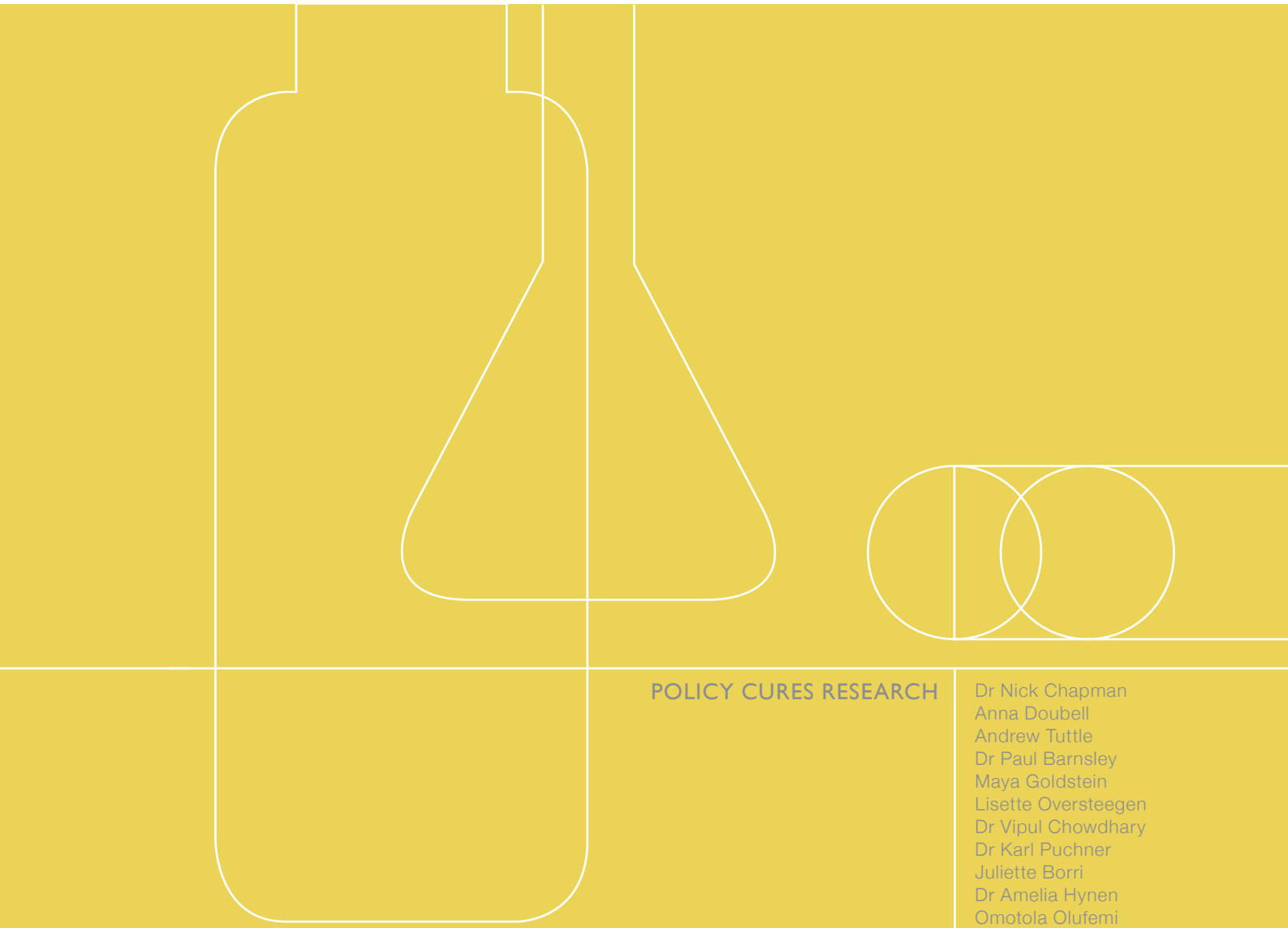
G-FINDER | 2021

POLICY CURES RESEARCH.

NEGLECTED DISEASE RESEARCH AND DEVELOPMENT: **NEW PERSPECTIVES**



POLICY CURES RESEARCH

Dr Nick Chapman
Anna Doubell
Andrew Tuttle
Dr Paul Barnsley
Maya Goldstein
Lisette Oversteegen
Dr Vipul Chowdhary
Dr Karl Puchner
Juliette Borri
Dr Amelia Hynen
Omotola Olufemi
Madeleine Kearney
Thomas Clifton
Dr Alex Ankomah
Oluwafolajimi Adesanya

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CONTENTS

INTRODUCTION 5
- The G-FINDER report 5
- What types of funding does G-FINDER include? 6

FUNDING BY NEGLECTED DISEASE 12
- HIV/AIDS 14
- Tuberculosis 16
- Malaria 18
- Diarrhoeal diseases 20
- Kinetoplastid diseases 22
- Helminth infections (worms and flukes) 24
- Salmonella infections 26
- Dengue 28
- Bacterial pneumonia & meningitis 30
- Hepatitis B 32
- Hepatitis C 34
- Rheumatic fever 36
- Snakebite envenoming 38
- Leprosy 40
- Cryptococcal meningitis 42
- Histoplasmosis 44
- Buruli ulcer 46
- Trachoma 48
- Leptospirosis 50
- Scabies 52
- Mycetoma 54
- R&D for more than one disease 56

NEGLECTED DISEASE FUNDERS 60
- Public funding 61
- Philanthropic funding 67
- Private sector funding 70
- Top funding organisations 73

FUNDING FLOWS 74
- Funding flow trends 75
- Funding by R&D stage 76
- Funding for product development partnerships 77
- Funding for other intermediaries 79

DISCUSSION 81

ANNEXURE A – ADVISORY COMMITTEE MEMBERS 87

ANNEXURE B – METHODOLOGY 88

ANNEXURE C – SURVEY PARTICIPANTS 92

ANNEXURE D – REFERENCES 96

INTRODUCTION

The G-FINDER report

Each year since 2007, G-FINDER has provided policy-makers, donors, researchers and industry with a comprehensive analysis of global investment into research and development of new products to prevent, diagnose, control or cure neglected diseases in developing countries, making it the gold standard in tracking and reporting global funding for neglected disease R&D.

This year's report, the fourteenth overall, focuses on investments made in participants' 2020 financial year ('FY2020'). We have adopted some changes to the formatting and structure of our report based on the response to the consolidated version we published last year on 2019 spending. While many graphs and tables have been returned to this version, the full suite of graphs and tables provided in previous reports can also be created using our online data portal: https://gfinderdata.policycuresresearch.org/

This year's report contains an overview of neglected disease funding, measured in 2020 US dollars, including:

- figures for individual diseases and product categories;
- analysis of public, philanthropic and (anonymised, aggregated) private neglected disease funders;
- details of the flow of funds to product development partnerships, other intermediaries and directly to researchers and developers; and
- a discussion of this year's key findings and how they fit with longer term trends, including the future impact of COVID-19 on funding for neglected diseases.

Last year's pandemic-driven reduction in survey participation meant that many of the headline findings in the last G-FINDER Neglected Diseases report were the result of reduced reporting rather than an actual drop in funding, requiring us to provide participation-adjusted figures in a number of places, including for the apparent fall in overall neglected disease R&D funding. We have subsequently been able to obtain retrospective Indian funding data for 2019, correcting more than half of the fall in 2020 participation. Figures for 2019 funding quoted in this report reflect this retrospective addition of Indian funding data, as well as several smaller improvements to our 2019 figures, and supersede the numbers presented in last year's report.

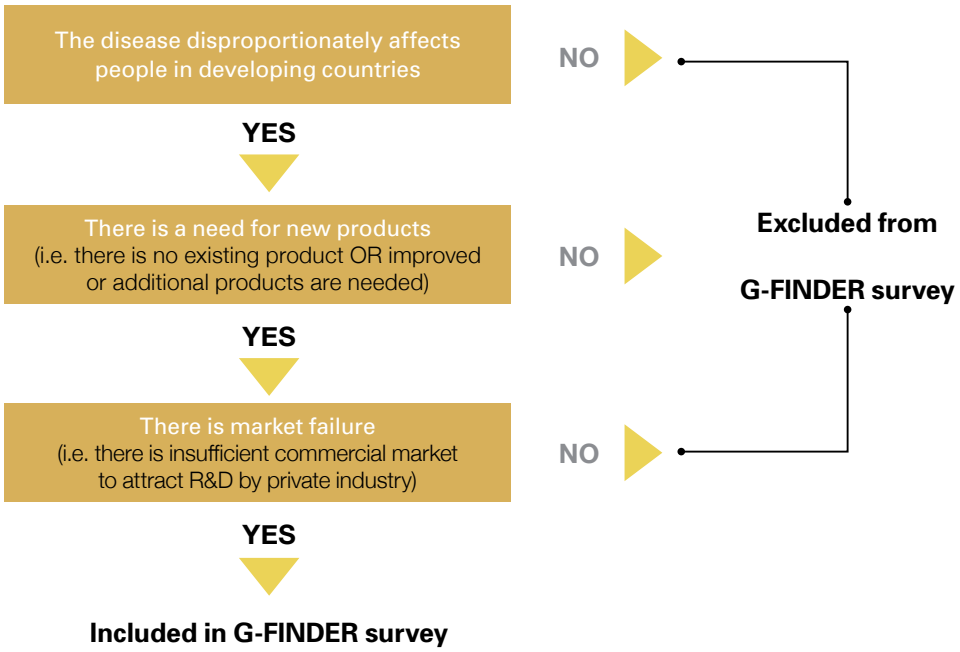
Other than our resumed collection of Indian funding data, participation in the G-FINDER report remained relatively consistent between the last two survey years. The few instances in which headline funding totals are potentially misleading due to survey participation effects are highlighted throughout the report.

