranked as the fifth highest cause of morbidity and mortality from neglected diseases.

The MenAfriVac™ vaccine protects against serogroup A meningococci, which historically accounted for the majority of epidemic and endemic disease in the meningitis belt of Africa. Its introduction via mass vaccination campaigns broke the cycle of epidemics in this region[60] and an infant version was WHO prequalified in early 2015.[61] However, vaccines are still needed for other meningitis serotypes, with only one polyvalent meningococcal conjugate vaccine currently in early development.

Traditional polysaccharide pneumococcal vaccines are unsuitable for DC use.[62] The conjugate pneumococcal vaccines PCV10 and PCV13 are effective against the strains included,[62] but expensive. New vaccines are therefore needed that are more affordable and that can provide either focused protection for children against strains prevalent in DCs or broad protection across all pneumococcal strains.[63] Pneumococcal protein vaccines (PPVs) are less expensive to manufacture and several of these new types of vaccines are in Phase II clinical trials.[64]

$80.8
MILLION



TOTAL SPEND ON BACTERIAL PNEUMONIA & MENINGITIS R&D IN 2014

OF GLOBAL R&D FUNDING

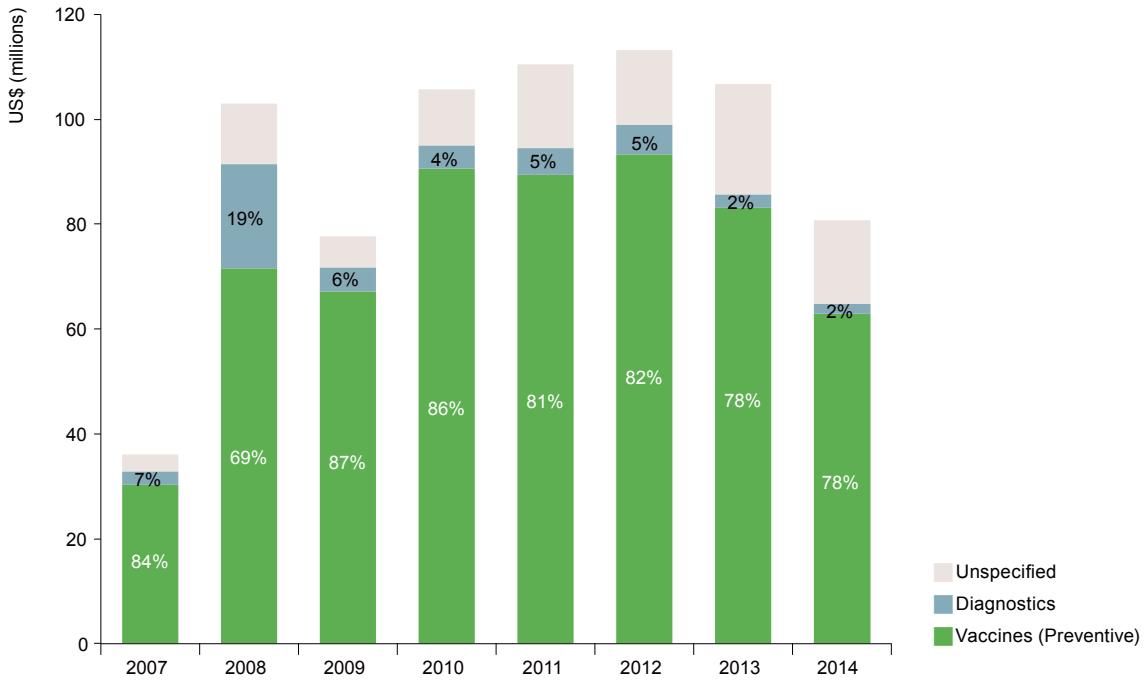
New products needed for pneumonia & meningitis are:

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

Bacterial pneumonia & meningitis received $81m in R&D funding in 2014. This was a significant decrease on 2013 investment, with YOY funding down $15m (-20%) to $60m. Irregular survey participants provided the remaining $21m.

The only bacterial pneumonia & meningitis investments tracked by G-FINDER are for vaccines and diagnostics. As in 2013, vaccines received over three-quarters ($63m, 78%) of funding, with most of this going towards pneumococcal vaccines ($50m, 80%). There was minimal investment in diagnostics ($2.0m, 2.0%). Continuing the trend of the two previous years, YOY funding fell for both product areas, with vaccines down by $9.1m (-17%) and diagnostics by $0.5m (-22%).

Figure 16. Bacterial pneumonia & meningitis R&D funding by product type 2007-2014



As in previous years, funding for bacterial pneumonia & meningitis was highly concentrated, and the top three funders – industry, Inserm and the Gates Foundation – provided the bulk of funding ($68m, 85%).

The large overall drop in bacterial pneumonia & meningitis investment came from only a handful of top funders, most notably the Gates Foundation (down $9.0m, -63%), the US NIH (down $4.2m, -66%) and Inserm (down $3.7m, -24%, after a considerable increase in 2013). There were no major funding increases, with the largest coming from industry (up $1.7m, 5.4%) and UK DFID (up $1.3m from a low base). It must be noted that the Global Alliance for Vaccines and Immunizations (GAVI) did not participate in this year's survey, but had substantial 2013 investments ($11m, not included in YOY analysis).

Table 15. Top bacterial pneumonia & meningitis R&D funders 2014

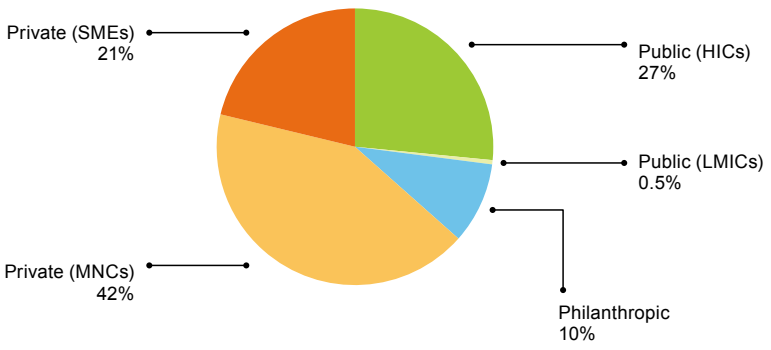
Funder	US$ (millions) 2007	2008	2009	2010	2011	2012	2013	2014	2014 % of total	2007-2014 trend
Aggregate industry	17	57	38	36	42	43	50	51	63	
Inserm	-	0.1	-	-	4.9	5.0	16	12	15	
Gates Foundation	6.4	30	24	45	38	43	14	5.3	6.6	
German DFG	-		0.6	0.7	-	0.4	2.9	3.1	3.9	
Wellcome Trust	0.2	0.2	0.1	0.3	0.8	3.8	2.2	2.2	2.7	
UK DFID	-	-	-	-	-	0.2	0.9	2.2	2.7	
US NIH	4.8	4.6	4.2	10	16	8.6	6.4	2.2	2.7	
European Commission	-	-	-	0.7	1.4	0.2	-	1.0	1.2	
UK MRC	1.8	2.1	2.2	1.1	0.7	0.3	0.7	0.6	0.7	
Undisclosed funder	-	0.5	0.4	0.4	0.1	0.2		0.4	0.5	
Institut Pasteur	0.4	0.3	0.3	0.4	0.9	0.6	0.3	0.3	0.4	
Swiss SNSF				-	-	-	0.2	0.2	0.3	
Subtotal of top 12^	36	102	76	103	110	112	106	81	99.8	
Disease total	36	103	78	106	110	113	107	81	100	

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014
- 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

Industry accounted for nearly two-thirds of bacterial pneumonia & meningitis funding ($51m, 63%), with MNCs providing the majority ($34m, 67%) and SMEs contributing $17m (33%). Public funders accounted for just over a quarter of funding ($22m, 27%), virtually all of which was provided by HICs ($21m, 98%). The philanthropic sector contributed $7.7m (10%), with almost the entire contribution coming from the Gates Foundation ($5.3m, 69%) and the Wellcome Trust ($2.2m, 29%).

There was less YOY investment from the philanthropic sector (down $9.0m, -54%), reflecting the Gates Foundation's funding drop, and the public sector (down $7.6m, -30%), while industry investment increased by $1.7m (up 5.4%).

Figure 17. Bacterial pneumonia & meningitis R&D funding by sector 2014



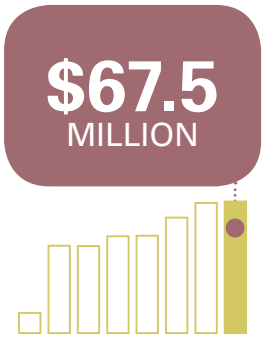
SALMONELLA INFECTIONS

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.

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 2013, salmonella infections were responsible for 16 million DALYs and 238,159 deaths.

Although data from endemic regions show that antimicrobial resistance in salmonella infections is common, increasingly rendering these conditions untreatable,[65] there are no new drugs in the pipeline. Rapid disease progression and the existing drugs' unsuitability for young children mean that vaccine development is an important priority in achieving disease control. 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 is becoming the main causative agent of enteric fever in Asia.[66] Similarly, no typhoid or NTS vaccine is readily available for HIV-infected individuals or children under two years of age.[67]

There are some bivalent vaccines in development, but the most advanced product is a conjugated typhoid vaccine (Vi-CRM 197) that completed Phase II trials in 2012.[68] Results from this trial, reported in 2014, found the candidate to be safe and immunogenic in populations of all ages.[69] Most NTS vaccines are in pre-clinical stages.



TOTAL SPEND ON SALMONELLA R&D IN 2014

OF GLOBAL R&D FUNDING

R&D needed for salmonella infections includes:

- Basic research
- Drugs
- Diagnostics
- Vaccines

A total of $68m was invested in R&D for salmonella infections in 2014. While this total was largely unchanged from the $67m reported in 2013, YOY funding in fact fell by $6.1m (-11%) to $52m. The remaining $16m was reported by irregular survey participants, with a sharp increase in typhoid vaccine investment reported by IDC SMEs.

As in 2013, typhoid and paratyphoid fever received nearly three-quarters of all funding ($48m, 71%); NTS received just $8.4m (12%). YOY funding fell for both typhoid and paratyphoid fever (down $4.5m, -11%) and NTS (down $0.9m, -13%).

Over 90% of salmonella R&D funding was for either basic research ($34m, 51%) or vaccine development ($27m, 41%), with only limited investment in diagnostics ($3.8m, 5.6%) and drugs ($2.0m, 2.9%). Vaccine development was particularly heavily focused on typhoid and paratyphoid fever ($24m, 87% of vaccine funding), with only minimal investment in NTS vaccines ($2.1m, 7.6% of vaccine funding).

The drop in YOY funding affected drug development (down $2.0m, -50%), basic research (down $2.0m, -6.2%) and vaccines (down $1.8m, -10%). Only funding for diagnostics (up <$0.1m, 1.3%) remained stable in 2014.

Table 16. Salmonella R&D funding 2014 (US$ millions)

Disease	Basic Research	Drugs	Vaccines (Preventive)	Diagnostics	Total	%
Typhoid and paratyphoid fever (*S. typhi, S. paratyphi A*)	20	1.3	24	2.5	**48**	71
Non-typhoidal *S. enterica* (NTS)	4.7	0.5	2.1	1.1	**8.4**	12
Multiple *Salmonella* infections	9.3	0.2	1.6	0.1	**11**	17
Total	34	2.0	27	3.8	68	100

As in 2013, the top 12 funders in 2014 provided essentially all funding (99%) for salmonella R&D, with the US NIH, industry and the Gates Foundation collectively providing over three-quarters of all funding ($52m, 78%).

Most funders invested less in 2014, with the most noticeable reductions coming from three of the top four funders: the Gates Foundation (down $2.7m, -29%), the US NIH (down $1.5m, -4.7%) and the Welcome Trust (down $1.1m, -20%). The increases which did occur were very small, and came from the Swiss National Science Foundation (SNSF, who invested $0.9m following zero investment in 2013), the German Research Foundation (DFG, up $0.7m, 48%) and the UK MRC (up $0.6m, 39%). The apparent increase from industry came from irregular survey participants (mainly IDC SMEs); YOY industry investment was largely unchanged (down $0.1m, -3.6%).

Table 17. Top salmonella R&D funders 2014

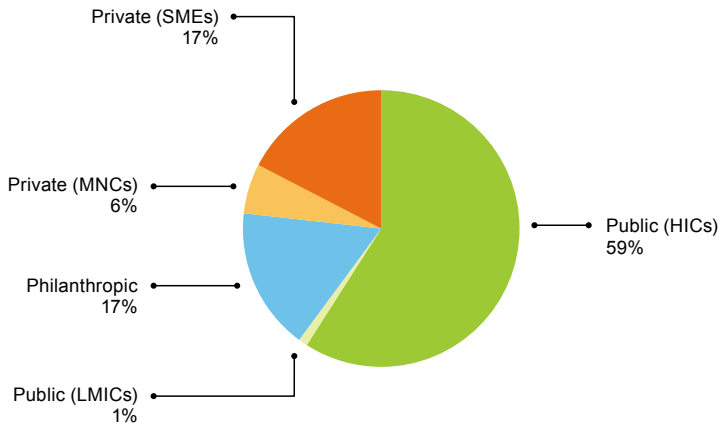
Funder	US$ (millions) 2007	2008	2009	2010	2011	2012	2013	2014	2014 % of total	2007-2014 trend
US NIH	9.3	23	29	31	25	34	31	30	44	
Aggregate industry	-	14	3.9	3.3	5.1	4.4	10	16	23	
Gates Foundation	-	-	1.9	3.7	4.3	5.3	9.5	6.8	10	
Wellcome Trust	-	1.1	2.1	3.0	5.2	6.0	5.6	4.4	6.6	
Institut Pasteur	-	1.6	1.8	1.7	2.7	1.6	1.9	2.2	3.3	
UK MRC	1.0	1.3	0.9	0.8	1.7	1.4	1.6	2.2	3.3	
German DFG	-		0.6	1.4	1.4	1.0	1.5	2.2	3.3	
Swiss SNSF				-	0.8	0.7	-	0.9	1.3	
Australian NHMRC	-	0.6	0.6	0.6	0.2	0.3	0.5	0.8	1.2	
Chilean FONDECYT				0.1	0.8	0.7	0.7	0.7	1.0	
Swedish Research Council		0.5	0.4	0.5	0.6	0.6	0.6	0.5	0.8	
Indian ICMR		-	-	0.1	0.3	0.1	0.4	0.4	0.6	
Subtotal of top 12^	10	45	45	49	49	58	66	67	99	
Disease total	10	45	45	50	50	59	67	68	100	

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014
- 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

Most funding in 2014 came from the public sector ($41m, 60%), with 98% of this coming from HIC governments. Industry invested $16m (23%), with three-quarters of this coming from SMEs ($12m, 75%) rather than MNCs, who invested just $3.9m (25%). The philanthropic sector contributed the remaining $11m (17%).