What types of funding does G-FINDER include?

DEFINING NEGLECTED DISEASES

The scope of the G-FINDER survey is determined in consultation with an Advisory Committee made up of a broad cross-section of international experts in neglected diseases and product development. The basis of this determination is the three-stage filter outlined in Figure 1. As this filter is applied not only at the overarching disease level but also at the product level, not all product areas are included for all of the diseases in the G-FINDER scope, and some are included only where they meet additional conditions designed to identify products targeting low- and middle-income countries (LMICs).

Figure 1. Identifying neglected diseases



Multi-disease investments judged to have a sufficient connection with fighting neglected disease, including platform technologies (adjuvants and immunomodulators, diagnostic platforms, and delivery devices for drugs or vaccines), multi-disease vector control R&D and core funding to neglected-disease-focused organisations are captured in our 'non-disease-specific' funding category.

Table 1 offers a complete breakdown of which disease and product combinations are included in our funding totals.

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

Disease		Basic research	Drugs	Vaccines	Biologics	Diagnostics	Microbicides	Vector control products
HIV/AIDS		Restricted	Restricted	✓	Restricted	✓	✓	-
Tuberculosis		✓	✓	✓	✓	✓	-	-
Malaria	*P. falciparum*	✓	✓	✓	✓	✓	-	✓
	P. vivax	✓	✓	✓	✓	✓	-	✓
	Multiple / other malaria strains	✓	✓	✓	✓	✓	-	✓
Diarrhoeal diseases	*Shigella*	✓	Restricted	✓	Restricted	✓	-	-
	Cholera	✓	Restricted	✓	Restricted	✓	-	-
	Rotavirus	Restricted	-	Restricted	-	-	-	-
	Cryptosporidiosis	✓	Restricted	✓	Restricted	✓	-	-
	Enterotoxigenic *E. coli* (ETEC)	Restricted	-	✓	-	✓	-	-
	Enteroaggregative *E. coli* (EAEC)	-	-	✓	-	✓	-	-
	Giardiasis	-	-	-	-	✓	-	-
	Multiple diarrhoeal diseases	✓	Restricted	✓	Restricted	✓	-	-
Kinetoplastid diseases	Leishmaniasis	✓	✓	✓	✓	✓	-	-
	Chagas' disease	✓	✓	✓	✓	✓	-	✓
	Sleeping sickness (HAT)	✓	✓	✓	✓	✓	-	✓
	Multiple kinetoplastid diseases	✓	✓	✓	✓	✓	-	✓
Helminth infections (worms & flukes)	Schistosomiasis (bilharziasis)	✓	✓	✓	✓	✓	-	✓
	Onchocerciasis (river blindness)	✓	✓	✓	-	✓	-	✓
	Lymphatic filariasis (elephantiasis)	✓	✓	-	-	✓	-	✓
	Tapeworm (taeniasis / cysticercosis)	✓	✓	-	-	✓	-	✓
	Hookworm (ancylostomiasis & necatoriasis)	✓	✓	✓	-	-	-	-
	Whipworm (trichuriasis)	✓	✓	-	-	-	-	-
	Strongyloidiasis & other intestinal roundworms	✓	✓	✓	-	✓	-	-
	Roundworm (ascariasis)	✓	✓	-	-	-	-	-
	Multiple helminth infections	✓	✓	✓	-	✓	-	✓
***Salmonella* infections**	Typhoid and paratyphoid fever (*S.* Typhi, *S.* Paratyphi A)	✓	✓	✓	✓	✓	-	-
	Non-typhoidal *S. enterica* (NTS)	✓	✓	✓	✓	✓	-	-
	Multiple *Salmonella* infections	✓	✓	✓	✓	✓	-	-
Dengue		✓	✓	-	✓	✓	-	✓
Bacterial pneumonia & meningitis	*S. pneumoniae*	Restricted	-	Restricted	-	✓	-	-
	N. meningitidis	Restricted	-	Restricted	-	✓	-	-
	Both *S. pneumoniae* and *N. meningitidis*	Restricted	-	-	-	✓	-	-
Hepatitis B		Restricted	Restricted	-	Restricted	✓	-	-
Hepatitis C		-	Restricted	✓	-	✓	-	-
Rheumatic fever		-	-	✓	-	-	-	-
Snakebite envenoming		Restricted	Restricted	-	Restricted	Restricted	-	-
Leprosy		✓	✓	✓	✓	✓	-	-
Cryptococcal meningitis		-	✓	-	✓	-	-	-
Histoplasmosis		✓	✓	-	-	✓	-	-
Buruli ulcer		✓	✓	✓	-	✓	-	-
Trachoma		-	-	✓	-	✓	-	-
Leptospirosis		-	-	-	-	Restricted	-	-
Scabies		Restricted	✓	-	-	✓	-	-
Mycetoma		✓	✓	-	-	✓	-	-

Investment applicable to more than one neglected disease, or to more than one global health area*

Platform technologies					
General diagnostic platforms	Adjuvants & immunomodulators	Drug delivery technologies & devices	Vaccine delivery technologies & devices	Multi-disease vector control	Core funding of a multi-disease R&D organisation
Restricted	Restricted	Restricted	Restricted	✓	✓

✓ denotes a category where a disease or product is included in the survey
Restricted denotes a category where only some investments are eligible, as defined in the G-FINDER neglected disease R&D scope document
* The G-FINDER project covers three global health areas: neglected diseases, emerging infectious diseases, and sexual & reproductive health issues

TYPES OF RESEARCH INCLUDED

Funding included in G-FINDER covers the spectrum from basic research to post-registration studies of new products. We break these activities down into the broad categories of basic & early-stage research and clinical or field development & post-registration studies:

- Basic & early-stage research, including:
  - Basic research
  - Discovery and pre-clinical development
- Clinical or field development & post-registration studies, including:
  - Baseline epidemiology in preparation for product trials
  - Clinical development and field evaluation
  - Post-registration studies of new products, including Phase IV/pharmacovigilance, and operational research for diagnostics

The purpose of G-FINDER is to track and analyse global investment in the research and development of new health technologies for neglected diseases; it is not intended to capture investment in the entire spectrum of neglected disease research. This means that significant and important investments in health systems and operational/implementation research and sociological, behavioural and epidemiological research not related to the development of new health technologies are not included in these funding totals. Similarly, funding for health programme delivery, advocacy, routine disease surveillance programmes, community education and general capacity building to address neglected diseases falls outside the scope of G-FINDER.

For a detailed breakdown of the diseases, products and activities included, please see our neglected disease R&D scope:
https://gfinder.policycuresresearch.org/staticContent/pdf/G-FINDER_ND_R%26D_scope.pdf.

CHANGES TO THE LIST OF NEGLECTED DISEASES

The G-FINDER scope is reviewed annually. This year, at the recommendation of our Advisory Committee (listed in Annexure A) histoplasmosis and scabies were added to the survey scope – including R&D for all product categories for both diseases, all basic research for histoplasmosis and basic research which is explicitly targeted at LMIC-related disease burden for scabies. We also moved to include LMIC-focused basic research on rotavirus and Enterotoxigenic *E. coli* as well as relaxing the restriction requiring hepatitis C vaccine R&D to be LMIC-specific. Since these newly-included areas accounted for no more than 0.2% of global funding in FY2020, the overall neglected disease R&D figures presented in the report can reasonably be compared to those from the previous year, other than the differences in survey participation outlined above. For comparisons with earlier years, please take care when examining overall totals, since some changes may reflect the gradual expansion in our survey's scope.

A more detailed history of the G-FINDER survey's scope is available on our website:
https://www.policycuresresearch.org/rd-needs-for-global-health/

INFLATION ADJUSTMENTS AND AGGREGATION OF INDUSTRY DATA

Funding data is adjusted for inflation and converted to US dollars (US$) to eliminate artefactual effects caused by inflation and exchange rate fluctuations.

All pharmaceutical industry funding data is aggregated and anonymised for confidentiality purposes, with a distinction made between multinational pharmaceutical companies (MNCs) and small pharmaceutical and biotechnology firms (SMEs).

FUNDING FOR EMERGING INFECTIOUS DISEASES AND SEXUAL & REPRODUCTIVE HEALTH

For the last several years, the G-FINDER survey has been expanded to gather data about funding for R&D targeting emerging infectious diseases and sexual & reproductive health. This data and an analysis of the related R&D funding trends are not included in the G-FINDER Neglected Disease report, but are covered instead in our ongoing series of companion reports (see https://www.policycuresresearch.org/analysis). However, all available neglected disease, emerging infectious disease and sexual & reproductive health survey data (now including FY2020 figures) are available immediately via the G-FINDER data portal (https://gfinderdata.policycuresresearch.org/). The data on funding for COVID-19 was gathered as part of this year's survey is available via the data portal and will ultimately be presented in our forthcoming report on funding for emerging infectious diseases later this year.

SUPPLEMENTARY MATERIALS

Details on the survey methodology and data validation are included in Annexure B
http://www.policycuresresearch.org/g-finder

All of the data behind the G-FINDER report is available through the online search tool at
https://gfinderdata.policycuresresearch.org

Table 2. Disease and product R&D funding 2020 (US$ millions)

Disease or R&D area	Basic research	Drugs	Vaccines	Biologics	Diagnostics	Microbicides	Vector control products	Unspecified	Total
HIV/AIDS	222.25	171.84	710.31	77.27	31.73	103.62		51.28	**1,368.30**
Tuberculosis	195.51	341.87	72.94	0.33	65.85			7.46	**683.97**
Malaria	175.55	226.35	117.58	5.27	17.01		64.87	12.21	**618.84**
P. falciparum	74.24	63.91	89.00	2.74	4.64		4.02	2.64	**241.21**
P. vivax	13.90	25.08	10.03	-	1.92		0.27	-	**51.19**
Multiple / other malaria strains	87.41	137.36	18.55	2.53	10.45		60.58	9.57	**326.44**
Diarrhoeal diseases	48.70	14.68	75.54	3.44	2.32			6.70	**151.36**
Shigella	9.28	2.35	25.20	1.95	0.79			-	**39.57**
Cholera	28.05	1.84	4.95	-	0.47			0.75	**36.07**
Rotavirus	0.03		33.31					0.75	**34.09**
Cryptosporidiosis	8.66	10.09	0.71	-	0.12			-	**19.59**
Enterotoxigenic *E. coli* (ETEC)	0.13		8.00		0.08			-	**8.21**
Enteroaggregative *E. coli* (EAEC)			-		0.02			-	**0.02**
Giardiasis					-				**-**
Multiple diarrhoeal diseases	2.54	0.39	3.36	1.48	0.84			5.20	**13.82**
Kinetoplastid diseases	49.91	88.07	4.66	0.03	3.45		0.10	0.05	**146.27**
Leishmaniasis	20.72	21.44	2.47	0.03	0.12			0.03	**44.81**
Chagas' disease	7.99	22.36	2.13	-	2.46		0.02	<0.01	**34.95**
Sleeping sickness (HAT)	18.88	13.00	0.06	-	0.88		-	-	**32.82**
Multiple kinetoplastid diseases	2.32	31.27	-	-	-		0.09	<0.01	**33.69**
Helminth infections (worms & flukes)	38.29	24.02	5.52	-	6.90		0.54	1.19	**76.46**
Schistosomiasis (bilharziasis)	10.78	4.40	3.56	-	2.51		0.51	-	**21.77**
Onchocerciasis (river blindness)	1.17	10.14	0.71		1.29		0.02	-	**13.32**
Lymphatic filariasis (elephantiasis)	7.21	3.15			0.88		0.02	1.18	**12.43**
Tapeworm (taeniasis / cysticercosis)	3.68	1.50			1.48		-	-	**6.66**
Hookworm (ancylostomiasis & necatoriasis)	2.18	0.78	1.25					-	**4.21**
Whipworm (trichuriasis)	2.72	0.30						-	**3.02**
Strongyloidiasis & other intestinal roundworms	2.27	0.48	-		0.02			-	**2.77**
Roundworm (ascariasis)	1.63	0.15						-	**1.78**
Multiple helminth infections	6.64	3.11	-		0.73		-	0.01	**10.49**
***Salmonella* infections**	36.24	2.72	32.91	-	1.64			1.95	**75.46**
Typhoid and paratyphoid fever (*S.* Typhi, *S.* Paratyphi A)	24.53	2.47	29.16	-	1.38			-	**57.53**
Non-typhoidal *S. enterica* (NTS)	2.64	-	2.04	-	0.12			-	**4.80**
Multiple *Salmonella* infections	9.07	0.26	1.71	-	0.14			1.95	**13.13**
Dengue	28.62	23.55		3.94	8.18		10.09	0.78	**75.16**
Bacterial pneumonia & meningitis	4.05		61.06		0.87			0.25	**66.23**
S. pneumoniae	3.29		55.67		0.36			0.25	**59.56**
N. meningitidis	0.76		5.39		0.25			-	**6.40**
Both *S. pneumoniae* and *N. meningitidis*	-				0.27			-	**0.27**

Disease or R&D area	Basic research	Drugs	Vaccines	Biologics	Diagnostics	Microbicides	Vector control products	Unspecified	Total
Hepatitis B	4.23	4.66		5.71	0.37			2.82	17.79
Hepatitis C		7.67	2.46		6.43			-	16.56
Rheumatic fever			15.59						15.59
Snakebite envenoming	0.42	7.13		5.92	0.84			0.89	15.20
Leprosy	6.29	1.13	0.43	0.03	0.21			0.06	8.17
Cryptococcal meningitis		6.85		0.13				-	6.97
Histoplasmosis	3.47	0.10			0.46			-	4.03
Buruli ulcer	0.86	1.01	0.02		0.29			0.27	2.46
Trachoma			1.91		-			-	1.91
Leptospirosis					1.35				1.35
Scabies	0.66	0.21			-			0.31	1.18
Mycetoma	0.40	0.32			-			-	0.72
Platform technologies									128.87
General diagnostic platforms									50.60
Vaccine delivery technologies and devices									47.04
Adjuvants and immunomodulators									23.75
Drug delivery technologies and devices									7.49
Multi-disease vector control products									63.57
Core funding of a multi-disease R&D organisation									339.54
Unspecified disease									51.05
Total R&D funding									**3,937.00**

- No reported funding

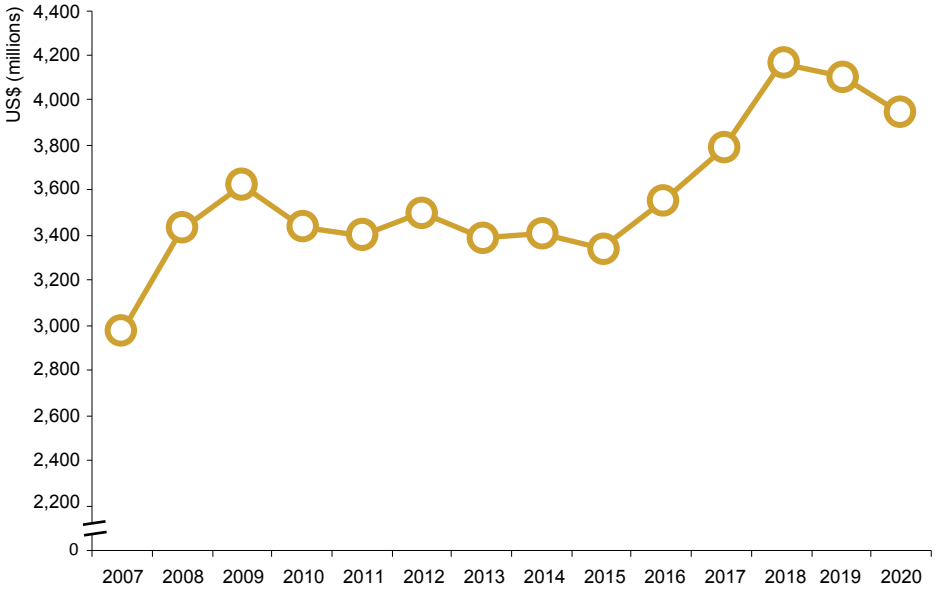
Category not included in G-FINDER

OVERVIEW OF NEGLECTED DISEASE R&D FUNDING

Reported global funding for basic research and product development for neglected diseases in 2020 was $3,937m, a drop of $172m (-4.2%) from 2019.

After funding remained mostly unchanged in 2019 (provided we adjust for variability in survey participation), the decline in 2020 reverses some of the three years of growth we observed between 2016 and 2018. Even after a slight decline, this year's funding for neglected disease R&D remains the third highest we have ever seen.

Figure 2. Total R&D funding for neglected diseases 2007-2020



Histoplasmosis and scabies were added to the G-FINDER survey of 2020, adding funding totalling $5.2m to our survey scope, while the addition of LMIC-focused basic research for Enterotoxigenic *E. coli* and rotavirus added less than $0.2m. We also relaxed the LMIC-specificity requirement for hepatitis C vaccine R&D, which was responsible for an additional $0.2m in included funding.

Neither these expansions of our scope, nor the slight net increase in participation compared to the previous survey had much influence on the headline funding figure: our best estimate of the true overall decline remains at just over 4%, even after adjusting for participation and scope.

The top three diseases – HIV/AIDS, tuberculosis, and malaria – received the largest shares of funding, as they have every year, accounting for more than two-thirds of reported global investment. Funding for each of the top three diseases fell in 2020, however, taking their share of global funding to a record-low 68% – down from an average of more than 75% over the first five years of the G-FINDER survey.

The drop in share for the top three diseases was driven by the significant rise in funding for non-disease-specific R&D – which includes core funding, funding for platform technologies, multi-disease vector control products and other multi-disease R&D. Non-disease-specific R&D grew by $47m (8.8%), marking six years of growth to a new record-high of $583m. This left non-disease-specific funding with a record 15% share of global funding, up nearly two percentage points from the previous record – which occurred just last year.

Funding for the WHO neglected tropical diseases (NTDs) covered by the G-FINDER survey totalled $328m, a decrease of $21m (-6.3%) from 2019, marking four years of decline from their 2016 peak and continuing a decade of relative stagnation. Amongst the NTDs, only snakebite envenoming saw increased investment in 2020 (up $3.6m, 31%).