With cuts from both the Gates Foundation and Wellcome Trust, philanthropic funding fell by $3.9m (-26%). Public sector funding was also lower (down $2.1m, -5.4%), whilst YOY industry investment was largely unchanged (down $0.1m, -3.6%).

Figure 18. Salmonella R&D funding by sector 2014



HEPATITIS C

Last year G-FINDER scope expanded to include DC-specific R&D for hepatitis C genotype 4. This year genotypes 5 and 6 were added to this category to capture further DC-relevant investments. The data reported here includes costs for R&D into either one of the specific genotypes as well as R&D costs of products targeted at all genotypes including genotypes 4, 5 and 6.

Hepatitis C is a blood-borne virus that causes inflammation of the liver. There are an estimated 26 million people infected with hepatitis C genotypes 4, 5 or 6 worldwide.[70] However, these genotypes are most prevalent in DCs, with genotype 4 accounting for more than 65% of infections in North Africa and the Middle East, genotype 5 accounting for almost 60% of infections in Southern Sub-Saharan Africa and genotype 6 accounting for over 16% of infections in East Asia.[70] Due to their low prevalence in the US and Europe they are significantly under-researched compared with other hepatitis C genotypes, and diagnostic, treatment and prevention tools are far less developed.

Hepatitis C can be successfully and safely treated with a pan-genotypic regimen of sofosbuvir/daclatasvir, including in hepatitis C/HIV co-infection.[24] However, the high cost of these drugs severely limits DC access. There are a number of new treatments in development that are either pan-genotypic or focused on genotypes prevalent in the West. Some of these have also shown efficacy in DC-relevant genotypes. 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.[71] A Phase III study showed efficacy of a grazoprevir/albasvir FDC in genotypes 1, 4 and 6.[72] A Phase II trial of ombitasvir/paritaprevir/ritonavir showed a high virological response in patients infected with hepatitis C genotype 4.[73] 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, 5 or 6 burdens challenging. Diagnostics specific to hepatitis C genotype 4 are needed.

There is no vaccine for hepatitis C and most vaccine R&D is focused on genotypes prevalent in the West. However, there are some pan-genotypic early-stage candidates, such as the Burnet Institute's Delta3 candidate.[74]

$39.6 MILLION

TOTAL SPEND ON HEPATITIS GENOTYPES 4, 5 & 6 R&D IN 2014

OF GLOBAL R&D FUNDING

R&D needed for hepatitis C genotypes 4,5 & 6 includes:

- Drugs
- Diagnostics
- Preventive vaccines

A total of $40m was invested in DC-specific R&D for hepatitis C in 2014, a drop of $3.6m (-8.5%) compared to the preceding year.

As in 2013, the majority of this investment ($33m, 83%) was for drug development, with only minimal funding reported for R&D of DC-relevant diagnostics ($3.6m, 9.2%) and vaccines ($2.9m, 7.4%). YOY funding fell for both drugs (down $3.3m, -9.2%) and vaccines (down $1.5m, -37%), but new investment from the EC resulted in a slight increase for diagnostics (up $2.1m from a low base).

Table 18. Hepatitis C (genotypes 4, 5 & 6) R&D funding by product type 2013-2014

Product	US$ (millions)		2014 % of total
	2013	2014	
Drugs	40	33	83
Diagnostics	1.2	3.6	9.2
Vaccines (Preventive)	4.3	2.9	7.4
Unspecified	1.0	-	-
Total	47	40	100

- No reported funding

Table 19. Top hepatitis C (genotypes 4, 5 & 6) R&D funders 2014

Funder	US$ (millions)		2014 % of total
	2013	2014	
Aggregate industry	27	26	64
US NIH	10	6.5	16
European Commission	0.7	3.4	8.5
French ANRS	2.2	2.8	7.1
UK MRC	0.5	0.5	1.2
Australian ACH[2]	0.1	0.2	0.6
Undisclosed funder		0.2	0.6
Australian NHMRC	0.3	0.2	0.5
Burnet Institute	0.1	0.1	0.2
Wellcome Trust	0.1	0.1	0.2
Indian DBT	1.1	<0.1	0.1
CASS Foundation	<0.1	<0.1	0.1
Subtotal of top 12^	47	40	100
Total	47	40	100

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014

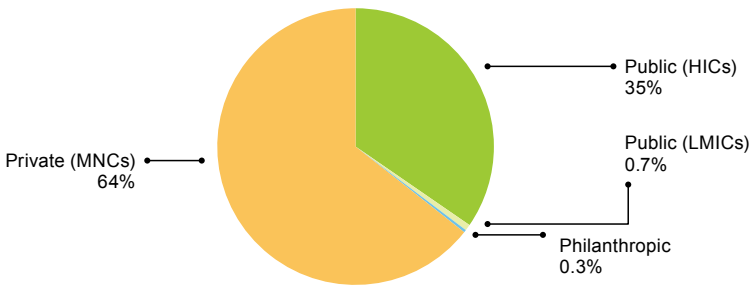
Funding organisation did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete

Funding was down from most of the top 12 funders in 2014, with the most significant reductions coming from the US NIH (down $3.8m, -37%), industry (down $1.9m, -7.0%) and the Indian Department of Biotechnology (DBT, down $1.1m, -97%). The EC was the only funder to noticeably increase their investment (up $2.7m from a low base), as a result of a new project to develop a POC diagnostic for hepatitis C. Cairo University did not participate in this year's survey, after reporting a significant investment ($4.1m) in 2013.

Just under two-thirds of all investment in DC-relevant hepatitis C R&D came from MNCs ($25m, 64%). The public sector contributed the remaining third ($14m, 35%), of which almost all came from HICs (98%).There was a minimal contribution from the philanthropic sector ($0.1m, 0.3%).

MNCs (down $1.9m, -7.0%) and the public sector (down $1.7m, -11%) were equally responsible for the decline in YOY funding, while the negligible investment of the philanthropic sector remained essentially unchanged.

Figure 19. Hepatitis C (genotypes 4, 5 & 6) R&D funding by sector 2014



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, trachoma, cryptococcal meningitis, Buruli ulcer, leptospirosis and rheumatic fever.

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 undertaken 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 20. R&D needs for the most neglected diseases

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

'R' denotes a 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 39,602 DALYs in 2013. 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.[75]

The current MDT regimen for leprosy has been standard treatment for 30 years and, although highly effective, it requires 6-24 months of treatment.[76] 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.[77,78]

Bedaquiline, an antibiotic approved for the treatment of MDR-TB, has been found effective in the treatment of leprosy in mice[79] and may hold some promise, and the Infectious Disease Research Institute (IDRI) is currently developing rapid diagnostic tests and a defined subunit vaccine.[80]

$10.5 MILLION

TOTAL SPEND ON LEPROSY R&D IN 2014

Funding for leprosy R&D in 2014 was $11m. Essentially all of this funding was for basic research, which received $10m (98%). Just $0.3m (2.4%) was allocated to product development, with diagnostics receiving $0.2m and drugs $0.1m.

Table 21. Leprosy R&D funding by product type 2007-2014

Product	US$ (millions)								2014 % of total
	2007	2008	2009	2010	2011	2012	2013	2014	
Basic research	5.1	6.6	7.4	5.2	7.2	10	12	10	98
Diagnostics	0.7	0.6	1.5	1.4	1.2	1.4	0.7	0.2	1.9
Drugs	<0.1	0.9	1.1	1.1	0.3	0.5	0.2	0.1	0.5
Unspecified	0.8	3.4	2.5	2.8	-	2.8	0.1	<0.1	<0.1
Total	6.5	11	12	11	8.8	15	13	11	100

- No reported funding

The majority of leprosy R&D funding came from the public sector ($9.3m, 88%), essentially reflecting the fact that two public sector funders (the US NIH and the Indian ICMR) were responsible for 85% of total leprosy R&D funding ($9.0m). The philanthropic sector provided $1.2m (11%), with industry investment almost non-existent ($0.1m, 0.8%, all from MNCs).

Table 22. Top leprosy R&D funders 2014

Funder \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2014	2014 % of total
US NIH	2.3	3.6	5.8	3.7	4.4	10	5.9	5.6	53
Indian ICMR		3.3	2.0	2.9	2.3	0.8	3.4	3.4	33
TLMI				0.3	0.4	0.4	0.6	0.6	5.8
NLR			0.1	0.7	0.4	0.4	0.3	0.2	1.9
FRF				0.2	0.2	0.2	0.2	0.1	1.3
DAHW			<0.1	0.1	0.1	0.1	0.1	0.1	1.0
Institut Pasteur	0.1	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.9
Aggregate industry	-	-	-	0.1	0.1	-	0.1	0.1	0.8
European Commission	-	-	-	<0.1	<0.1	-	<0.1	0.1	0.6
Brazilian DECIT	1.8	2.7	2.2	-	0.1	1.4	0.2	0.1	0.6
DFB							0.1	0.1	0.5
Wellcome Trust	-	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	0.3
Subtotal of top 12^	6.5	11	12	10	8.8	15	13	10	99
Disease total	6.5	11	12	11	8.8	15	13	11	100

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014
- 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. It is the leading infectious cause of blindness in the world.[81]

Trachoma is endemic in 51 countries with an estimated 1.8 million people visually impaired or blind from the disease (of whom 0.5 million are irreversibly blind).[81] Trachoma was responsible for 171,169 DALYs in 2013, making it the twelfth highest cause of morbidity from neglected diseases. Although debilitating, trachoma is not a fatal disease.

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). There are several *Chlamydia trachomatis* vaccines in development; however all of these are in pre-clinical/discovery stages.

Clinical diagnosis of trachoma is not always reliable, but current diagnostic tests are not a viable alternative due to their cost and complexity.[82] Recent studies showed that an antibody-based multiplex assay could be used to diagnose trachoma in low prevalence settings.[82]

$6.8 MILLION

TOTAL SPEND ON TRACHOMA R&D IN 2014

Funding for trachoma R&D was $6.8m in 2014. We note that the only trachoma investments tracked by G-FINDER are for vaccine and diagnostic R&D; vaccines received over two-thirds ($4.7m, 69%) of total funding, and diagnostics over a quarter ($2.0m, 29%).

Table 23. Trachoma R&D funding by product type 2007-2014

Product	US$ (millions)								2014 % of total
	2007	2008	2009	2010	2011	2012	2013	2014	
Vaccines (Preventive)	-	1.1	1.5	2.1	4.2	4.7	3.0	4.7	69
Diagnostics	1.0	0.1	0.4	3.1	6.8	4.7	2.6	2.0	29
Unspecified	0.8	1.1	0.1	-	-	0.5	0.6	0.2	2.5
Total	1.7	2.4	2.0	5.2	11	9.9	6.1	6.8	100

- No reported funding

Only four organisations funded trachoma R&D in 2014, with the US NIH accounting for almost all funding ($6.3m, 92%). Small grants from the Institut Pasteur and US CDC brought the total public sector contribution up to $6.5m (95% of total funding), with philanthropic funding coming from the Wellcome Trust ($0.3m, 4.6%). There was no industry investment for trachoma R&D in 2014.

Table 24. Trachoma R&D funders 2014

Funder \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2014	2014 % of total
US NIH	-	1.2	1.9	3.0	6.3	9.3	5.2	6.3	92
Wellcome Trust	1.5	-	-	-	-	0.6	0.5	0.3	4.6
Institut Pasteur	-	<0.1	-	<0.1	<0.1	-	0.1	0.1	2.0
US CDC	-	-	-	-	-	-	-	0.1	1.6
Brazilian DECIT	-	0.2	-	-	-	-	-	-	-
SSI	-	0.8	-	-	-	-	-	-	-
German DFG	-		-	-	-	-	0.2	-	-
TI Pharma					0.2				
Swedish Research Council		<0.1	0.1	-	-	-	-	-	-
Aggregate industry	0.1	0.1	-	2.2	4.5	-	-	-	-
Disease total	1.7	2.4	2.0	5.2	11	9.9	6.1	6.8	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.[83]

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.[84]

A new long-acting azole-like compound (VT-1129) is currently being developed and received orphan drug status from the US FDA in 2014.[85] Furthermore, several oral formulations of AmB are in early stages of development.[86]

$5.8 MILLION

TOTAL SPEND ON CRYPTOCOCCAL MENINGITIS R&D IN 2014

Table 25. Cryptococcal meningitis R&D funders 2014

Funder	US$ (millions)		2014 % of total
	2013	2014	
US NIH	1.4	4.1	71
UK MRC	1.6	1.5	25
Australian NHMRC	0.1	0.2	2.9
Fondation Mérieux	<0.1	<0.1	0.4
Wellcome Trust	0.3	<0.1	0.4
Disease total	3.4	5.8	100

A total of $5.8m was invested in cryptococcal meningitis R&D in 2014. We note that the only cryptococcal meningitis investments tracked by G-FINDER are for drug R&D.

Once again, just five organisations reported providing funding for cryptococcal meningitis R&D in 2014. Three public HIC funders (the US NIH, the UK MRC and the Australian NHMRC) accounted for 99% ($5.7m) of total funding. The Wellcome Trust provided the small philanthropic sector contribution of less than $0.1m (0.4%). There was no industry investment for cryptococcal meningitis in 2014.

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. Although HIV infection is not a risk factor of Buruli ulcer, co-infection complicates the management of the patient[87] and may impact its severity.[88]

Buruli ulcer occurs in more than 33 countries, predominantly in Western Africa. No DALY figures are available, although the WHO estimates that 2,200 new cases were reported in 2014 by 12 of the 33 countries.[89]

Treatment options including antibiotics and surgery are effective if the disease is diagnosed early, however, current diagnostics are both costly and insufficiently sensitive.[90] 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. The BCG vaccine (designed for TB) provides short-term protection, but this is insufficient.