Table 3. R&D funding by disease 2011-2020^

Disease or R&D area	US$ (millions)										2020 % of total
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
HIV/AIDS	1,278	1,307	1,193	1,222	1,149	1,237	1,327	1,485	1,500	1,368	35
Tuberculosis	618	586	599	618	617	636	652	697	717	684	17
Malaria	625	620	574	636	618	636	672	685	633	619	16
Diarrhoeal diseases	176	180	214	187	172	162	172	186	173	151	3.8
Kinetoplastid diseases	147	148	138	159	135	153	153	151	154	146	3.7
Helminth infections (worms & flukes)	91	98	99	96	83	80	96	91	88	76	1.9
Salmonella infections	51	61	69	70	73	99	86	94	81	75	1.9
Dengue	85	79	74	88	99	126	83	82	81	75	1.9
Bacterial pneumonia & meningitis	114	118	108	80	100	99	78	91	70	66	1.7
Hepatitis B								10	14	18	0.5
Hepatitis C			50	49	36	31	16	49	11	17	0.4
Rheumatic fever	1.3	1.4	1.1	1.7	2.8	1.9	1.8	2.0	13	16	0.4
Snakebite envenoming								7.9	12	15	0.4
Leprosy	8.9	14	12	11	11	12	12	9.1	9.8	8.2	0.2
Cryptococcal meningitis			3.2	5.9	5.4	6.0	12	8.3	8.1	7.0	0.2
Histoplasmosis										4.0	0.1
Buruli ulcer	6.1	6.4	6.8	3.9	2.0	2.9	4.3	2.6	2.8	2.5	<0.1
Trachoma	5.1	2.2	2.3	1.4	1.2	2.4	2.8	2.0	1.9	1.9	<0.1
Leptospirosis			0.4	1.3	1.4	2.5	3.2	1.7	1.9	1.3	<0.1
Scabies										1.2	<0.1
Mycetoma								0.6	0.9	0.7	<0.1
Platform technologies	19	54	48	25	39	58	38	59	96	129	3.3
General diagnostic platforms	11	18	18	11	17	19	12	22	34	51	1.3
Vaccine delivery technologies and devices	2.0	0.9	4.8	2.6	5.0	17	5.3	16	33	47	1.2
Adjuvants and immunomodulators	6.2	30	23	9.2	13	19	14	20	23	24	0.6
Drug delivery technologies and devices	-	4.3	1.8	2.6	3.8	3.4	6.7	2.2	5.6	7.5	0.2
Multi-disease vector control products							31	41	65	64	1.6
Core funding of a multi-disease R&D organisation	92	110	121	112	149	168	290	342	310	340	8.6
Unspecified disease	83	120	79	41	50	37	53	67	66	51	1.3
Total R&D funding	3,400	3,505	3,393	3,406	3,344	3,548	3,782	4,164	4,109	3,937	100

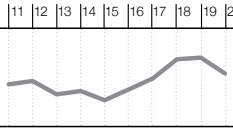
Hepatitis C, cryptococcal meningitis and leptospirosis were added to G-FINDER in 2013. Multi-disease vector control products were added in 2017. Mycetoma, snakebite envenoming and hepatitis B were added in 2018. Histoplasmosis and scabies were added in 2020.

^ 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.

\- No reported funding

HIV/AIDS

47M DALYS
849K DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$1,368m	35%	-8.8%			

Total funding for HIV/AIDS R&D was $1,368m in 2020, falling $132m (-8.8%) from 2019's historic high – its largest ever decline.

The vast majority of the drop was due to the combined decrease in funding from the US NIH (down $55m, -5.6%), the Gates Foundation (down $26m, -17%) and industry (down $46m, -24%). Despite the drop in its overall funding, especially for vaccine R&D, the US NIH continued to be the predominant funder of HIV/AIDS R&D ($926m, 68% of the total). Only two funders saw significant increases in 2020: USAID (up $8.2m, 20%) and the US DOD (up $9.3m, 52%).

Partly as a result of the decline in US NIH funding, global funding for vaccine R&D fell by $66m (-8.4%), leaving it just above its record low. The main contributor, however, was a drop in investment from industry (down $33m, -32%) after a two-year peak. The Gates Foundation also reduced its vaccine R&D investment (down $12m, -13%), as funding for two South African efficacy trials wound down.

Drug R&D funding also fell, dropping by $33m (-16%) due to decreased investment from the Gates Foundation (down $16m, -65%), as well as a decline in industry investment from its 2018-19 peak.

While Gates Foundation HIV/AIDS funding saw reductions for drugs, vaccines and a two-thirds reduction in its basic research spend, it did have a significant increase for biologics (up $19m, 217%), which helped push global R&D funding for HIV biologics to a record-high. This jump in biologics R&D was partly due to a $14m increase in funding under a partnership between the Gates Foundation and the NIH to develop LMIC-appropriate gene therapies.

HIV/AIDS diagnostic R&D funding fell by a third (down $15m, -33%) for the second consecutive year, as the US NIH and Unitaid both reported reduced investments. The ongoing fall in Unitaid's funding comes as its LMIC-based post-registration studies for point-of-care diagnostics for early infants and HIV-positive mothers neared their conclusion. Funding for microbicide R&D continued its gradual decline from its peak in 2008.

In an ongoing reversal of the prior trend, nearly half of all HIV/AIDS funding was for basic & early-stage research ($653m, 48%), slightly above the 45% ($613m) for clinical development. The overall drop in HIV/AIDS R&D funding disproportionately fell on clinical development & post-registration studies (down $70m, -10%), largely due to reductions from industry and the Gates Foundation across most product categories.

pipeline spotlight

Following EMA approval and WHO prequalification in 2020, the International Partnership for Microbicides' dapivirine vaginal ring (DPV-VR) was recommended by WHO as an additional prevention choice for women at substantial risk of HIV.[1] A newly developed AIOD-CRISPR assay system was able to successfully detect nucleic acids of both SARS-CoV-2 and HIV.[2]

Unmet R&D needs: There is currently no vaccine against HIV, and the rapid mutation of the virus poses a significant challenge to development. Currently, only one large HIV vaccine efficacy trial is underway: a global Phase III HVTN 706.[3] Two other large HIV vaccine efficacy studies, HVTN 705 and HVTN 702 have both ceased due to non-efficacy.[4] Despite advances in HIV therapeutics, R&D gaps for HIV drugs persist in LMICs, including paediatric formulations or long-acting injectable drugs for PrEP, with promising progress underway, including both small molecule and broadly neutralising anti-HIV antibody (bNAb) based approaches.[5,6,7] In addition, microbicides – preventive tools designed to block transmission of HIV through the vaginal or rectal mucosa – have shown promise as a complementary tool. Current methods for early diagnosis are often not adapted to, or suitable for, developing countries, especially early infant diagnosis. However, there is progress towards robust, point-of-care diagnostics, culminating in the recent WHO prequalification of several promising candidates.[8]

Figure 3. **HIV/AIDS R&D funding by product type 2011-2020**

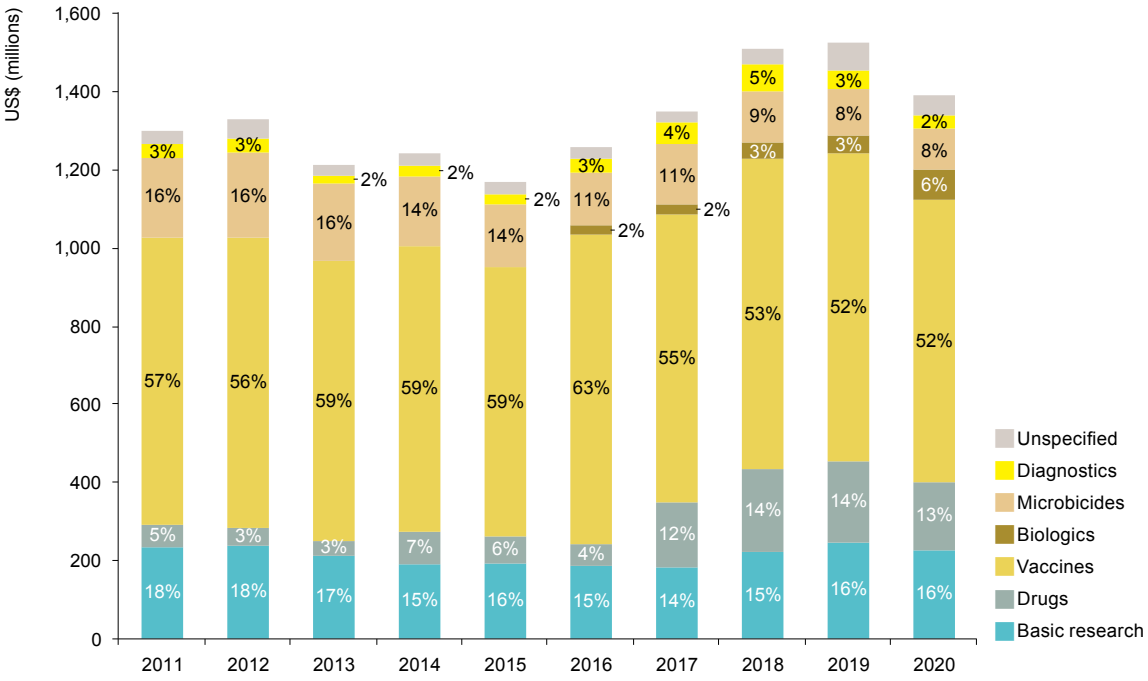


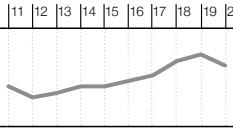
Table 4. **Top HIV/AIDS R&D funders 2020**

Funder \ US$ (millions)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
US NIH	821	836	752	780	768	809	782	916	981	926	68
Aggregate industry	26	24	17	50	60	92	156	209	190	144	11
Gates Foundation	139	137	133	122	119	142	145	138	153	127	9.3
USAID	81	80	72	64	64	51	66	50	41	50	3.6
US DOD	53	57	61	81	31	38	36	21	18	27	2.0
Unitaid	-	-	0.7	7.5	5.7	4.8	36	54	26	20	1.5
French ANRS	9.6	10	12	4.5	4.5	5.2	7.2	7.5	13	11	0.8
EC	22	16	18	14	13	17	16	14	11	11	0.8
UK FCDO	14	19	6.4	10	1.4	5.5	10	12	12	5.8	0.4
Canadian CIHR	7.8	8.1	8.3	6.6	6.6	5.9	6.2	8.3	5.7	5.7	0.4
Inserm	14	13	13	11	12	11	11	6.3	7.8	5.3	0.4
South African DSI	3.0	4.0	4.1	1.8	1.8	2.6	2.7	3.1	3.6	3.3	0.2
Subtotal of top 12^	1,208	1,231	1,121	1,174	1,105	1,200	1,283	1,447	1,464	1,336	98
Disease total	1,278	1,307	1,193	1,222	1,149	1,237	1,327	1,485	1,500	1,368	100

^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.
- No reported funding

TUBERCULOSIS

47M DALYS
1.2M DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$684m	17%	-4.6%			

Global investment for tuberculosis (TB) basic research and product development in 2020 was $684m. Funding fell $33m (down 4.6%) from its record high in 2019, after four consecutive years of growth. For the third year running, TB received the second most funding of any neglected disease, behind only HIV/AIDS.

Funding from the US National Institutes of Health (NIH) – the top funder of TB R&D every year since 2009 – fell by $21m (-6.5%) from last year's record high, though it remained at the second highest level ever reported. Record-high funding from the European Commission (EC)[1] – mostly reflective of new funding for the European Regimen Accelerator for Tuberculosis – was enough to offset the drop in NIH funding, but thanks to falls from most of the remaining top funders, overall funding declined.

The significant shifts in overall funding were mostly concentrated in drug R&D, including the big increase in EC funding (up $22m, 477%) and the majority of the reductions from the US NIH (down $18m, -18%), USAID (down $9.1m, -72%), Unitaid (down $7.2m, -50%) and the German BMBF (down $6.8m, -42%).

The smaller drop in vaccine funding mostly resulted from reduced investment from industry (down $4.5m, -53%), and a slight fall in NIH vaccine funding from its record high in 2019. The vaccine-focused drop in industry funding continued a long-term decline in overall private sector investment, which fell to its lowest level in more than a decade (down $3.3m, -3.7%). Diagnostic R&D was the only product to receive more funding in 2020, largely driven by a four-fold increase in funding from Unitaid (up $3.5m, 545%).

A majority of funding for tuberculosis went to either basic (29%) or early-stage research (32%), each receiving their highest share of funding in over a decade. Just under a quarter went to clinical development ($157m, 23%), which fell by $28m (-15%) to its lowest share since 2009. The downturn in clinical development funding was partially driven by the drop-off in reported disbursements to clinical trial units for drug development, and may reflect the impact of COVID-related disruptions on the clinical trial process.

pipeline spotlight

In the TB Practecal Phase II/III trial, a new shorter, all oral regimen containing the new chemical entity pretomanid proved to be superior to the current standard of care for DR-TB.[9] More than 14 preventive vaccine candidates are under development, with Immuvac and VPM1002 being currently tested in a large Phase III trial in India.[10]

Unmet R&D needs: Despite recent improvements in diagnostic tools, TB is still lacking a reliable and accessible point-of-care test.[11] There is also a need for improved tests to diagnose TB in children, and to test for drug resistance and susceptibility. The existing TB vaccine (BCG) is still in widespread use, but provides limited protection against pulmonary disease in adults. A vaccine which provides protection against all forms of TB in all age groups is needed; current efforts target one or more of prevention of infection, prevention of disease, or prevention of recurrence. New drugs are needed that can shorten treatment, work against both drug-sensitive and drug-resistant TB, are suitable for all age groups, are safe to use in conjunction with HIV treatments, and can be used in new treatment paradigms, including treatment of latent TB and MDR-TB prophylaxis.[12] Therapeutic vaccines and other biologics are also a potential tool to simplify and shorten TB treatment.

[1] The term 'EC' used here and throughout the report refers to funding from the European Union budget that is managed by the European Commission or related European Union partnerships and initiatives.

Figure 4. **TB funding by product type 2011-2020**

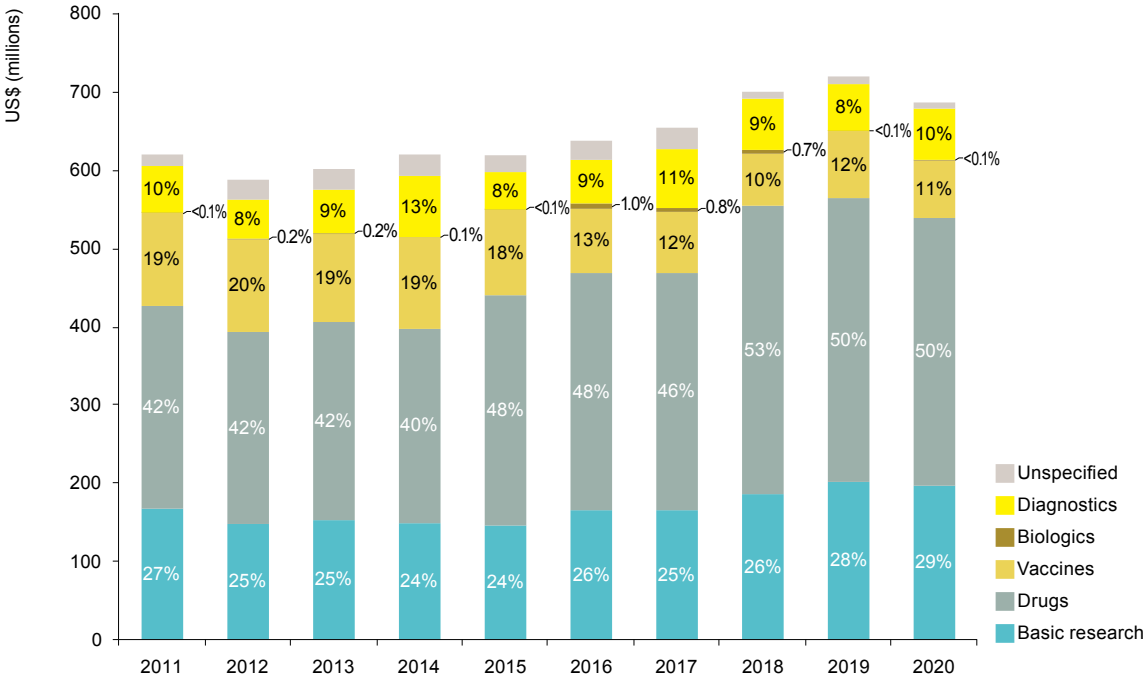


Table 5. **Top TB R&D funders 2020**

Funder \ US$ (millions)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
US NIH	191	199	185	210	218	229	253	280	319	299	44
Gates Foundation	108	113	140	147	141	108	95	106	119	120	17
Aggregate industry	172	148	122	113	110	101	106	106	89	86	13
EC	19	11	20	16	26	22	17	12	8.7	31	4.6
German BMBF	4.0	5.0	5.1	6.2	7.0	9.8	17	16	23	15	2.1
Indian ICMR	3.6	7.1	8.5	8.7	8.4	13	19	20	16	15	2.1
US CDC	11	-	-	16	9.7	9.2	16	15	13	14	2.1
UK FCDO	11	1.4	13	14	12	7.7	14	23	17	13	1.9
Unitaid	-	0.4	2.2	0.5	6.6	35	12	13	15	11	1.7
UK MRC	13	14	11	9.6	7.2	9.3	8.6	7.7	11	9.9	1.5
Wellcome Trust	11	12	13	12	9.8	9.0	9.1	10	12	9.8	1.4
MSF	0.3		-	-	-	0.9	2.8	5.5	6.1	6.0	0.9
Subtotal of top 12^	562	534	538	569	570	573	579	627	657	629	92
Disease total	618	586	599	618	617	636	652	697	717	684	100

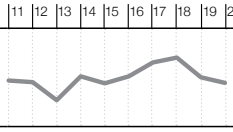
^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.

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.

- No reported funding

MALARIA

46M DALYS
643K DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$619m	16%	-2.3%			

Total funding for malaria basic research and product development in 2020 was $619m. This was a small decrease from 2019 (down $15m, -2.3%), and the second year of decline, following the three consecutive years of growth which had culminated in 2018's record high.

The distribution of product funding was largely unchanged in 2020, with over a third of R&D funding going to drugs ($226m, 37%), 28% ($176m) to basic research, and about a fifth ($118m, 19%) to vaccine R&D. A further 10% ($65m) went to vector control products (VCPs), while the other product areas each received less than $20m.

The 2020 drop in overall funding was felt most heavily in vaccine R&D, where investment dropped by $21m (-15%). Vaccine R&D funding has been trending downwards since 2017, making this its third consecutive year of decline, and taking it to its lowest level since 2010. Funding from all five of 2019's top malaria vaccine R&D funders – the US NIH, industry, the Gates Foundation, US DOD and USAID – fell, each continuing an ongoing decline.

This overall drop in vaccine R&D, however, was not shared equally across R&D stages. Whereas funding for clinical development fell for a third year running, funding to early-stage vaccine research continued to grow. This reflects the transitional state of the pipeline following the progression of RTS,S and the search for next generation vaccines – and potentially also the challenges to clinical research posed by COVID-19.

Diagnostic R&D funding slumped by 40%, totalling just $17m after a three-year period over which it averaged well over $20m. The decline was driven by the same organisations responsible for the three years of high funding: NIH funding fell by $2.3m (-28%) from its 2019 peak, the Gates Foundation's by $4.4m (-59%), and the UK DHSC, which began a new funding stream for malaria diagnostics in 2017, by $3.3m (-49%).