There are no new drugs in development for Buruli ulcer and the only vaccine in the pipeline is in pre-clinical stages (TMX 201[91]). FIND is developing several Buruli ulcer tests in collaboration with the WHO and other partners. These include an instrument-free POC test and tests to be used at a district hospital or microscopy level laboratory.[92]

$4.1 MILLION

TOTAL SPEND ON BURULI ULCER R&D IN 2014

Funding for Buruli ulcer R&D in 2014 was $4.1m. This was equally distributed between basic research and product development, which each received $1.6m (39%); the remaining $0.9m went to unspecified R&D. The vast majority of product development funding went to diagnostics ($1.4m, 87%), with the remainder going to drug development ($0.2m, 13%). There was no reported funding for vaccine R&D.

Table 26. Buruli ulcer R&D funding by product type 2007-2014

Product \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2014	2014 % of total
Basic research	1.0	1.6	1.1	1.4	0.9	1.9	4.0	1.6	39
Diagnostics	<0.1	0.1	0.3	0.8	0.3	1.1	0.8	1.4	34
Drugs	-	0.2	0.3	0.8	0.7	0.7	0.8	0.2	5.0
Vaccines (Preventive)	-	<0.1	0.2	2.4	2.2	2.2	0.9	-	-
Unspecified	1.7	0.3	0.1	0.8	2.4	1.0	0.8	0.9	22
Total	2.7	2.2	2.0	6.2	6.5	6.9	7.3	4.1	100

- No reported funding

As in 2013, eight funders invested in Buruli ulcer R&D in 2014. Other than the UBS Optimus Foundation, which provided close to two-thirds of total funding ($2.6m, 64%), no other funder gave more than $0.5m. With many of these small contributions also coming from foundations, the philanthropic sector was the source of the majority of Buruli ulcer R&D funding in 2014 ($3.5m, 84%). The public sector provided the remaining $0.7m (16%), and there was no industry investment in Buruli ulcer R&D in 2014.

Table 27. Buruli ulcer R&D funders 2014

Funder / US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2014	2014 % of total
UBS Optimus Foundation		0.2	0.1	1.2	2.2	2.4	1.8	2.6	64
Institut Pasteur	0.7	0.3	0.4	0.5	0.3	0.5	0.4	0.5	12
Wellcome Trust	-	<0.1	<0.1	<0.1	0.3	0.3	0.3	0.3	6.3
Medicor Foundation				0.4	0.1	0.2	0.2	0.2	5.2
FRF				-	-	0.2	0.2	0.2	4.5
UK MRC	-	-	-	-	-	-	0.2	0.2	4.2
ALM	-	-	-	-	-	<0.1	0.2	0.2	3.6
Volkswagen-Stiftung					0.1	<0.1	<0.1	<0.1	0.8
Australian NHMRC	0.3	0.1	0.2	0.2	0.1	0.1	-	-	-
Belgian FWO		0.1	0.1	0.1	0.1	-	-		
Aggregate industry	<0.1	0.3	-	-	-	-	-	-	-
French ANR		-	-	-	-	0.2	-	-	-
Disease total	2.7	2.2	2.0	6.2	6.5	6.9	7.3	4.1	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.[93] Experts estimate that approximately 1 million people contract leptospirosis annually, resulting in nearly 60,000 deaths per year.[94]

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.

A promising rapid POC test using chromatographic immunoassay technology is currently in development, with early studies demonstrating an overall sensitivity of 85% and specificity of 90%.[95]

$1.4 MILLION

TOTAL SPEND ON LEPTOSPIROSIS R&D IN 2014

Table 28. Leptospirosis R&D funders 2014

Funder	US$ (millions)		2014 % of total
	2013	2014	
Institut Pasteur	0.4	1.0	71
US NIH	-	0.3	21
Colombian Colciencias		0.1	8.2
ALRA	<0.1	-	-
Disease total	0.4	1.4	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

There was $1.4m in reported funding for DC-specific leptospirosis R&D in 2014. We note that the only leptospirosis investments tracked by G-FINDER are for diagnostics.

Only three organisations funded leptospirosis R&D in 2014, all of them from the public sector. The Institut Pasteur provided close to three-quarters of total funding ($1.0m, 71%).

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 9.0 million DALYs and 244,080 deaths in 2013. It was the seventh highest cause of mortality and ninth 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 therefore the development of a vaccine.

Several vaccines are being developed, the most advanced being a Group A *streptococcus* vaccine in Phase I.[96]

$1.4
MILLION

TOTAL SPEND ON RHEUMATIC FEVER R&D IN 2014

Just $1.4m was invested in rheumatic fever R&D in 2014. We note that the only rheumatic fever product area tracked by G-FINDER is preventive vaccine development.

Table 29. Rheumatic fever R&D funding by product type 2007-2014

Product / US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2014	2014 % of total
Vaccines (Preventive)	1.7	2.3	3.3	2.1	0.8	0.9	0.9	1.3	93
Unspecified	0.3	0.3	0.2	-	0.1	0.1	-	0.1	6.6
Total	2.0	2.6	3.5	2.1	1.0	1.0	0.9	1.4	100

- No reported funding

There were three funders of rheumatic fever R&D in 2014. The two public sector funders – the Australian NHMRC ($0.7m, 53%) and the US NIH ($0.5m, 37%) – provided 90% of total funding, and industry the remaining $0.1m (10%).

Table 30. Rheumatic fever R&D funders 2014

Funder	US$ (millions)								2014 % of total
	2007	2008	2009	2010	2011	2012	2013	2014	
Australian NHMRC	0.5	0.4	0.7	0.9	0.4	0.4	0.3	0.7	53
US NIH	1.5	0.7	0.9	0.9	0.4	0.5	0.6	0.5	37
Aggregate industry	-	1.1	1.7	-	-	-	-	0.1	10
Australia - India SRF				0.1					
Australian DIIS		0.1	-	-	-	-	-	-	-
Australian NHF		0.1	0.1	0.2					
Fondazione Cariplo		-	0.1	-					
Swedish Research Council		0.1	0.1	-	0.1	0.1	-	-	-
Disease total	2.0	2.6	3.5	2.1	1.0	1.0	0.9	1.4	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

Table 31. Disease and product R&D funding 2014 (US$ millions)

Disease or R&D area	Basic research	Drugs	Vaccines (Preventive)	Vaccines (Therapeutic)	Microbicides	Vector control products	Diagnostics	Unspecified	Total
HIV/AIDS	179.46	37.01	651.55		165.41		20.58	25.59	1,079.61
Malaria	163.61	214.43	173.20			17.97	19.21	21.72	610.14
P. falciparum	89.08	85.89	149.97			7.81	4.81	5.84	343.41
P. vivax	11.79	63.95	5.62			0.31	6.59	0.42	88.69
Other and/or unspecified malaria strains	62.75	64.59	17.60			9.85	7.80	15.46	178.04
Tuberculosis	143.38	243.00	111.68	0.47		-	63.71	26.49	588.73
Diarrhoeal diseases	38.32	6.39	107.78				9.18	18.50	180.17
Rotavirus			55.05					1.15	56.20
Cholera	21.03	0.58	3.67				0.44	3.47	29.19
Shigella	8.40	-	10.70				0.86	2.08	22.04
Enterotoxigenic *E.coli* (ETEC)			9.37				0.07	-	9.44
Cryptosporidium	2.31	3.32	1.29				0.43	-	7.36
Giardia							0.29	0.25	0.54
Enteroaggregative *E.coli* (EAggEC)			0.34				-	0.06	0.40
Multiple diarrhoeal diseases	6.57	2.49	27.35				7.10	11.49	55.00
Ebola	18.48	70.47	69.22				6.38	-	164.55
Kinetoplastids	56.76	74.54	5.70	1.78		-	8.92	1.24	148.94
Sleeping sickness	21.60	24.21	-			-	2.65	-	48.46
Leishmaniasis	22.89	15.28	5.06	1.55			1.10	1.04	46.92
Chagas' disease	8.32	11.65	0.64	0.23		-	1.36	0.20	22.41
Multiple kinetoplastids	3.95	23.40	-	-		-	3.80	-	31.15
Helminths (worms & flukes)	35.13	33.08	20.06			0.20	3.50	5.35	97.32
Schistosomiasis (bilharziasis)	10.62	3.28	7.72			-	2.93	3.62	28.18
Lymphatic filariasis (elephantiasis)	5.30	14.08				0.01	0.22	1.40	21.02
Onchocerciasis (river blindness)	1.15	8.28	0.03			0.01	0.06	-	9.53
Hookworm (ancylostomiasis & necatoriasis)	1.08	0.68	5.14					0.06	6.95
Strongyloidiasis & other intestinal roundworms	2.95	0.11	<0.01				0.24	0.20	3.50
Tapeworm (cysticercosis/taeniasis)	1.59	0.68				0.17		-	2.44
Whipworm (trichuriasis)	1.14	0.17						0.05	1.36
Roundworm (ascariasis)	0.02	0.02						0.02	0.06
Multiple helminths	11.29	5.78	7.17			-	0.04	<0.01	24.28
Dengue	39.33	19.77				21.46	5.44	1.38	87.38
Bacterial pneumonia & meningitis			62.90				1.97	15.95	80.82
S. pneumoniae			50.24				0.45	2.88	53.57
N. meningitidis			12.66				0.33	0.93	13.92
Both bacteria							1.19	12.14	13.33
Salmonella infections	34.30	1.97	27.49				3.77	-	67.52
Typhoid and paratyphoid fever (*S. typhi, S. paratyphi A*)	20.28	1.34	23.82				2.51	-	47.96
Non-typhoidal *S. enterica* (NTS)	4.69	0.48	2.08				1.12	-	8.36
Multiple *Salmonella* infections	9.32	0.15	1.59				0.14	-	11.20

Disease or R&D area	Basic research	Drugs	Vaccines (Preventive)	Vaccines (Therapeutic)	Microbicides	Vector control products	Diagnostics	Unspecified	Total
Hepatitis C (genotypes 4, 5 & 6)		33.04	2.95				3.63	-	**39.62**
Leprosy	10.28	0.05					0.20	<0.01	**10.53**
Trachoma			4.70				1.97	0.17	**6.84**
Cryptococcal meningitis		5.80							**5.80**
Buruli ulcer	1.61	0.21	-				1.43	0.89	**4.14**
Leptospirosis							1.45		**1.45**
Rheumatic fever			1.33					0.09	**1.42**
Core funding of a multi-disease R&D organisation									**104.25**
Unspecified disease									**74.40**
Platform technologies	General diagnostic platforms			Adjuvants and immunomodulators			Delivery technologies and devices		
	10.17			8.40			4.42		**22.99**
Total R&D funding									**3,376.62**

- No reported funding

Category not included in G-FINDER

NEGLECTED DISEASE FUNDERS

FUNDER OVERVIEW

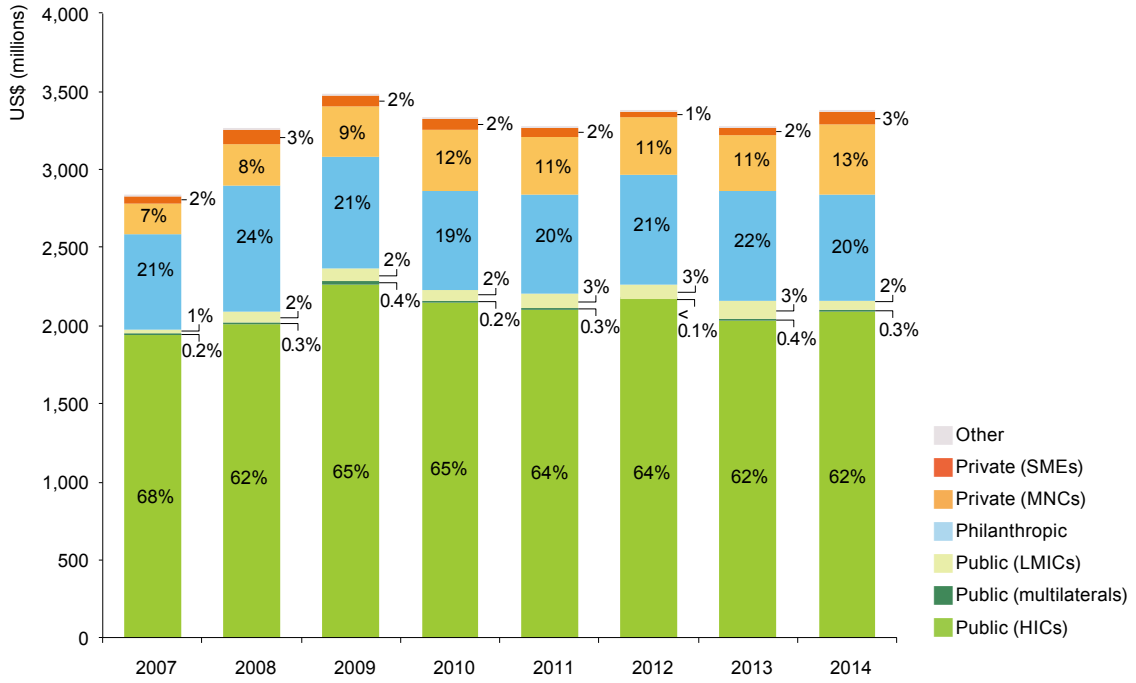
The public sector once again provided almost two-thirds of neglected disease R&D funding ($2,165m, 64%), with the vast majority of this coming from HIC governments and multilaterals ($2,101m, 97%). The philanthropic sector provided 20% ($678m), and industry the remaining 16% ($534m). Not only did this represent a marked increase in industry funding share (from 12% in 2013) and a drop in public sector funding share (from 66% in 2013), but also the highest ever industry share and equal lowest public sector share in the history of the G-FINDER survey.

The YOY total funding increase of $150m (4.9%) was driven entirely by industry and HIC public funders. Public funding increased by $55m (2.7%), due to an increase of $72m (up 3.7%) from HICs, mainly due to new Ebola funding. When Ebola funding is excluded, public funding actually decreased by $62m (-3.1%).

Industry funding increased significantly, up $98m (28%) due to MNC investment in malaria, Ebola and HIV/AIDS. Most of this increase was from malaria and HIV/AIDS: with Ebola excluded, industry investment still grew by $64m (up 18%).

Philanthropic funding was essentially unchanged at $678m (down $3.2m, -0.5%).

Figure 20. Total R&D funding by sector 2007-2014



PUBLIC FUNDERS

As has been the case in each of the past seven years, the top three public funders in 2014 were the US, the UK and the EC. Once again, the US contributed over two-thirds of global public funding (71%, up from 68% in 2013). And once again, the US contribution of $1,529m was more than 11 times larger than that of the next biggest public funder (the UK, with $135m).

YOY public funding for neglected disease R&D increased by $55m in 2014 (up 2.7%), entirely driven by new investment in Ebola. Ebola received a total of $118m from public funders, with the vast majority of this ($101m, 86%) coming from the US.

Significant new public investment in Ebola hid a more concerning trend: with Ebola excluded, YOY public funding for neglected disease R&D actually fell by $62m (-3.1%), further compounding the larger US sequester-related cuts seen in 2013.

US Government funding increased by $71m (4.9%), mainly due to new Ebola funding ($101m). Without Ebola, US Government funding actually dropped by $29m (-2.0%), driven by the US NIH (down $37m, -2.9%) and USAID (down $4.7m, -5.8%). On the other hand, US CDC more than doubled its funding (up $12m from a relatively low base), despite not having any Ebola-related investment.

Australian public funding increased by $13m (47%), due to the first disbursements of a renewed PDP funding stream from the Department of Foreign Affairs and Trade (DFAT, $9.0m following zero investment in 2013) and a smaller increase from the Australian NHMRC (up $4.0m, 15%).

Funding from France dropped by $15m (-17%). Ebola funding from Inserm hid decreases in their other disease areas, and with Inserm's Ebola investment excluded, the French Government's R&D investment actually decreased by $24m (-28%).

Table 32. Top public R&D funders 2014

Country \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2014	2014 % of total
United States of America	1,408	1,429	1,649	1,570	1,536	1,637	1,461	1,529	71
United Kingdom	106	108	151	166	134	94	129	135	6.2
European Commission	133	144	131	101	118	104	123	126	5.8
France	17	32	53	44	67	60	88	73	3.4
Germany	13	4.1	38	41	36	61	50	54	2.5
Australia	24	33	29	33	41	52	27	40	1.9
India		39	26	40	44	44	52	40	1.8
Switzerland	8.1	5.1	9.2	16	16	18	19	20	0.9
Netherlands	37	30	32	20	27	17	26	20	0.9
Canada	22	26	19	10	10	19	21	17	0.8
Japan	4.6	7.5	6.3	9.6	3.3	2.5	12	11	0.5
Brazil	27	28	37	13	13	24	19	11	0.5
Subtotal of top 12^	1,859	1,943	2,221	2,082	2,067	2,149	2,027	2,077	96
Total public funding	1,979	2,095	2,361	2,233	2,200	2,267	2,158	2,165	100

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014

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

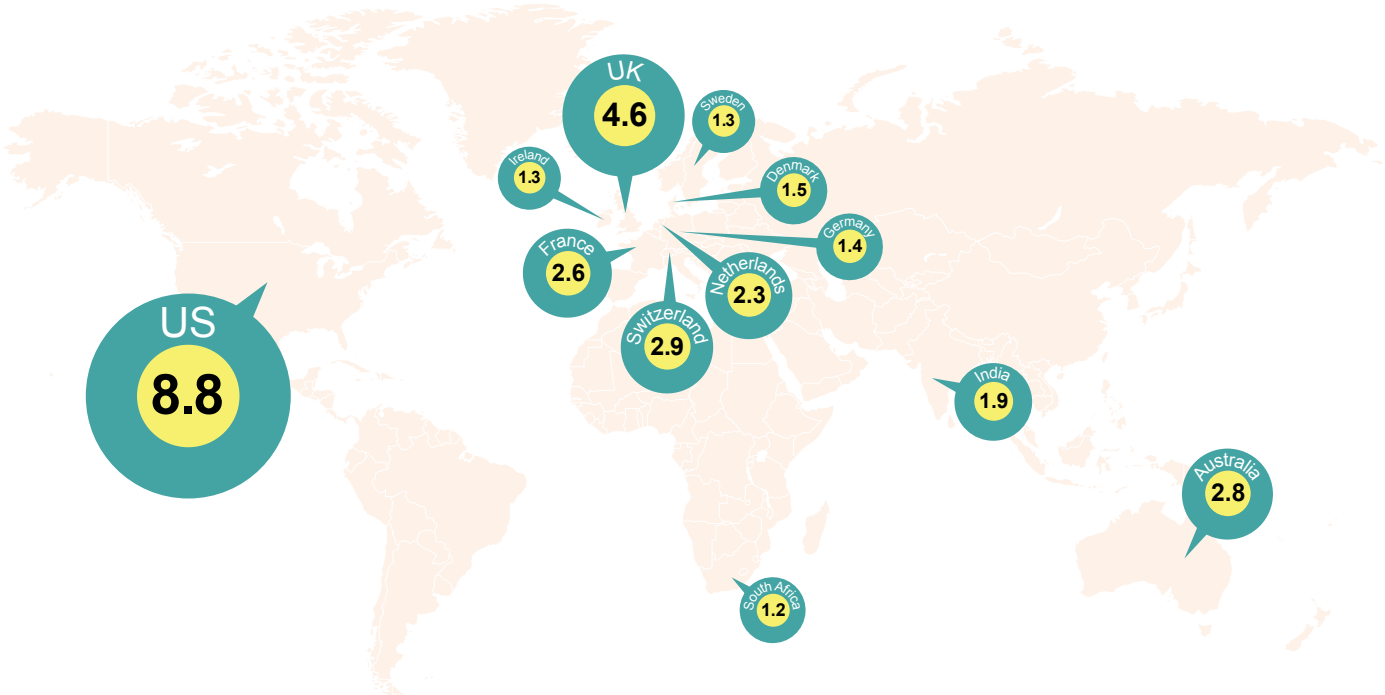
Overall IDC[i] public funding fell by $18m (-28%), primarily driven by a drop in Indian public funding (down $13m, -24%). This was the result of a substantial cut from the Indian DBT, which provided just $2.9m in 2014 (after consistently contributing over $10m in previous years).

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 proportion of GDP rather than absolute funding, a slightly different picture of public funding emerges. Four countries not ranked in the top 12 funders by absolute funding appear when ranked by contribution relative to GDP: Sweden, Denmark, South Africa and Ireland. In contrast, four countries ranked in the top 12 funders by absolute funding amount – Canada, Japan, the EC and Brazil – drop out of the list when GDP is factored in. However, the majority of countries remain in the top 12 funders using either metric, including the US, UK, France, Germany, Australia, India, Switzerland, and the Netherlands. Notably, Switzerland reported the third highest ratio of public funding to GDP in 2014, even though it ranks eighth by absolute funding amount.

Figure 21. Public R&D funding by GDP 2014^* (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 value of (US$ funding / GDP) * 100,000

[i] IDC increases or decreases refer to organisations that participated in both 2013 and 2014, as IDC survey participation is inconsistent from year to year

HIGH-INCOME COUNTRIES AND MULTILATERALS

HIC governments and multilaterals provided $2,101m in neglected disease R&D funding in 2014, accounting for 97% of total public funding. YOY funding increased by $70m (up 3.6%), but this was entirely a result of the $118m in funding for Ebola R&D – almost all of which was new funding. Outside of Ebola, funding for all other neglected disease R&D decreased by $47m (-2.4%), further extending the $147m US sequester-related cut of the preceding year.

As in previous years, the top three best-funded diseases (HIV/AIDS, malaria and TB) received almost three-quarters of all HIC public funding ($1,489m, 71%). The rapid influx of new investment in Ebola made it the fourth-best funded disease, receiving 5.6% of HIC public funding. The US Government provided the vast majority of this ($101m, 86%), primarily via the US NIH ($64m), with the remainder coming from the US HHS ($26m) and the US DTRA ($11m). This is the first reported funding for neglected disease R&D to come from either the US HHS – with these funds administered by the department's Biomedical Advanced Research and Development Authority (BARDA) – or the US DTRA.

In addition to new investment in Ebola, HIC and multilateral funding also increased for TB (up $27m, 10%) and dengue (up $6.3m, 14%), with both of these increases driven by the US NIH. The biggest reduction in funding was for HIV/AIDS (down $26m, -2.9%), followed by malaria (down $9.4m, -3.3%) and bacterial pneumonia & meningitis (down $7.6m, -30%). The remainder of the drop in HIC and multilateral public funding was for multiple-disease (unspecified) R&D (down $24m, -35%) and platform technologies (down $18m, -62%). Funding for diarrhoeal diseases, kinetoplastids and helminth infections remained fairly stable.

Table 33. Public (HIC and multilaterals) R&D funding by disease 2007-2014

Disease or R&D area	US$ (millions)								2014 % of total
	2007	2008	2009	2010	2011	2012	2013	2014	
HIV/AIDS	1,077	1,062	1,089	1,012	973	1,002	924	888	42
Tuberculosis	247	235	349	319	289	283	284	309	15
Malaria	244	264	299	323	300	295	298	293	14
Ebola								118	5.6
Diarrhoeal diseases	50	69	104	85	94	88	91	87	4.1
Kinetoplastids	51	90	107	108	99	96	78	84	4.0
Dengue	40	44	58	52	58	55	45	50	2.4
Helminths (worms & flukes)	42	37	54	52	50	61	53	47	2.3
Salmonella infections	10	30	37	38	34	41	41	40	1.9
Bacterial pneumonia & meningitis	11	11	14	18	29	17	29	21	1.0
Hepatitis C (genotypes 4, 5 & 6)							14	14	0.7
Trachoma	<0.1	2.0	2.0	3.0	6.3	9.3	5.6	6.5	0.3
Cryptococcal meningitis							3.0	5.7	0.3
Leprosy	4.0	4.1	7.0	3.9	4.5	11	6.0	5.7	0.3
Leptospirosis							0.4	1.3	0.1
Rheumatic fever	2.0	1.4	1.7	1.9	1.0	1.0	0.9	1.3	0.1
Buruli ulcer	2.5	1.7	1.7	4.2	3.8	3.8	4.5	0.7	<0.1
Platform technologies	3.4	6.2	7.8	11	12	27	29	11	0.5
General diagnostic platforms	1.3	2.2	2.1	5.8	9.3	7.7	9.0	6.3	0.3
Adjuvants and immunomodulators	<0.1	0.8	3.0	4.2	2.1	18	16	3.3	0.2
Delivery technologies and devices	2.1	3.1	2.7	1.3	0.5	0.4	4.0	1.7	0.1
Core funding of a multi-disease R&D organisation	106	96	73	77	95	74	74	70	3.3
Unspecified disease	55	65	77	47	67	106	70	48	2.3
Total public funding (HICs/multilaterals)	1,947	2,017	2,282	2,156	2,115	2,171	2,050	2,101	100

New disease added to G-FINDER in 2013 or 2014

LOW- AND MIDDLE-INCOME COUNTRIES

Public institutions in LMICs reported $63m in funding for neglected disease R&D in 2014, accounting for 2.9% of all public funding. This included $56m from YOY funders who participated in both 2013 and 2014, and $7.6m from irregular participants.[ii] Inconsistent survey participation by many LMIC organisations makes year to year comparison of funding difficult, but funding reported by YOY funders was down by $23m (-30%).[iii]

[ii] LMIC increases or decreases refer to organisations that participated in both 2013 and 2014, as LMIC survey participation is inconsistent from year to year

[iii] Figures for 2010-2013 LMIC investment are lower than reported in the previous report as Chile and Russia became HICs in FY2014. Chilean and Russian investment across all years is now included under the High-income countries and multilaterals section

In 2014, 87% of LMIC public investment came from three IDCs: India ($40m, 73%), Brazil ($11m, 20%) and South Africa ($4.3m, 7.8%).

YOY LMIC funding decreased substantially for TB, malaria and HIV/AIDS, usually the top three diseases (down $24m, -45%). Funding for TB halved (down $16m, -51%), although some of this reduction may be related to changed reporting between 2013 and 2014. Funding for HIV/AIDS fell by $6.0m (-55%) and for malaria by $2.3m (-20%).

As a result of these decreases, kinetoplastids moved into the top three diseases for the first time in four years (up $2.0m, 29%).

Inconsistent survey participation by LMIC public funders is the reason for the much larger apparent drops in overall HIV/AIDS and malaria funding, and other minor discrepancies.

There was no investment in Ebola R&D reported by LMIC public funders.

Table 34. Public (LMIC) R&D funding by disease 2010-2014

Disease or R&D area	US$ (millions)					2014 % of total
	2010	2011	2012	2013	2014	
Tuberculosis	12	18	17	35	15	24
Kinetoplastids	12	9.9	14	8.6	9.5	15
Malaria	10	13	22	22	9.2	15
HIV/AIDS	19	19	15	19	6.8	11
Diarrhoeal diseases	7.7	13	5.2	5.3	6.0	9.5
Leprosy	3.7	2.5	2.4	4.9	3.5	5.6
Dengue	6.7	4.8	7.8	3.6	3.5	5.5
Helminths (worms & flukes)	1.2	2.1	3.2	1.8	3.0	4.8
Salmonella infections	0.8	0.5	0.5	0.6	0.7	1.1
Bacterial pneumonia & meningitis	0.4	0.1	0.3	<0.1	0.4	0.6
Hepatitis C (genotypes 4, 5 & 6)				5.4	0.3	0.5
Leptospirosis				-	0.1	0.2
Platform technologies	3.5	0.5	4.6	0.6	0.5	0.8
Delivery technologies and devices	1.9	<0.1	3.8	0.4	0.3	0.5
General diagnostic platforms	0.9	0.5	0.6	<0.1	0.1	0.2
Adjuvants and immunomodulators	0.6	-	0.1	0.1	<0.1	<0.1
Core funding of a multi-disease R&D organisation	0.9	0.3	-	0.4	0.3	0.4
Unspecified disease	-	0.5	4.6	2.4	4.3	6.8
Total public funding (LMICs)	77	85	97	109	63	100

- No reported funding

New disease added to G-FINDER in 2013 or 2014

PHILANTHROPIC FUNDERS

Philanthropic funders provided $678m for neglected disease R&D in 2014, representing 20% of total funding. The two largest investors – the Gates Foundation and the Wellcome Trust – together contributed 97% of this amount ($660m), up from 94% in 2013.