In contrast, VCP funding leapt by 25% ($13m), despite the absence of 2020 data from a long-term industry funder. Adjusting for participation, the increase was closer to 33%. This spike in VCP investment was driven by a 70% increase in Gates Foundation funding, leaving it with a 65% share in 2020. The increase lifted spending to nearly double its average level over the first decade of the G-FINDER survey, and left VCPs with a record share of malaria R&D funding.

pipeline spotlight

In October 2021, based on pilot programmes in Malawi, Kenya and Ghana – and following shortly after a Phase III trial showed its effectiveness in significantly reducing malaria mortality when combined with chemoprevention – WHO recommended the use of RTS,S/AS01E for children in areas with moderate to high *P. falciparum* malaria transmission.[13,14]

Unmet R&D needs: There remains a clear need for a more efficacious vaccine, as well as vaccines that can provide protection against *P. vivax*, and/or block transmission.[15] New drugs are needed in response to emerging resistance and to meet the needs of key populations, as well as for chemoprotection, and – ideally – to meet the goal of a single-dose treatment. In addition to small molecule drugs, monoclonal antibodies (mAbs) are being investigated. There is an urgent need to develop new rapid diagnostic tests in response to emerging *pfhrp2/3* gene deletion in malaria parasites,[16] as well as a need for more sensitive diagnostics to identify non-*falciparum* species, distinguish malaria from other febrile illnesses, detect asymptomatic cases, and diagnose G6PD enzyme deficiency. Next-generation VCPs are needed in response to emerging pyrethroid resistance, including genetic approaches to reduce mosquito populations or block parasite transmission, as well as endectocides for malaria transmission control.[17]

Figure 5. **Malaria R&D funding by product type 2011-2020**

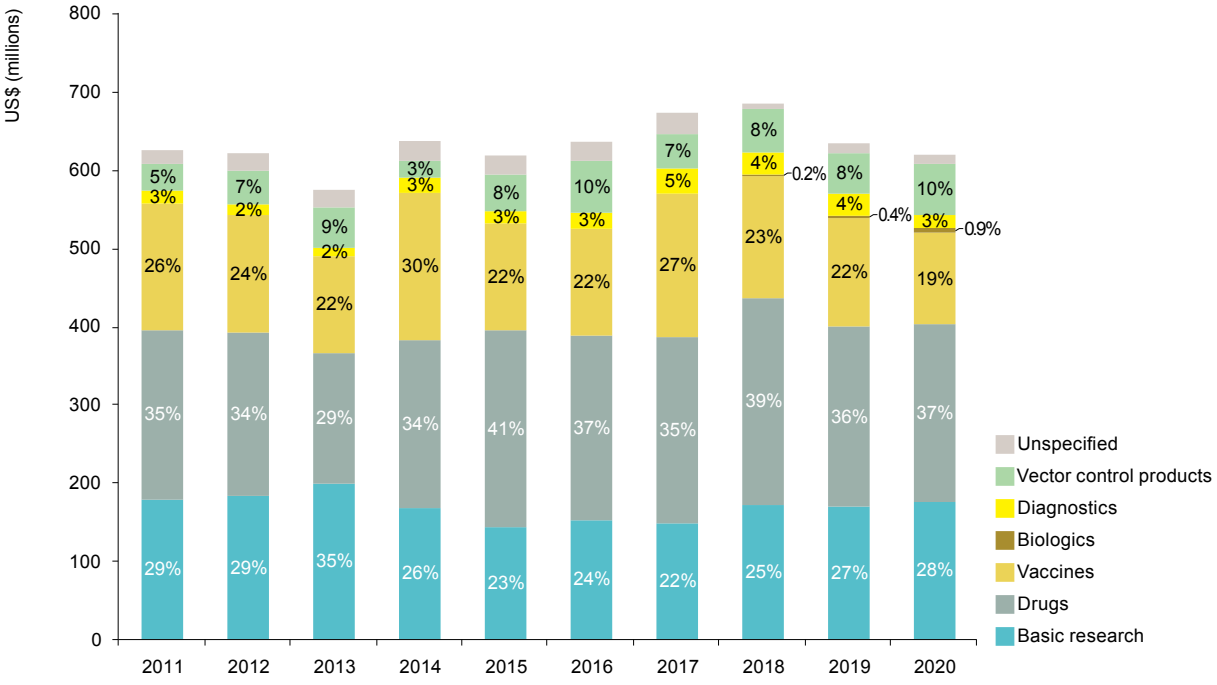


Table 6. **Top malaria R&D funders 2020**

Funder	US$ (millions) 2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
US NIH	153	191	155	165	171	179	182	177	172	181	29
Gates Foundation	181	149	141	160	129	135	110	130	125	129	21
Aggregate industry	97	112	80	124	149	145	141	166	122	112	18
UK FCDO	18	5.8	25	18	17	12	37	32	34	32	5.1
US DOD	24	17	29	40	48	45	37	41	35	27	4.3
Wellcome Trust	27	27	25	22	17	14	15	16	19	19	3.1
Indian ICMR	5.2	7.0	7.8	7.4	8.2	9.6	15	15	16	15	2.5
Australian NHMRC	13	15	12	11	3.3	3.4	4.3	9.9	11	14	2.2
EC	22	15	23	22	15	9.4	12	12	11	11	1.7
Open Philanthropy							8.2	4.4	3.7	9.8	1.6
UK MRC	17	16	16	14	8.3	11	13	9.0	10	9.1	1.5
Unitaid	-	-	6.2	9.0	8.5	4.1	4.1	2.8	7.4	8.9	1.4
Subtotal of top 12^	574	573	527	598	583	589	599	626	572	566	91
Disease total	625	620	574	636	618	636	672	685	633	619	100

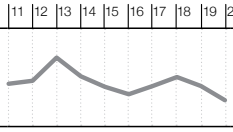
^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.

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.

- No reported funding

DIARRHOEAL DISEASES

46M DALYS
1.0M DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$151m	3.8%	-13%			

Diarrhoeal diseases received $151m in funding for basic research and product development in 2020, a 13% ($22m) reduction from 2019 and a second consecutive year of declining funding, taking it to its lowest level in the last decade.

Shigella ($40m, 26%), cholera ($36m, 24%) and rotavirus ($34m, 23%) received roughly equal shares of funding in 2020, jointly accounting for almost three-quarters of diarrhoeal disease funding. This was the highest ever combined share of funding for these three diseases, a result of gradually increasing concentration of funding since 2015. Cryptosporidiosis ($20m, 13%) and multiple diarrhoeal diseases ($14m, 9.1%) received the next largest shares, while *E. coli* R&D received only 5.4% ($8.2m). For the second year running, no funding was reported for giardiasis.

The substantial overall drop in diarrhoeal disease funding was mostly driven by reductions from the Gates Foundation (down $19m, -42%), US DOD (down $4.6m, -52%) and industry (down $9.1m, -19%) from their recent peaks, resulting in nearly universal declines across the individual pathogens. This masked an increase from the US NIH (up $11m, 25%), which made it the top funder of diarrhoeal disease R&D for the first time since 2014.

Vaccine R&D investment fell across most diarrhoeal diseases (down $22m, -23%), but the largest decreases were in rotavirus (down $13m, -28%) and *Shigella* (down $8.2m, -25%). Both were partly driven by reduced investment from the Gates Foundation, the result of a cyclical funding drop for an ongoing Phase III rotavirus vaccine efficacy trial, as well as decreased funding for O-antigen based *Shigella* vaccine licensure. These falls culminated in the Gates Foundation's smallest ever contribution to diarrhoeal disease R&D.

Along with the fall in Gates Foundation funding, the overall fall in *Shigella* vaccine funding was largely due to reduced investments from industry (down $4.0m, -32%), ending four years of growth.

Funding for multiple diarrhoeal diseases also decreased, falling by a third (down $6.9m, 33%), and continuing a seven-year decline in funding. The US DOD redirected $2.6m of vaccine R&D funding to malaria and the Gates Foundation reported no funding for basic research (down from $3.9m in 2019) or drug R&D ($0.7m in 2019), which collectively offset the first full year of EC funding for ShigETECvax.

Funding for cryptosporidiosis R&D was relatively stable (down $0.5m, -2.5%), following steady growth over the past six years.

pipeline spotlight

ShigETEC, the novel live attenuated combined *Shigella* and ETEC oral vaccine candidate developed by Eveliqure Biotechnologies, reported promising preclinical results,[18] paving the way for the commencement of Phase I clinical trials in 2020. The company also recently received NIH funding to advance the candidate into subsequent Phase II clinical trials.[19]

Unmet R&D needs: Available vaccines against diarrhoeal diseases are mostly oral, live attenuated candidates, which are sometimes ineffective, and may be unsuitable for infants. Novel multivalent vaccines are needed, which confer longer-term protection in high-burden settings and are suitable for infants. Such next-generation candidates for rotavirus include non-replicating parenteral vaccines, the most advanced being PATH's trivalent NRRV (P2-VP8) candidate, currently in Phase III trials.[20,21] Others including CureVac's mRNA rotavirus vaccine remain in preclinical development.[22] Supportive therapy including oral rehydration therapy and zinc supplementation remain the mainstay of management in LMICs but are insufficient in many cases. Safe, affordable, and effective pathogen-specific drugs are needed to improve treatment options for these diseases. The therapeutic pipeline currently includes both small molecule drugs and biologics, which remain in preclinical development.[23–27] Likewise, multiplex rapid diagnostic tests able to diagnose multiple diarrhoeal diseases as well as differentiate between them are needed, however, no candidate is in late-stage development.