YOY philanthropic funding was essentially stable (down $3.2m, -0.5%). The drop in funding from the Wellcome Trust (down $8.8m, -6.4%) was related to cyclical funding for major overseas programmes, and was partially offset by slightly increased investment from the Gates Foundation (up $5.8m, 1.1%).

Table 35. Top philanthropic R&D funders 2014

Funder	US$ (millions) 2007	2008	2009	2010	2011	2012	2013	2014	2014 % of total	2007-2014 trend
Gates Foundation	518	690	627	516	512	508	526	531	78	
Wellcome Trust	60	63	69	81	96	149	137	128	19	
MSF	7.9	8.0	5.1	5.2	5.8	6.4	6.6	5.3	0.8	
UBS Optimus Foundation	0.6	1.2	1.2	8.0	6.0	3.6	3.0	4.0	0.6	
Funds raised from the general public	2.3	1.4	0.5	0.4	0.5	0.4	0.8	1.0	0.2	
Carolito Foundation				0.4	<0.1	0.5		0.9	0.1	
TLMI				0.3	0.4	0.4	0.6	0.6	<0.1	
Medicor Foundation			0.6	0.9	0.7	0.6	0.8	0.6	<0.1	
New Venture Fund								0.5	<0.1	
ExxonMobil Foundation	2.2	2.0	1.5	0.8	0.3	0.5		0.5	<0.1	
Fondation Mérieux	-	-	0.1	2.1	1.2	0.7	0.5	0.5	<0.1	
All other philanthropic organisations	18	32	16	19	17	31	33	4.1	0.6	
Total philanthropic funding	610	798	721	634	640	702	708	678	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

With overall funding from the sector remaining flat, the most notable changes in philanthropic funding in 2014 were in the distribution between diseases. Most of these changes reflected the disbursements of the Gates Foundation, which provided more than three-quarters ($531m, 78%) of all philanthropic funding in 2014.

The Gates Foundation was entirely responsible for the increases in philanthropic funding for malaria (up $17m, 11%) and kinetoplastids (up $13m, 62%), just as it was for the decreases seen for HIV/AIDS (down $9.1m, -6.3%) and diarrhoeal diseases (down $8.0m, -15%).

Only two philanthropic organisations – the Gates Foundation and Wellcome Trust – reported providing funding for Ebola R&D in 2014. Their combined contribution of $12m was just 7.3% of global Ebola R&D investment, around a third of the 20% share that this sector contributes to overall neglected disease R&D funding.

Table 36. Philanthropic R&D funding by disease 2007-2014

Disease or R&D area	US$ (millions)								2014 % of total
	2007	2008	2009	2010	2011	2012	2013	2014	
Malaria	174	230	241	139	202	169	155	170	25
Tuberculosis	136	158	123	136	117	122	145	149	22
HIV/AIDS	116	199	151	153	152	162	150	137	20
Diarrhoeal diseases	64	48	54	52	36	49	62	47	6.9
Kinetoplastids	75	55	60	33	25	23	22	35	5.2
Helminths (worms & flukes)	12	30	25	23	31	27	33	30	4.4
Dengue	2.3	3.3	3.4	4.9	7.5	11	21	26	3.8
Ebola								12	1.8
Salmonella infections	0.1	1.1	4.0	7.7	10	13	15	11	1.7
Bacterial pneumonia & meningitis	7.0	31	26	50	39	52	27	7.7	1.1
Buruli ulcer	-	0.2	0.3	2.0	2.7	3.1	2.8	3.5	0.5
Leprosy	0.8	1.2	1.1	2.8	1.7	2.3	2.0	1.2	0.2
Trachoma	1.5	-	-	-	0.2	0.6	0.5	0.3	<0.1
Hepatitis C (genotypes 4,5 & 6)							0.1	0.1	<0.1
Cryptococcal meningitis							0.3	<0.1	<0.1
Rheumatic fever	-	0.1	0.2	0.2	-	-	-	-	-
Leptospirosis							<0.1	-	-
Platform technologies	2.3	9.3	17	15	6.9	19	15	11	1.6
Adjuvants and immunomodulators	-	1.5	2.5	5.6	3.8	9.3	4.9	5.0	0.7
General diagnostic platforms	2.3	3.1	7.8	4.1	1.6	9.2	8.2	3.8	0.6
Delivery technologies and devices	0.1	4.7	6.3	5.0	1.4	0.7	1.6	2.4	0.4
Core funding of a multi-disease R&D organisation	15	11	6.3	6.7	5.7	46	46	24	3.6
Unspecified disease	3.7	20	8.6	7.4	3.2	2.3	11	12	1.8
Total philanthropic funding	610	798	721	634	640	702	708	678	100

- No reported funding
New disease added to G-FINDER in 2013 or 2014

PRIVATE SECTOR FUNDERS

The private sector invested $534m in neglected disease R&D in 2014, which represented 16% of total funding – quite a significant increase from the 12% share the sector contributed in 2013. MNCs provided $448m (84%), with SMEs accounting for the remaining $86m (16%).

The increase in industry's share of global funding reflects sharply higher YOY industry investment in neglected disease R&D, which increased by over a quarter in 2014 (up $98m, 28%). Unlike HIC public funding, this increase was not due entirely to Ebola – even with Ebola excluded, industry investment for neglected diseases increased by $64m (18%), driven by increased MNC investment in malaria and HIV/AIDS.

MULTINATIONAL PHARMACEUTICAL COMPANIES

In 2014, almost two-thirds ($279m, 62%) of MNC investment in neglected disease R&D went to three diseases (malaria, TB and HIV/AIDS). YOY investment from MNCs increased by $94m (up 27%). However, this was not a reversal of the decline seen in most diseases in 2013, as the 2014 increase was essentially restricted to three diseases: malaria (up $51m, 64%), HIV/AIDS (up $31m, a quadrupling of previous investment), and Ebola (which received $33m, with the majority of this believed to be new investment).

The increase in malaria R&D investment followed an unusually low year in 2013, and was predominantly for drug development (up $38m, 81%), in large part due to GSK's investment in Phase III trials of tafenoquine for *P. vivax* infection.

Ebola received the fifth largest MNC investment of any of the neglected diseases, receiving 7.3% of total MNC funding, essentially all of which was for vaccine development. The increase in HIV/AIDS investment was also primarily vaccine-related, and placed HIV/AIDS in the top three diseases for MNC funding for the first time since the start of the survey.

In contrast to these increases, MNCs invested less in R&D for TB (down $10m, -8.7%), diarrhoeal diseases (down $7.3m, -19%) and kinetoplastids (down $3.5m, -24%). Although the drop in diarrhoeal disease investment followed a big increase the previous year, the cut to TB represented a continuing decline, with 2014 investment nearly a third lower than in 2010 (down $47m, -30%). Of the third tier diseases, only rheumatic fever and leprosy received any contributions from MNCs (both around $0.1m).

Table 37. MNC R&D funding by disease 2007-2014

Disease or R&D area	US$ (millions)								2014 % of total
	2007	2008	2009	2010	2011	2012	2013	2014	
Malaria	85	88	89	121	100	115	80	131	29
Tuberculosis	56	83	122	159	155	138	117	107	24
HIV/AIDS	8.6	23	20	19	16	16	10	41	9.2
Bacterial pneumonia & meningitis	17	36	29	29	36	38	32	34	7.6
Ebola								33	7.3
Diarrhoeal diseases	12	25	37	35	25	29	39	32	7.1
Hepatitis C (genotypes 4, 5 & 6)							27	26	5.7
Kinetoplastids	5.3	1.3	4.1	11	10	19	17	13	2.9
Dengue	4.8	3.4	4.2	6.7	11	8.0	7.0	7.1	1.6
Helminths (worms & flukes)	0.1	4.5	9.3	3.6	2.6	3.4	8.2	6.6	1.5
Salmonella infections	-	1.3	2.0	3.1	5.0	4.1	4.1	3.9	0.9
Rheumatic fever	-	1.1	1.7	-	-	-	-	0.1	<0.1
Leprosy	-	-	-	-	-	-	0.1	0.1	<0.1
Buruli ulcer	-	0.1	-	-	-	-	-	-	-
Trachoma	0.1	0.1	-	-	-	-	-	-	-
Core funding of a multi-disease R&D organisation	-	-	-	-	-	-	2.6	9.5	2.1
Unspecified disease	-	-	-	-	3.7	1.8	8.8	4.5	1.0
Total MNC funding	189	266	317	387	363	371	354	448	100

- No reported funding
New disease added to G-FINDER in 2013 or 2014

SMALL PHARMACEUTICAL AND BIOTECHNOLOGY FIRMS

SMEs invested $86m in neglected disease R&D in 2014 (16% of total industry funding). Once again, IDC firms provided the majority of SME investment ($55m, 64%), with developed country firms contributing the remainder ($31m, 31%). The apparent increase in SME investment was largely due to increased participation of SMEs in Brazil (who reported investments of $16m in 2014, compared to zero in 2013), but also reflected a significant increase in typhoid polysaccharide conjugate vaccine investment from one Indian SME.[iv]

Irregular survey participation among SMEs makes analysis of funding trends difficult, but regular survey participants increased their investment in several diseases, including TB (up $6.1m), salmonella infections (up $5.8m) and helminths (up $5.1m), all off relatively low bases. There were no significant drops in SME funding for any diseases. As was the case in 2013, there was no SME investment in any of the third tier diseases in 2014.

SMEs reported investing $2.5m in Ebola R&D. While this total likely reflects some degree of underreporting due to survey participation, we note that the majority of SME R&D activity for Ebola is funded through external support. SMEs received $62m in public and philanthropic funding for Ebola R&D in 2014, with the majority of this coming from the US Government ($52m, 84%).

[iv] SME increases or decreases refer to organisations that participated in both 2013 and 2014, as SME survey participation is inconsistent from year to year

Table 38. SME R&D funding by disease 2007-2014

Disease or R&D area	US$ (millions)								2014 % of total
	2007	2008	2009	2010	2011	2012	2013	2014	
Bacterial pneumonia & meningitis	0.6	21	9.0	7.6	5.9	5.4	18	17	20
Salmonella infections	-	13	1.9	0.2	0.1	0.3	6.0	12	14
Helminths (worms & flukes)	0.8	1.2	0.5	4.0	6.5	0.7	0.1	11	12
Diarrhoeal diseases	3.3	2.3	5.3	0.7	5.1	2.6	6.3	8.8	10
Tuberculosis	17	15	18	19	15	9.1	5.1	8.1	9.4
Malaria	12	11	20	12	8.1	8.1	6.8	7.3	8.5
Kinetoplastids	<0.1	1.8	1.5	1.6	3.9	0.9	0.7	7.1	8.2
HIV/AIDS	13	31	20	15	10	7.6	6.2	6.3	7.3
Ebola								2.5	2.9
Dengue	2.4	0.2	1.2	0.7	0.6	0.5	0.4	0.6	0.7
Buruli ulcer	<0.1	0.2	-	-	-	-	-	-	-
Leprosy	-	-	-	<0.1	0.1	-	-	-	-
Trachoma	-	-	-	2.2	4.5	-	-	-	-
Core funding of a multi-disease R&D organisation	-	-	-	-	-	-	-	0.2	0.2
Unspecified disease	0.7	-	-	-	-	<0.1	1.9	5.7	6.6
Total SME funding	50	97	78	64	60	35	52	86	100

- No reported funding

New disease added to G-FINDER in 2013 or 2014

IN-KIND CONTRIBUTIONS

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

Companies also provide in-kind contributions that are specifically targeted to neglected disease R&D, but cannot easily be captured in dollar terms. 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 39. Typical industry in-kind contributions 2014

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 Johnson & Johnson 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 Eli Lilly GSK Johnson & Johnson MSD Novartis Otsuka Sanofi
Teaching and training	• In-house attachments offered to Developing Country (DC) trainees in medicinal chemistry, clinical trial training etc • Providing training courses for DC researchers at academic institutions globally • Organising health care provider training in DCs for pharmacovigilance of new treatments • Organising conferences and symposia on neglected disease-specific topics	GSK Johnson & Johnson MSD Novartis Otsuka 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 Johnson & Johnson 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 Johnson & Johnson Novartis Sanofi

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

FUNDING BY ORGANISATION

Neglected disease R&D funding remained highly concentrated in 2014, with the top 12 funders – including aggregate industry – providing 90% of funding ($3,038m). Collectively, the US NIH, industry and the Gates Foundation again provided just over two-thirds (70%, $2,363m) of global R&D funding.

YOY aggregate industry funders provided the greatest increase in investment, with funding up $98m (28%), due to increased investment in malaria, Ebola and HIV/AIDS. US NIH funding rose by $26m (2.1%), entirely due to Ebola. Other notable increases came from UK DFID (up $7.3m, 9.9%), with 2014 being the first full year of its new PDP funding stream, and the Australian NHMRC (up $4.0m, 15%) following a significant decrease in 2013.

The largest decreases came from the Wellcome Trust, with a drop of $8.8m (-6.4%) due to cyclical funding patterns for major overseas programmes, and Inserm, down $7.7m (-12%).

Ebola had a substantial impact on the funding trends of just two of the top 12 funders: the US NIH and Inserm. When Ebola funding is excluded, US NIH funding actually fell by $37m (-2.9%), partly due to the absence of any in-scope R&D projects within the Therapeutics for Rare and Neglected Diseases (TRND) programme in 2014, as well as reduced funding for platform technologies (down $16m, -76%) and HIV/AIDS (down $10m, -1.5%). Without Ebola, the drop in Inserm funding almost doubled, with a $14m decrease (-23%). Inserm's decreased funding was the result of reductions across all disease areas, with the biggest drops in bacterial pneumonia and meningitis (down $3.7m, -24%) and TB (down $3.0m, -48%).

Table 40. Top neglected disease R&D funders 2014

Funder	US$ (millions)								2014 % of total	2007-2014 trend
	2007	2008	2009	2010	2011	2012	2013	2014		
US NIH	1,209	1,229	1,422	1,376	1,344	1,452	1,272	1,298	38	
Aggregate industry	239	363	396	453	424	407	406	534	16	
Gates Foundation	518	690	627	516	512	508	526	531	16	
Wellcome Trust	60	63	69	81	96	149	137	128	3.8	
European Commission	133	144	131	101	118	104	123	126	3.7	
US DOD	84	77	105	74	83	81	95	96	2.8	
UK DFID	48	45	90	98	76	46	74	81	2.4	
USAID	92	96	97	99	93	94	81	77	2.3	
Inserm	1.9	3.5	30	22	42	45	62	54	1.6	
UK MRC	52	55	55	62	54	48	51	50	1.5	
Indian ICMR		24	18	23	22	23	35	33	1.0	
Australian NHMRC	20	24	26	25	35	38	26	30	0.9	
Subtotal of top 12^	2,534	2,846	3,081	2,957	2,911	2,997	2,888	3,038	90	
Total R&D funding	2,844	3,258	3,480	3,320	3,265	3,383	3,273	3,377	100	

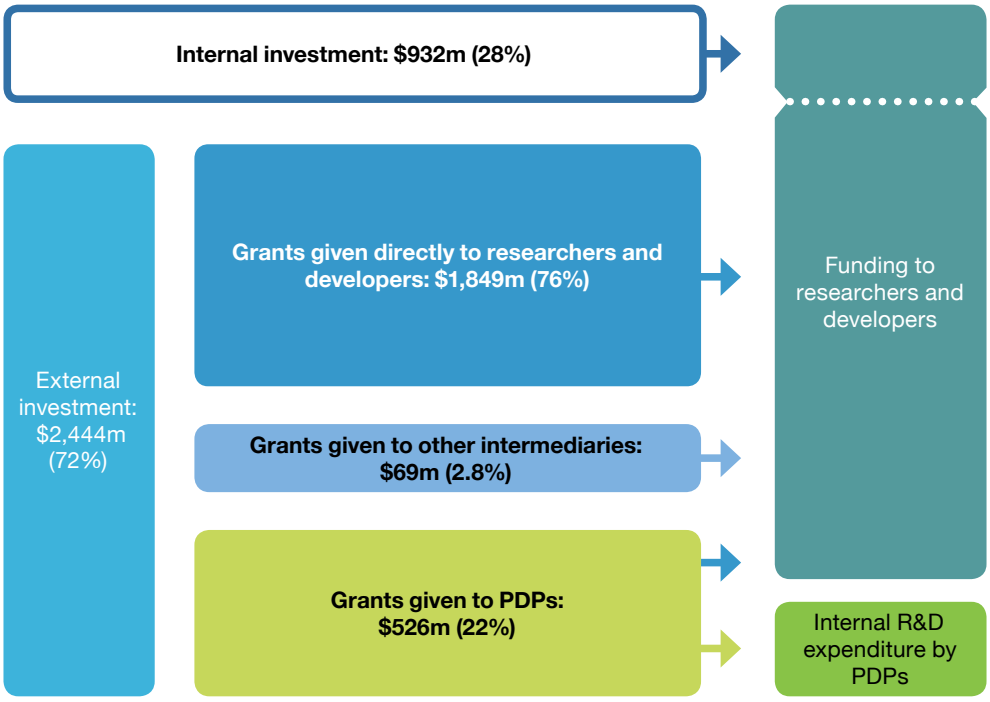
^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014

Funding organisation did not participate in the survey for this year

FUNDING FLOWS

Organisations can invest in neglected disease R&D in two main ways: by funding their own in-house research (internal investment, also referred to as intramural or self-funding); or by giving grants to others (external investment). This external investment can either be given directly to researchers and developers, or it can be provided via PDPs[v] 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 2014



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 are the source of the vast majority of PDP funding (usually over 90%). In contrast, non-PDP 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, changes in S&T funding are more likely to affect researchers and developers; changes in philanthropic or aid agency funding are more likely to affect PDPs; and non-PDP intermediary organisations are least vulnerable to changes from one donor funding stream.

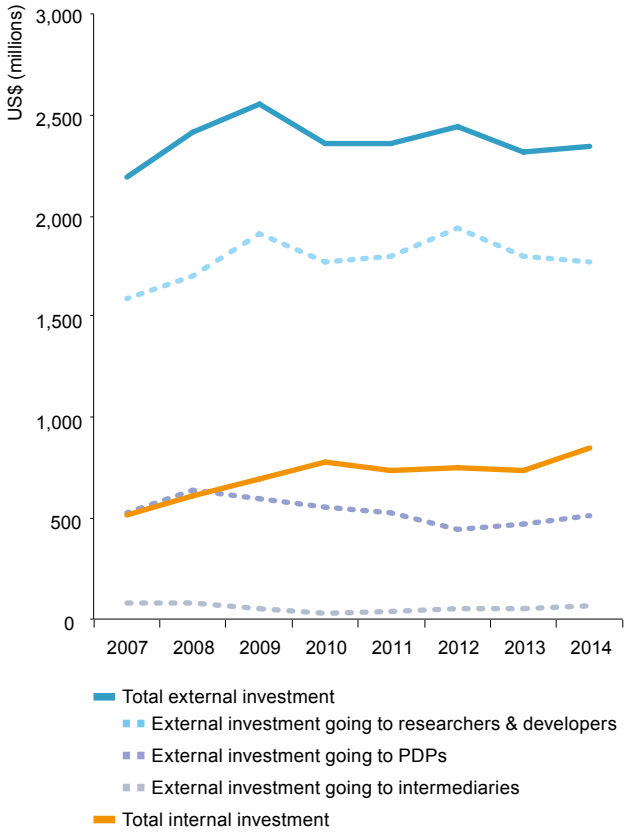
[v] PDPs are defined as public health driven, not-for-profit organisations that typically use private sector management practices to drive product development in conjunction with external partners. PDPs tend to focus on one or more neglected diseases and aim to develop products suitable for DC use. While 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 accounts for the majority of all neglected disease R&D investments. Total external investment in 2014 was $2,444m (72% of total funding). Of this, $1,849m (76%) went directly to researchers and developers, $526m (22%) went to PDPs, and the remaining $69m (2.8%) was channelled through other intermediary organisations.

After a sizable drop the previous year, and despite the influx of new funds for Ebola R&D, YOY external investment in 2014 was essentially flat (up $26m, 1.1%). YOY external investment in non-Ebola neglected disease R&D fell by $81m (down 3.5%).

Figure 23. R&D funding trends 2007-2014



As usual, three-quarters of the $1,849m in external investment given directly to researchers and developers came from S&T agencies ($1,361m, 74%), with most of the remainder provided by philanthropic funders ($362m, 20%). The total value of grants given to researchers and developers in 2014 remained relatively stable (down $23m, -1.3%). This was despite $108m in new Ebola grants to researchers and developers, primarily because of significantly reduced public funding to researchers and developers for HIV/AIDS (down $60m, -8.8%), as well as overall philanthropic funding to researchers and developers (down $59m, -14%), which largely reflected a return to normal funding levels from the Gates Foundation after several large disbursements in 2013.

More than 90% of the $526m in external funding for PDPs in 2014 came from philanthropic funders ($308m, 59%) and aid agencies ($182m, 35%). The Gates Foundation's PDP funding increased for the first time since 2008 (up $55m, 23%), and was the reason that overall PDP funding increased (up $42m, 9.1%) even in the face of cuts from S&T agencies (down $5.3m, -22%) and aid agencies (down $4.4m, -2.4%). The slight drop in funding from aid agencies was in contrast to the $34m increase (up 24%) seen the previous year.

Intermediary funding was more diverse: public funders contributed $53m (77%), industry $8.5m (12%), and the philanthropic sector $7.4m (11%). More than half of public funding came from S&T agencies ($30m, 57%), although a doubling of aid agency investment (to $12m, 18% of public funding) was the driver behind the overall increase in YOY intermediary funding (up $6.7m, 12%). The Japanese Government provided $11m (15% of public funding) to the Global Health Innovative Technology Fund (GHIT Fund).

Internal investment (self-funding) in neglected disease R&D was $932m in 2014, accounting for 28% of all funding. Just over half of this came from the pharmaceutical industry ($516m, 55%), which almost invariably funds only its own internal R&D programmes – 97% of industry funding in 2014 was internal investment. Governments invested the remaining $416m (45%) in their own institutes.

YOY internal investment increased substantially (up $124m, 17%), primarily driven by increased industry investment (up $98m, 28%) in malaria, Ebola and HIV/AIDS. The increase in internal investment by the public sector (up $25m, 6.7%) was entirely from the US NIH, around half of which was for Ebola.

PRODUCT DEVELOPMENT PARTNERSHIPS

PDPs received $526m for neglected disease R&D in 2014. This represented 16% of total funding and over a fifth (22%) of all external investment.

The central role of PDPs is somewhat obscured by the "NIH factor". The US NIH is by far the largest funder of neglected disease R&D, but allocated only a small portion ($9.3m, 0.7%) of its funding to PDPs in 2014. If the US NIH is excluded, the role of PDPs in product development for neglected diseases becomes clearer, with PDPs collectively managing 38% of all remaining external investment for neglected disease R&D in 2014.

Three PDPs – PATH, Medicines for Malaria Venture (MMV) and Drugs for Neglected Diseases initiative (DNDi) – collectively received almost half of all funding given to PDPs ($256m, 49%).

All of the major changes in funding for individual PDPs were related to the Gates Foundation. An increase in funding to PATH (up $43m, 56%) was mainly due to increased investment from the Gates Foundation in PATH's next-generation malaria *P. falciparum* vaccines. Funding to DNDi grew by $20m (up 57%), putting it in the top three for the first time, largely due to new Gates Foundation funding for sleeping sickness and lymphatic filariasis. The Gates Foundation was also behind the increase in funding to Aeras (up $14m, 34%).

The Gates Foundation was also the main driver behind the reduced funding received by several other PDPs. This included the International AIDS Vaccine Initiative (IAVI), whose drop of $19m (-32%) meant that it fell out of the top three PDPs for the first time, as well as the Innovative Vector Control Consortium (IVCC), down $11m (-53%) after a substantial increase last year. Funding for CONRAD fell again (down $8.6m, -33%), partially reflecting the end of the Phase III tenofovir gel FACTS 001 trial.

Table 41. Funds received by PDPs 2007-2014

PDPs	US$ (millions)								2014 % of total
	2007	2008	2009	2010	2011	2012	2013	2014	
PATH	44	127	142	76	100	85	83	121	23
MMV	86	52	47	77	79	53	71	77	15
DNDi	31	25	36	37	40	35	38	58	11
TB Alliance	45	39	41	54	39	46	53	58	11
Aeras	45	73	60	44	44	40	41	55	11
IAVI	90	97	80	72	67	65	61	41	7.8
IPM	51	68	39	34	16	25	31	29	5.4
FIND	26	35	23	28	24	24	25	26	4.9
CONRAD	18	16	24	19	25	31	26	17	3.3
IDRI	9.3	16	19	13	23	11	5.9	14	2.7
IVCC	-	11	15	17	<0.1	10	23	10	2.0
IVI	15	2.4	13	10	5.7	8.2	9.5	6.4	1.2
Sabin Vaccine Institute	8.7	17	10	4.3	9.0	6.4	6.8	5.7	1.1
EVI	8.5	4.8	4.2	5.7	8.5	2.4	7.2	3.4	0.6
TBVI	-	-	0.1	4.6	4.2	5.5	6.1	1.5	0.3
FHI 360	14	19	19	19	12	5.9	4.5	0.2	<0.1
OWH[A]	31	33	17	23	11	7.2	-	-	-
WHO/TDR[B]	36	41	38	32	34	-	-	2.4	0.5
Total funding to PDPs	559	675	627	569	541	461	493	526	100

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

[B] TDR's mission extends beyond product development, but it operated as a de facto PDP from the mid-1970s until 2012, when it decided to focus on implementation research and research capacity strengthening. Funds received in 2014 are related to the pooled fund demonstration projects

- No reported funding

FUNDERS OF PDPs

Almost all PDP funding in 2014 came from philanthropic organisations ($308m, 59%) and HIC governments ($206m, 39%). Most HIC government funding was provided by aid agencies ($182m, 88%) which accounted for 35% of total PDP funding. The three biggest funders of PDPs – the Gates Foundation ($294m, 56%), UK DFID ($79m, 15%) and USAID ($57m, 11%) – collectively provided 82% of all PDP funding in 2014.

The biggest change came from the Gates Foundation, which increased its PDP funding by nearly a quarter (up $55m, 23%) after several years of declining disbursements, reflecting the Foundation's new $500m commitment to reduce the burden of NDs announced in late 2014.

The Australian Government gave $9.0m to PDPs in 2014 ($3.0m each to the TB Alliance, MMV and FIND), having provided no PDP funding at all in 2013. These funds were the first disbursements under the Australian Government's new PDP funding commitment, which will provide AU$30m over three years for TB and malaria R&D. UK DFID (up $5.6m, 7.6%), the Swiss Agency for Development and Cooperation (SDC) (up $2.4m, 49%) and the German BMBF (up $2.2m, 38%) also increased their PDP funding in 2014.

Despite these increases, YOY public funding for PDPs actually fell by $10m (-4.8%) in 2014, with the biggest drops coming from Irish Aid (down $6.7m, -72%) related to grant disbursment patterns, USAID (down $5.4m, -8.6%), the EC (down $5.3m, -84%) and the Dutch DGIS (down $5.2m, -20%).

Table 42. Top funders of PDPs 2014

Funder	US$ (millions)								2014 % of org's funds given to PDPs	% of 2014 total PDP funding
	2007	2008	2009	2010	2011	2012	2013	2014		
Gates Foundation	266	390	326	290	260	246	239	294	55	56
UK DFID	34	29	82	98	76	46	74	79	98	15
USAID	77	77	79	78	76	75	62	57	74	11
Dutch DGIS	35	22	22	17	23	14	25	20	100	3.8
UNITAID			7			0.4	8.5	10	100	1.9
US NIH	4.7	3.8	8.6	2.9	21	8.0	11	9.3	0.7	1.8
Australian DFAT						9.5	-	9.0	100	1.7
German BMBF			-	-	1.4	6.9	5.7	7.9	40	1.5
Swiss SDC	2.5	2.5	2.7	5.0	3.9	3.6	4.8	7.2	95	1.4
MSF	7.9	8.0	5.1	5.2	5.5	6.4	6.6	5.3	100	1.0
Wellcome Trust	4.0	3.9	3.8	2.7	3.3	4.5	3.9	4.6	3.6	0.9
Norwegian NORAD	15	13	12	9.7	7.2	2.5	4.9	3.3	100	0.6
Subtotal top 12 funders of PDPs^	511	617	577	535	501	432	459	507		
Total PDP funding	559	675	627	569	541	461	493	526		
% of total PDP funding (top 12)	91	91	92	94	92	94	93	96		

^ Subtotals for 2007–2013 top 12 reflect the top funders for those respective years, not the top 12 for 2014
- 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

INTERMEDIARIES

An intermediary is an organisation that aims to accelerate neglected disease product development without having its own product portfolio. Intermediaries generally act as coordinating agencies, providing funding to researchers and developers either directly or via PDPs, although they may perform their own research (for example operational research, or research into existing treatment regimens) or be involved in clinical trials of novel products in development by others.