Table 7. Diarrhoeal disease R&D funding 2020 (US$ millions)^

Disease	Basic research	Drugs	Vaccines	Biologics	Diagnostics	Unspecified	Total	%
Shigella	9.3	2.3	25	2.0	0.8	-	40	26
Cholera	28	1.8	4.9	-	0.5	0.7	36	24
Rotavirus	<0.1		33			0.7	34	23
Cryptosporidiosis	8.7	10	0.7	-	0.1	-	20	13
Enterotoxigenic *E. coli* (ETEC)	0.1		8.0		<0.1	-	8.2	5.4
Enteroaggregative *E. coli* (EAEC)			-		<0.1	-	<0.1	<0.1
Giardiasis					-		-	-
Multiple diarrhoeal diseases	2.5	0.4	3.4	1.5	0.8	5.2	14	9.1
Total	49	15	76	3.4	2.3	6.7	151	100

^ Strict eligibility conditions on private sector drug and vaccine investments for some pathogens mean direct comparisons between product totals can be misleading.
- No reported funding
Category not included in G-FINDER

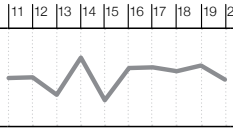
Table 8. Top diarrhoeal disease R&D funders 2020

Funder	US$ (millions)										2020 % of total
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
US NIH	66	60	52	48	41	41	43	46	45	56	37
Aggregate industry	30	32	48	42	36	32	36	49	48	39	26
Gates Foundation	39	43	56	45	44	52	49	45	45	26	17
Wellcome Trust	0.4	3.6	2.6	4.6	3.7	2.7	3.4	7.5	7.4	8.7	5.8
Indian ICMR	3.0	2.8	4.9	4.9	5.4	5.2	7.2	5.6	5.0	6.1	4.0
US DOD	6.0	9.4	11	10	7.7	6.3	8.8	9.0	8.8	4.2	2.8
EC	2.9	3.0	3.3	3.3	3.2	0.6	2.0	3.0	3.4	3.5	2.3
UK MRC	0.3	0.9	1.6	1.5	1.0	0.9	0.8	0.2	1.6	1.9	1.3
UK FCDO	2.6	-	3.3	8.0	4.9	3.6	4.0	7.5	2.9	1.8	1.2
Institut Pasteur	4.3	4.1	4.0	4.1	3.9	4.2	4.2	2.3	2.8	1.5	1.0
Open Philanthropy							-	-	-	1.0	0.7
Swedish Research Council	0.8	0.9	0.5	0.5	0.5	0.3		0.7	0.4	0.5	0.3
Subtotal of top 12^	170	175	208	184	166	156	165	181	171	150	99
Disease total	176	180	214	187	172	162	172	186	173	151	100

^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.
Funding organisations did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete.
- No reported funding

KINETOPLASTIDS

1.0M DALYS
16K DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$146m	3.7%	-5.2%			

In 2020, funding for kinetoplastid R&D was $146m, a drop of 5.2% (-$7.9m) leaving it slightly below its ten-year average.

In line with recent history, the majority of the 2020 investment was for drug R&D ($88m, 60% of total) with most of the remainder going to basic research ($50m, 34% of total) – a pattern which also largely held across individual kinetoplastid infections. Funding for all other products remained orders of magnitude smaller, with vaccines and diagnostics each receiving less than $5m, and biologics, vector control and unspecified R&D less than $0.2m between them.

All of the individual kinetoplastid diseases dropped at least slightly. Funding for sleeping sickness (HAT) saw the largest fall (down $4.7m, -13%), continuing last year's downward trend. This year's drop was largely due to ongoing falls in industry drug development funding, which has fallen by around half in each of the last two years. This decline aligns with the conclusion of the fexinidazole trials, and potentially also with COVID-imposed limitations on Phase III acoziborole trials.

Chagas' disease funding declined only slightly from its record high in 2019 (down $2.3m, -6.2%). This ongoing peak in funding for Chagas' disease – which had spent the previous six years receiving the least funding of any kinetoplastid – is due to continued high levels of funding from industry, the US NIH and especially the EC, which has provided the vast majority of Chagas' vaccine funding over the last two years.

Total funding to leishmaniasis and multiple kinetoplastid disease R&D remained basically unchanged, despite a doubling of German BMBF funding, which was largely directed to DND*i*'s multiple kinetoplastid drug R&D programme and contributed to a decade-long focus of drug R&D on projects targeting more than one type of kinetoplastid infection.

While funding to leishmaniasis basic & early-stage research dropped $4.3m (-14%), this was largely offset by a $3.3m (23%) increase for clinical development, leaving leishmaniasis with two-thirds of kinetoplastid clinical development funding. This increase was largely due to a boost from industry for Phase I trials of new drug candidates, primarily Novartis/DND*i*'s LXE408 and GSK's GSK3494245. This capped a decade of gradual growth in private sector funding for kinetoplastid R&D and once again leaves industry, collectively, as the second largest funder of kinetoplastid R&D – behind only the US NIH.

pipeline spotlight

The BENDITA trial showed no benefit from fosravuconazole in treating Chagas' disease, but showed a two week regimen of benznidazole is just as effective as the current eight week course.[28] Acoziborole is being tested in a Phase II/III trial as a single dose cure against HAT caused by *T.b. gambiense*.[29]

Unmet R&D needs: No human vaccine exists for any of the three kinetoplastid diseases (Chagas' disease, leishmaniasis and HAT), and current development efforts are relatively early stage, with all current candidates still in the preclinical or early clinical phases.[30-31] There is a need for new diagnostic tests – particularly point of care tests – for all three diseases, including tests for cure, and for monitoring chronic or second stage disease. In leishmaniasis, HIV co-infection constitutes a diagnostic challenge, as most existing RDTs exhibit reduced sensitivity in co-infected patients.[32] Simplification of diagnosis is also needed, with appropriate role for different tests currently being evaluated in operational studies.[32] There is a need for improved, preferably oral, drug formulations for leishmaniasis, and safer, more effective drugs for Chagas', which are suitable for children and pregnant and breastfeeding women. Biologics and therapeutic vaccines may also have a role to play, particularly for Chagas' disease.

Table 9. Kinetoplastid disease R&D funding 2020 (US$ millions)

Disease	Basic research	Drugs	Vaccines	Biologics	Diagnostics	Vector control products	Unspecified	Total	%
Leishmaniasis	21	21	2.5	<0.1	0.1		<0.1	45	31
Chagas' disease	8.0	22	2.1	-	2.5	<0.1	<0.1	35	24
Sleeping sickness (HAT)	19	13	<0.1	-	0.9	-	-	33	22
Multiple kinetoplastid diseases	2.3	31	-	-	-	<0.1	<0.1	34	23
Total	50	88	4.7	<0.1	3.5	0.1	<0.1	146	100

- No reported funding
Category not included in G-FINDER

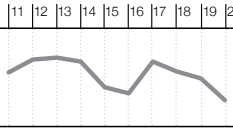
Table 10. Top kinetoplastid disease R&D funders 2020

Funder	US$ (millions)										2020 % of total
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
US NIH	59	57	50	45	39	44	45	43	44	42	28
Aggregate industry	14	19	17	20	21	15	17	28	33	29	20
UK FCDO	8.9	9.4	8.5	13	13	14	23	22	20	19	13
Wellcome Trust	9.0	11	10	13	12	12	9.3	10	10	10	7.1
German BMBF	0.8	5.7	4.3	5.7	3.3	1.8	3.1	2.8	3.1	6.7	4.6
Gates Foundation	14	9.9	9.7	21	3.0	14	11	8.3	5.1	6.2	4.2
EC	7.3	6.0	4.0	11	15	12	5.8	3.4	3.2	4.6	3.1
Indian ICMR	3.9	3.4	5.0	4.4	3.1	3.5	6.0	3.3	3.9	3.9	2.7
UK MRC	2.0	1.4	2.1	2.9	2.4	3.2	3.2	3.4	3.9	3.5	2.4
Swiss SNSF	2.3	0.9	1.8	2.3	1.2	1.8	2.0	2.0	3.2	2.9	2.0
US DOD	1.9	0.6	4.2	-	3.3	4.7	5.1	2.3	2.4	2.2	1.5
French IRD						2.8	2.4	2.7	2.8	2.0	1.4
Subtotal of top 12^	131	134	123	146	120	133	135	133	137	132	90
Disease total	147	148	138	159	135	153	153	151	154	146	100

^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.
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.
- No reported funding

HELMINTH INFECTIONS (WORMS AND FLUKES)

7.7M DALYS
15K DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$76.5m	1.9%	-13%			

Global funding for basic research and product development for helminth infections dropped significantly in 2020, falling by $11m (13%) to just $76m, its lowest level in more than a decade.

All six of the top funders from 2019 reduced their funding in 2020, headlined by a $2.7m fall in industry funding and reductions of nearly $2.5m from both the German BMBF and the US NIH, following record-high funding from both in 2019. Despite the decline from the US NIH, it remained the largest funder of helminth R&D, providing just over half of global funding. The decline from industry took its funding to just $4.4m in 2020, down nearly 70% from its peak in 2018.

The only notable increase was from the EC, which continued to rebound from record-low funding in 2018 with a $1.8m (89%) increase, flowing mostly to the Helminth Elimination Platform consortium and focused on drugs for multiple helminth infections.

Around two-thirds of the drop in overall helminth funding can be attributed to the $7.7m (-42%) drop in funding for R&D targeting multiple helminth infections. Otherwise, most pathogens saw only slight changes in funding. Roundworm, hookworm and strongyloidiasis each experienced small funding increases, the largest of which was a $0.5m (35%) increase for roundworm.

As in previous years, schistosomiasis received the largest share of helminth R&D funding (28%). Onchocerciasis was the second largest recipient (17% - a record high), followed by lymphatic filariasis (16%), meaning that nearly two-thirds of helminth funding went to these three pathogens.

Though overall funding for onchocerciasis remained relatively stable, there was movement at the product level: drug funding increased by $2.2m, due largely to an increase in Gates funding, which offset a decrease in funding from industry following the completion of a Phase I drug trial. Conversely, vaccine funding decreased by $3.0m, returning it to 2018 levels, after a big spike in 2019 due to front-loaded NIH funding.