Intermediaries received $69m in 2014, representing 2.0% of total neglected disease R&D funding and 2.8% of external investment. The largest intermediaries captured in G-FINDER in 2014 were the EDCTP (received $26m), the GHIT Fund (received $25m), the International Union Against Tuberculosis and Lung Disease (The Union, received $9.2m) and the Barcelona Institute for Global Health (ISGlobal, received $5.9m).

Five organisations provided 90% of all funding to intermediaries in 2014. By far the largest funder was the EC ($26m, 38%) followed by the other four organisations at some distance (accounting for 11-15% of total intermediary funding each). As far as intermediaries go, USAID only funded The Union, to which it increased investment by $4.2m (up 84%). Similarly, the Spanish Ministry of Foreign Affairs and Cooperation for Development (MAEC) only invested in ISGlobal, to which it increased funding by $3.2m, after not having reported any funding to this organisation since 2012. The increase in industry funding (up $4.6m, 118%) reflected industry contributions to the GHIT Fund. All Japanese government funding for intermediaries also went to the GHIT Fund.

The only funders to slightly reduce intermediary investment were the EC (down $2.4m, -8.5%) and the Netherlands-African Partnership for Capacity Development and Clinical Interventions against Poverty related Diseases (NACCAP, down $1.4m, -98%).

Table 43. Top funders of intermediaries 2014

Funder \ US$ (millions)	2007	2008	2009	2010	2011	2012	2013	2014	2014 % of org's funds given to intermediaries	% of 2014 total intermediary funding
European Commission	46	43	22	2	28	29	29	26	21	38
Japanese Government							11	11	100	15
USAID	<0.1	4.2	5.3	5.8	5.7	5.5	5.0	9.2	12	13
Aggregate industry	-	1.3	3.2	-	-	-	3.9	8.5	1.6	12
Gates Foundation	10.5	8.3	13.4	5.9	5.2	4.1	6.8	7.4	1.4	11
US NIH	-	1.0	3.4	3.1	1.3	2.1	1.8	3.5	0.3	5.0
Spanish MAEC	-	-	-	-	-	0.3	-	3.2	83	4.7
Carlos III Health Institute	4.5	4.5	-	1.5	1.3	-	-	0.2	6.6	0.3
German BMBF			-	1.3	0.2	0.0	0.2	0.2	0.8	0.2
NACCAP		4.9			0.1	1.0	1.4	<0.1	100	<0.1
Subtotal top 10 funders of intermediaries^	82	87	59	31	46	58	61	69		
Total funding to intermediaries	82	88	60	34	46	60	63	69		
% of total intermediary funding (top 10)	100	99	98	92	99	98	97	100		

^ Subtotals for 2007–2013 top 10 reflect the top funders for those respective years, not the top 10 for 2014
- 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

More than three-quarters (77%) of funding given to intermediaries was not earmarked for specific diseases: $28m was provided as core funding, and a further $25m was allocated to multiple or unspecified diseases. This means that a large proportion of intermediary funding cannot be further allocated, and that some of the individual disease totals in this report slightly underrepresent the true amount of R&D funding these diseases receive. Of the intermediary funding that was disease-specific, $9.2m was for TB, $4.2m for malaria and $2.4m for HIV/AIDS.

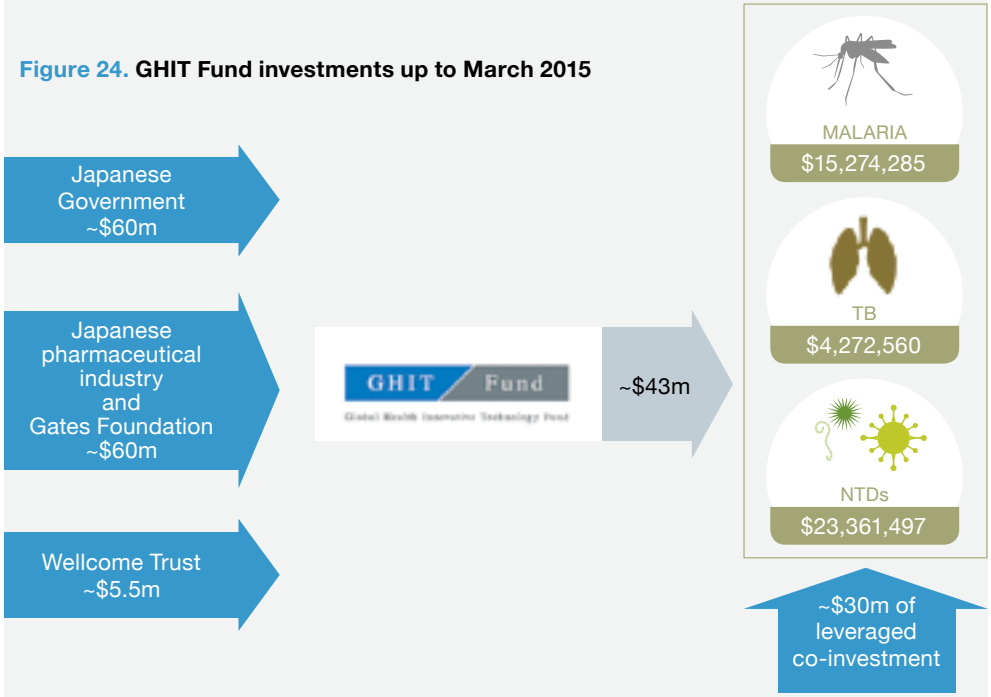
Global Health Innovative Technology Fund (GHIT Fund)

The GHIT Fund, established in Japan in 2013, is an innovative, non-profit, public-private fund designed to advance the development of new drugs, vaccines and diagnostics for HIV/AIDS, malaria, tuberculosis and neglected tropical diseases (although HIV/AIDS is not within the scope of current funding calls). The GHIT Fund was established as a joint initiative of the Japanese Government, a group of leading Japanese pharmaceutical companies, and the Gates Foundation.[97] In mid-2015, the Wellcome Trust joined as a funder, alongside several new commercial sponsors.[98]

The GHIT Fund invests in the development of new health technologies from the discovery stages through to clinical development, with the requirement that all projects beyond proof-of-concept stage have a co-funding strategy and the support of a commercial partner. All products must be affordable in LMICs on the basis of a no gain/no loss policy, and any patents deriving from GHIT-funded research must be made available to users operating in Least Developed Countries (LDCs) and LICs via royalty-free licenses.[99]

One of the major features of the fund, along with its public-private governance structure, is its focus on facilitating international R&D partnerships between Japanese and non-Japanese organisations, particularly through engaging PDPs. Because G-FINDER reports funding given to the GHIT Fund, onward funding to PDPs and other developers is not reflected in the G-FINDER analysis in order to prevent 'double counting' this investment. However, this obscures the significant contribution of the GHIT Fund (and the Japanese Government) as funders of PDPs; if onward funding were analysed instead, the GHIT Fund would have been the sixth largest funder of PDPs in 2014.

Figure 24. GHIT Fund investments up to March 2015



DISCUSSION

The 2014 West African Ebola outbreak resulted in rapid mobilisation of significant R&D funding, led by the US Government

Not only was the 2014 West African Ebola outbreak the largest ever recorded, but with nearly 30,000 cases and over 11,000 deaths between December 2013 and November 2015, it was larger and more deadly than all previous outbreaks combined. With no vaccine, no anti-viral drugs and no field-suitable diagnostic tests, the global response to the epidemic included significant new funding for R&D to address these gaps.

Figure 25. Global Ebola R&D funding 2014

A total of $165m was invested globally in Ebola R&D in 2014, enough to make Ebola the fifth-highest funded of all the neglected diseases, behind only HIV/AIDS, malaria, TB and diarrhoeal diseases. This substantial 2014 investment was also mobilised over a relatively short timeframe – the first confirmed Ebola diagnosis was made only in late March 2014, and the WHO did not declare a public health emergency until early August.

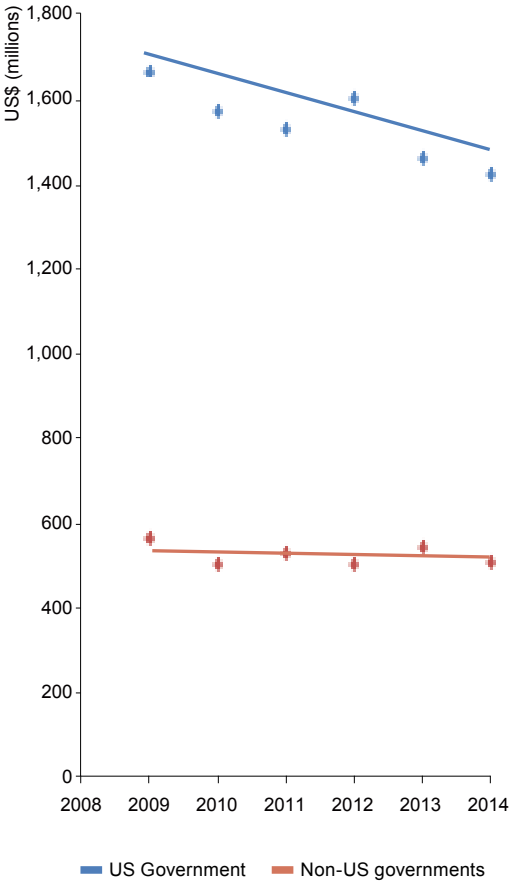
Nearly three-quarters of all funding for Ebola R&D in 2014 came from the public sector ($118m, 71%), and all of this from HIC governments. The US Government was by far the most significant funder, providing $101m (86% of total public funding) via three agencies: US NIH ($64m), US HHS ($26m) and US DTRA ($11m). European public funders appeared to be slower to mobilise, contributing $14m (12% of public funding). This is expected to grow in coming years, with the establishment of funding streams like the Ebola+ program under the EC's Innovative Medicines Initiative (IMI).

The pharmaceutical industry investment of $35m represented 21% of global Ebola funding, most of which was vaccine R&D investment by MNCs ($33m, 93% of industry Ebola funding). The philanthropic sector provided a relatively modest contribution of $12m (7.3% of global Ebola R&D funding).

In contrast, public funding for other neglected disease R&D approached a historical low

The mobilisation of significant new funds for Ebola in 2014 masked a more concerning trend. Public sector funding for all other neglected disease R&D in fact fell for the second year in a row (down $62m, -3.1%). As a result, public funding for non-Ebola neglected disease R&D in 2014 was the lowest recorded since the first year of the G-FINDER survey in 2007.

Figure 26. The decline of US Government funding for non-Ebola R&D since 2009



The US Government is the single biggest funder of neglected disease R&D – it contributed 44% of all global non-Ebola funding in 2014 – and has been a major factor behind the ongoing decline in public funding. US Government funding for neglected disease R&D peaked in 2009 driven by economic stimulus spending, but it has been trending downwards ever since, with a single funding spike in 2012 quickly reversed by budget sequester-related cuts in 2013. US Government funding for neglected disease R&D in 2014 (excluding Ebola) was nearly a quarter of a billion dollars lower than in 2009 (down $221m, -13%).

It's impossible – based on funding data alone – to know whether all of the public sector investment in Ebola R&D in 2014 was truly 'new' funding, or if (and to what extent) this was funding that would otherwise have been invested in other neglected diseases. But the rapid mobilisation of political commitment and financial support for Ebola provides a template of what might be possible for even more deadly neglected diseases – such as diarrhoeal diseases, which kill more than a million children in developing countries every year, but which received just $93m in public sector R&D funding in 2014, compared to the $118m that went to Ebola.

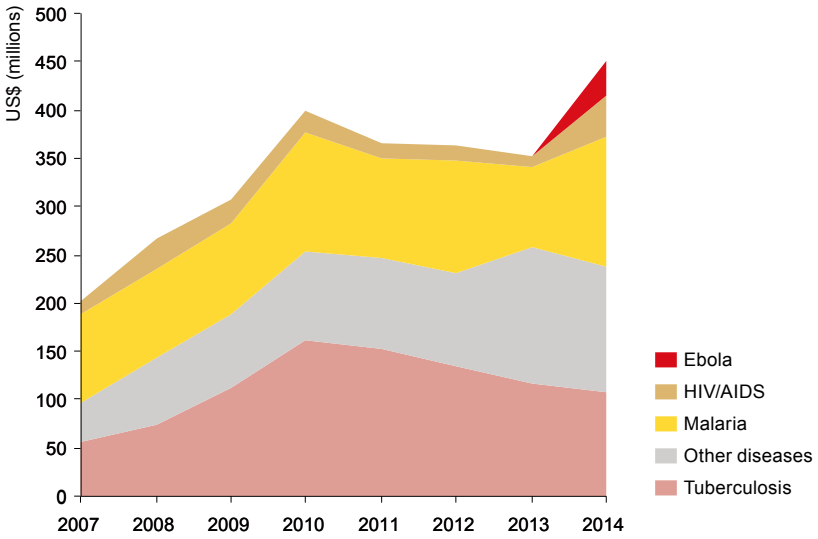
Industry funding increased for the first time since 2010… and not only due to Ebola

As we noted in last year's G-FINDER report, industry investment in neglected disease R&D had been declining for several years, reflecting changes in the malaria pipeline and a withdrawal from TB R&D by MNCs. Encouragingly, in 2014 industry reported its largest investment in neglected disease R&D in the history of the G-FINDER survey, with YOY funding increasing by more than a quarter (up $98m, 28%).

Encouragingly, unlike HIC public funding, the industry increase was not due to Ebola investment, which received $35m in industry funding in 2014. Even with Ebola excluded, industry funding still rose $64m (18%) due to increases for malaria and HIV/AIDS. Malaria funding rose by $51m (62%), due to increases for clinical drug development (up $45m, more than doubling previous investment) as a result of GSK's investment in Phase III trials of tafenoquine, and vaccine clinical development (up $13m, 40%). Industry investment in HIV/AIDS also increased by $33m (a quadrupling of previous investment) due to vaccine clinical development.

However, industry funding for TB continued to decline and 2014 was the first time that TB was not the largest disease area for industry. TB accounted for less than a quarter (22%) of industry funding in 2014, compared to around 40% in 2010 and 2011. In addition, industry funding for TB R&D was nearly a third lower than the 2010 peak, with funding down $55m (-34%) since then.

Figure 27. Industry investment in neglected disease R&D 2007-2014



Funding to PDPs increased for the second year in a row

Funding to PDPs had been in consistent decline since 2008, before an increase in funding from European aid agencies – particularly UK DFID – in 2013. In 2014, funding to PDPs grew again (up $42m, 9.1%), but this time it was an increase in PDP funding from the Gates Foundation (up $55m, 23%) behind the change.

This was the first increase in Gates Foundation funding to PDPs since 2008, and was driven by big increases for PATH (up $39m, 58%), largely for next-generation *P. falciparum* malaria vaccines, and DNDi (up $17m, from $4.0m in 2013), thanks to new funding for sleeping sickness and lymphatic filariasis. Despite these increases, overall Gates Foundation funding to PDPs was still down by a quarter from its 2008 peak (down $96m, -25%).

Overall public funding to PDPs in 2014 fell by $13m (-5.9%), despite a $17m increase in PDP funding from aid agencies in Australia, the UK and Switzerland.

ANNEXE CONTENTS

REPORT ANNEXES

ONLINE ANNEXES

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

ANNEXE 1

ACRONYMS

AC	Advisory Committee
Aggregate industry	Aggregate pharmaceutical and biotechnology company respondents
AIDS	Acquired Immune Deficiency Syndrome
ALM	American Leprosy Missions
ALRA	Austrian Leprosy Relief Association
AmB	Amphotericin B
ARV	Antiretroviral
Australia - India SRF	Australia - India Strategic Research Fund
Australian ACH^2	Australian Centre for HIV and Hepatitis Virology Research
Australian DIIS	Australian Department of Industry, Innovation and Science
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
Belgian FWO	Belgian National Fund for Scientific Research
Brazilian DECIT	Brazilian Ministry of Health: Department of Science and Technology
Canadian CIHR	Canadian Institutes of Health Research
Canadian DFATD	Canadian Department of Foreign Affairs, Trade and Development (previously the Canadian International Development Agency (CIDA))
CASS Foundation	Contributing to Australian Scholarship and Science Foundation
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
DC	Developing country
DFB	Damien Foundation
DNDi	Drugs for Neglected Diseases initiative
Dutch DGIS	Dutch Ministry of Foreign Affairs - Directorate General of Development Cooperation
EAggEC	Enteroaggregative *E. coli*
EC	European Commission (including the Directorate-General for Research and Innovation, and the Directorate-General for Development and Cooperation - EuropeAid)
EDCTP	European and Developing Countries Clinical Trials Partnership
ETEC	Enterotoxigenic *E. coli*
EU	European Union
EVI	European Vaccine Initiative
FDC	Fixed-dose combination
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
GAVI	Global Alliance for Vaccines and Immunizations

ACRONYMS

GBD	Global Burden of Disease Study
GDP	Gross domestic product
German BMBF	German Federal Ministry of Education and Research
German BMG	German Federal Ministry of Health
German DFG	German Research Foundation
G-FINDER	Global Funding of Innovation for Neglected Diseases
GHIT Fund	Global Health Innovative Technology Fund
GSK	GlaxoSmithKline
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	French National Institute of Health and Medical Research
IPM	International Partnership for Microbicides
ISGlobal	Barcelona Institute for Global Health
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
MMV	Medicines for Malaria Venture
MNC	Multinational pharmaceutical company
MSD	Merck Sharp & Dohme (Merck)
MSF	Médecins Sans Frontières
NACCAP	Netherlands-African Partnership for Capacity Development and Clinical Interventions against Poverty related Diseases
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*
OECD	Organisation for Economic Cooperation and Development
OWH	OneWorld Health
PDP	Product development partnership
POC	Point-of-care
R&D	Research and development
RCDC	US NIH's Research, Condition and Disease Categorization systems
RePORTER	US NIH's Research Portfolio Online Reporting Tools
RT-PCR	Reverse transcription polymerase chain reaction
S&T	Science & Technology
SME	Small pharmaceutical and biotechnology firms
Spanish MAEC	Spanish Ministry of Foreign Affairs and Cooperation for Development (MAEC) and/or Agency of International Cooperation for Development (AECID)
SSI	Statens Serum Institute
Swiss SDC	Swiss Agency for Development and Cooperation
Swiss SNSF	Swiss National Science Foundation
TB	Tuberculosis
TBVI	TuBerculosis Vaccine Initiative
The Union	International Union Against Tuberculosis and Lung Disease
TLMI	The Leprosy Mission International

ACRONYMS

UK	United Kingdom
UK DFID	UK Department for International Development
UK MRC	UK Medical Research Council
US	United States
US CDC	US Centers for Disease Control
US DOD	US Department of Defense (DOD) including DOD Defense Advanced Research Projects Agency
US DTRA	US Department of Defense: Defense Threat Reduction Agency
US FDA	US Food and Drug Administration
US HHS	US Department of Health and Human Services
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
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
Alan Fenwick	Imperial College London	Professor of Tropical Parasitology
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
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
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
Tim Wells	Medicines for Malaria Venture (MMV)	Chief Scientific Officer

ADDITIONAL EXPERT	ORGANISATION	TITLE
Matthew Albert	Institut Pasteur Inserm U818	Director, Immunology Department Director of Research
Darragh Duffy	Institut Pasteur Inserm U818	Researcher, Immunology Department
Arnaud Fontanet	Institut Pasteur	Head of the Emerging Diseases Epidemiology Unit
Angela Loyse	St. George's University London	Clinical Academic Lecturer, Infectious Diseases Specialist Registrar
Mathieu Picardeau	Institut Pasteur	Head of the Biology of Spirochetes Unit
Harry Thangaraj	St. George's University London	Coordinator, Access to Pharmaceuticals Project, Infections and Immunity Research Centre, Division of Clinical Sciences

ANNEXE 3

Survey respondent list

ORGANISATION NAME

- AbbVie
- Advinus Therapeutics
- Aeras
- American Leprosy Missions (ALM)
- Anacor Pharmaceuticals
- Apopo VZW
- Argentinian Ministry of Science, Technology and Productive Innovation (MINCYT)
- Argentinian National Council for Scientific and Technical Research (CONICET)
- Atomo Diagnostics
- 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
- Bavarian Nordic
- Bayer CropScience
- Baylor College of Medicine
- Becton, Dickinson and Company
- Belgian Ministry of Foreign Affairs
  – including data from Belgian Development Cooperation (DGDC)
- Bernhard Nocht Institute for Tropical Medicine (BNI)
- Bill & Melinda Gates Foundation
- Bio Manguinhos
- Biological E. Limited
- Brazilian Development Bank (BNDES)
- Brazilian Innovation Agency (FINEP)
- Brazilian Ministry of Health: Department of Science and Technology (DECIT)
- Burnet Institute (previously the Macfarlane Burnet Institute for Medical Research and Public Health)
- Canadian Department of Foreign Affairs, Trade and Development (previously the Canadian International Development Agency (CIDA))
- Canadian Institutes of Health Research (CIHR)
- Carlos III Health Institute
- Catalan Agency for Development Cooperation (ACCD), Agencia Catalana de Cooperació al Desenvolupament
- Cepheid
- Chiang Mai University*
- Chilean National Fund for Scientific and Technological Development (FONDECYT)
- Colombian Department for Science, Technology and Innovation (Colciencias)
- CONRAD
- Corgenix Medical Corporation
- Crucell
- Dafra Pharma International, Ltd.
- Damien Foundation (DFB)
- Dana-Farber Cancer Institute
- Danish Ministry of Foreign Affairs
  – including data from the Danish International Development Agency (DANIDA)
- Dengue Vaccine Initiative (DVI)
- DesignMedix, Inc.
- Doris Duke Foundation*
- Drugs for Neglected Diseases initiative (DNDi)
- Dutch Ministry of Foreign Affairs – Directorate General of Development Cooperation (DGIS)
- Eisai Co., Ltd.
- Eli Lilly and Company
- Emergent Biosolutions
  – including data from Microscience, Antex Biologics, Inc. and Emergent Product Development
- EpiVax
- 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)

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

ORGANISATION NAME

- FAIRMED – Health for the Poorest
- FHI 360 – previously Family Health International
- Fio Corporation
- FK Biotecnológia
- Fondation Mérieux
- 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 Institute of Health and Medical Research (Inserm)
- French National Research Agency (ANR)
- Fundacion Huesped*
- Genekam Biotechnology AG
- 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)
- Global Alliance for TB Drug Development (TB Alliance)
- Global Health Innovative Technology Fund (GHIT Fund)
- Global Health Investment Fund (GHIF)
- Global Solutions for Infectious Diseases
- Griffith University – including data from the Institute for Glycomics
- GSK Bio
- Hawaii Biotech, Inc.
- Health Research Council of New Zealand (HRC)
- Hebron Farmacêutica, Ltd.
- HIVACAT*
- Hospital Vall d'Hebron. Servei Malalties Infeccioses
- Indian Council of Medical Research (ICMR)
- Indian Council of Scientific and Industrial Research (CSIR)
- Indian Department of Biotechnology, Ministry of Science and Technology (DBT)
- Indian Department of Science and Technology
- Industry Canada*
- Infectious Disease Research Institute (IDRI)
- Innovative Vector Control Consortium (IVCC)
- Inovio Pharmaceuticals, Inc.
- 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 Partnership for Microbicides (IPM)*
- International Union Against Tuberculosis and Lung Disease
- International Vaccine Institute (IVI)
- Inviragen, Inc.
- IRCCS San Raffaele Scientific Institute and/or IRCCS Ospedale San Raffaele*
- Irish Aid
- Italian Association Amici di Raoul Follerau (AIFO)
- IVD Research, Inc.
- Japanese National Institute of Infectious Diseases (NIID)*
- Johnson & Johnson
- KNCV Tuberculosis Foundation
- Korean Institute of Tuberculosis
- Laboratório Farmacêutico do Estado de Pernambuco (LAFEPE)
- Lepra
- Leprosy Relief (SLC)
- Liverpool School of Tropical Medicine (LSTM)
- Mapp Biopharmaceuticals

ORGANISATION NAME

- Max Planck Society – Max Planck Institute for Infection Biology (MPIIB)
- Médecins Sans Frontières (MSF)
- Medicines for Malaria Venture (MMV)
- Mexican National Institute of Public Health (INSP)
- Mexico National Council of Science and Technology (CONACYT)
- Mologen AG
- MSD (Merck)
- Mymetics
- National Research Council of Thailand (NRCT)*
- Netherlands Leprosy Relief (NLR)
- Norwegian Institute of Public Health
- Novartis
- Okairos
- Omega Diagnostics
- OneWorld Health (OWH)
- Ontario HIV Treatment Network*
- Ortho-Clinical Diagnostics, Inc.
- Otsuka Pharmaceutical Co., Ltd.
- Ouro Fino
- Pfizer
- Population Council
- PATH
  – including data from the Meningitis Vaccine Project (MVP), Malaria Vaccine Initiative (MVI), Technology Solutions, Vaccine Development, Vaccine Access and Delivery
- Public Health Agency of Canada (PHAC)*
- Public Health England – previously the Health Protection Agency
- Research Centre Borstel
- Research Council of Norway
- Roche
- Royal Norwegian Ministry of Foreign Affairs
  – including data from the Norwegian Agency for Development Cooperation (NORAD)
- Royal Society of New Zealand (RSNZ)
- Royal Tropical Institute (KIT)
- Sabin Vaccine Institute
- Sanofi
- Sanofi Pasteur
- Sarepta Therapeutics
- Sasakawa Memorial Health Foundation (SMHF)
- Science Foundation Ireland
- Serum Institute of India
- Shantha Biotechnics
- Shin Poong Pharmaceutical Co., Ltd.
- Sidaction*
- Sigma-Tau
- South Africa Medical Research Council (MRC)
- South African Department of Science and Technology (DST)
  – including data from the Technology Innovation Agency
- Spanish Clinical Foundation for Biomedical Research, Fundacio Clinic per a la Recerca Biomedica (FCRB)
- Spanish Ministry of Foreign Affairs and Cooperation for Development (MAEC)
  – including data from the Agency of International Cooperation for Development (AECID)
- Statens Serum Institute (SSI)
- Sumagen Co., Ltd.*
- Swedish International Development Agency (SIDA)
- Swedish Research Council
- Swiss Agency for Development and Cooperation (SDC)
- Swiss National Science Foundation (SNSF)
- Swiss State Secretariat for Education, Research and Innovation (SERI)
- Swiss Tropical & Public Health Institute (Swiss TPH)
- Syngenta Crop Protection AG
- Synstar Japan Co., Ltd.
- Takeda Pharmaceutical Company
- Thailand Government Pharmaceutical Organisation (GPO)
- Thailand National Science and Technology Development Agency (NSTDA)
- The Leprosy Mission International (TLMI)
- The Wellcome Trust

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

ORGANISATION NAME

- TIB MOLBIOL
- Tibotec
- TuBerculosis Vaccine Initiative (TBVI)
- UBS Optimus Foundation
- UK Department for International Development (DFID)
- UK Medical Research Council (MRC)
- United States Agency for International Development (USAID)
- University of California Irvine
- University of Dundee
- University of Georgia (UGA)
- University of Nebraska Medical Center
- University of North Carolina
- 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)
- US Public Health Research Institute
- Walter Reed Army Institute of Research (WRAIR)
  – including data from the Military HIV Research Program (MHRP)*
- World Bank
- World Health Organization: Special Programme for Research and Training in Tropical Diseases (WHO/TDR)

ANNEXE 4

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