The significant reduction in funding for multiple helminth drugs (-$5.6m) was concentrated on clinical development, which fell to zero for the first time since 2008. The reduction was mostly due to two drug candidates – Emodepside and TylAMac – completing Phase I trials.

There was a decrease in funding for helminth R&D across all sectors, the most significant being a 37% decrease in funding from industry, with public funding declining by 12%, and philanthropic funding remaining relatively stable (-1.6%).

pipeline spotlight

In 2021, Merck KGaA and the Pediatric Praziquantel Consortium successfully completed a pivotal Phase III trial for an orally dispersible form of arpraziquantel in preschool-aged children, which achieved clinical cure while showing favourable safety, tolerability and improved palatability. They plan to apply for a scientific opinion by EMA under the EU-M4all scheme.[33]

Unmet R&D needs: With no vaccines, disease control efforts currently rely on mass-drug administration.[34] Variable drug efficacy and the need to control transmission mean that treatment programmes must continue for many years, increasing the risk of drug resistance.[35] New and more effective drugs are needed, as are paediatric formulations of existing drugs. Moxidectin, the first new onchocerciasis treatment in 20 years received FDA approval in 2018, Promising clinical candidates include emodepside and oxfendazole for onchocerciasis, tribendimidine for hookworm, and TylAMac for filarial diseases.[33,36-39] Vaccine development has proved a challenge: for schistosomiasis, the most advanced vaccine candidate, rSh28GST showed insufficient efficacy in a Phase III trial.[40] Clinical development of the most promising candidate antigen, Sm-p80 is currently underway.[41] Other promising candidate antigens for multiple helminth infections are in preclinical/Phase I stages of development.[42-43] Current diagnostic products are outdated or complex. As such, new and effective diagnostics that can measure infection intensity and detect drug resistance are urgently needed.

Table 11. Helminth R&D funding 2020 (US$ millions)

Disease	Basic research	Drugs	Vaccines	Biologics	Diagnostics	Vector control products	Unspecified	Total	%
Schistosomiasis (bilharziasis)	11	4.4	3.6	-	2.5	0.5	-	22	28
Onchocerciasis (river blindness)	1.2	10	0.7		1.3	<0.1	-	13	17
Lymphatic filariasis (elephantiasis)	7.2	3.2			0.9	<0.1	1.2	12	16
Tapeworm (taeniasis / cysticercosis)	3.7	1.5			1.5	-	-	6.7	8.7
Hookworm (ancylostomiasis & necatoriasis)	2.2	0.8	1.3				-	4.2	5.5
Whipworm (trichuriasis)	2.7	0.3					-	3.0	4.0
Strongyloidiasis & other intestinal roundworms	2.3	0.5	-		<0.1		-	2.8	3.6
Roundworm (ascariasis)	1.6	0.2					-	1.8	2.3
Multiple helminth infections	6.6	3.1	-		0.7	-	<0.1	10	14
Total	38	24	5.5	-	6.9	0.5	1.2	76	100

- No reported funding
Category not included in G-FINDER

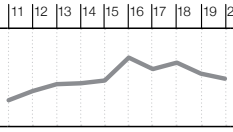
Table 12. Top helminth R&D funders 2020

Funder	US$ (millions)										2020 % of total
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
US NIH	30	41	32	32	31	34	41	37	42	40	52
Gates Foundation	23	21	24	26	20	19	15	17	9.5	8.6	11
Aggregate industry	7.1	4.5	9.1	14	12	8.5	10	14	7.1	4.4	5.8
EC	6.6	7.6	7.4	7.0	5.1	3.7	3.2	1.1	2.0	3.8	5.0
German DFG	0.7	2.7	3.0	-	2.1	1.5	1.5	2.4	4.7	3.1	4.0
Indian ICMR	1.3	1.4	1.6	1.5	1.4	1.2	2.1	1.4	2.5	2.8	3.6
German BMBF	0.5	1.2	0.7	0.3	0.3	<0.1	3.8	3.5	5.2	2.7	3.6
Medicines Development for Global Health							2.9	1.1	2.1	2.2	2.9
UK DHSC							<0.1	0.1	3.4	1.7	2.3
Wellcome Trust	7.4	5.6	6.8	4.4	3.6	3.6	3.3	2.6	2.1	1.5	1.9
Mundo Sano Foundation							<0.1	<0.1	-	1.3	1.7
UK MRC	3.0	2.1	1.8	2.5	1.3	1.1	0.7	1.3	1.4	0.7	0.9
Subtotal of top 12^	85	92	94	93	81	77	91	85	83	73	95
Disease total	91	98	99	96	83	80	96	91	88	76	100

^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.
Funding organisations did not participate in the survey for this year. Any contributions listed are based on data reported by funding recipients so may be incomplete.
- No reported funding

SALMONELLA INFECTIONS

16M DALYS
212K DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$75.5m	1.9%	-6.9%			

Global funding for basic research and product development for *Salmonella* infections was $75m in 2020. Funding fell $5.6m (-6.9%), marking a second consecutive year of reduced investment.

The slight decline in funding was mostly driven by reduced vaccine funding from the Gates Foundation (down $2.5m, -18%) and cuts to US NIH-funded basic research (down $4.2m, -17%) and vaccine R&D (down $3.5m, -52%), which took the NIH's *Salmonella* funding to a nine-year low.

These falls were partly offset by vaccine-focused increases from industry (up $2.4m, 24%), along with higher funding from the Wellcome Trust (up $1.5m, 42%) and the first full year of a new EC funding stream (up $1.2m, 106%).

As has been the case every year since 2012, most global *Salmonella* funding went to typhoid and paratyphoid fever ($57m, 76% of the total), followed by multiple *Salmonella* infections ($13m, 17%) and non-typhoidal *Salmonella* ($4.8m, 6.4%). Multiple *Salmonella* infections was the only disease category to see increased funding in 2020 (up $6.2m, 89%).

Though product distribution of *Salmonella* funding has remained relatively stable over the last decade, the share of vaccine R&D has gradually increased every year since 2015, matched by a similarly gradual decline in the share going to basic research. For the first time since its inclusion in the survey in 2018, there was no reported funding for biologics R&D, following the completion of NIH-funded early-stage research into potential monoclonal antibody treatments for typhoid fever which identified promising candidates for clinical development.

Industry funding rose to $12m (up 24%) and went almost exclusively to typhoid and paratyphoid vaccines. Private sector funding came primarily from small pharmaceutical and biotechnology companies (SMEs) ($8.5m, 70% of the private sector total), which gave more than double the amount provided by multinationals – though SME funding remained far below its 2016-2018 peak, when it rose to more than $23m per year during late-stage clinical trials of a typhoid conjugate vaccine, which went on to achieve pre-qualification in 2020.

Just over one-third of *Salmonella* funding was for clinical development & post-registration studies ($26m, 34%), with the vast majority targeting the development of typhoid and paratyphoid fever vaccines ($24m, 92% of total clinical development funding).

pipeline spotlight

TYPHIBEV, the Vi-polysaccharide typhoid conjugate vaccine (TCV) developed by Biological E, received WHO prequalification in 2020,[44] becoming the second TCV to achieve this since 2018. Two other TCVs – PedaTyph (Bio-Med) and ZyVac TCV (Cadila Healthcare) have been licensed for use in India, but have not been submitted for WHO prequalification.[45,46]

Unmet R&D needs: The rise of antimicrobial resistant *S.* typhi strains linked to the H58 clade is threatening the efficacy of existing drugs.[47] There is a need for better surveillance of these resistant strains, and the development of novel, efficacious drugs, especially those suitable for children. The WHO recommends TCVs as the preferred vaccine for use in high-burden countries, and in 2018, Typbar TCV became the first TCV to achieve WHO prequalification,[48] followed by TYPHIBEV in 2020,[44] both of which are effective in children, and in high burden settings.[49,50] There are however no approved bivalent vaccines targeting both typhoid and paratyphoid fever, nor any monovalent vaccines targeting paratyphoid fever specifically. Phase II trial results were recently published for the most advanced candidate CVS 1902.[51] There are also no approved non-typhoidal *Salmonella* vaccines, with all candidates in early-stage development.[52,53] Given the threat of drug resistance, biologic R&D remains a need, with several monoclonal antibody cocktails in preclinical development.[54–57]

Table 13. Salmonella R&D funding 2020 (US$ millions)

Disease	Basic research	Drugs	Vaccines	Biologics	Diagnostics	Unspecified	Total	%
Typhoid and paratyphoid fever (*S.* Typhi, *S.* Paratyphi A)	25	2.5	29	-	1.4	-	58	76
Non-typhoidal *S. enterica* (NTS)	2.6	-	2.0	-	0.1	-	4.8	6.4
Multiple *Salmonella* infections	9.1	0.3	1.7	-	0.1	1.9	13	17
Total	36	2.7	33	-	1.6	1.9	75	100

- No reported funding

Table 14. Top Salmonella R&D funders 2020

Funder	US$ (millions)										2020 % of total
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
US NIH	28	37	34	33	31	42	33	37	37	28	37
Gates Foundation	4.8	5.8	10	7.5	14	14	16	17	20	19	25
Aggregate industry	5.4	4.8	11	17	15	26	24	26	9.8	12	16
Wellcome Trust	4.4	5.1	4.7	3.8	3.3	3.0	2.4	2.4	3.6	5.2	6.8
EC	0.5	0.2	-	<0.1	<0.1	0.2	0.6	0.9	1.2	2.4	3.2
Korea Support Committee for IVI										1.9	2.6
Indian ICMR	0.3	<0.1	0.4	0.4	<0.1	<0.1	<0.1	1.5	1.3	1.5	2.0
UK MRC	1.5	1.2	1.3	1.9	2.2	2.1	1.8	2.4	2.2	1.1	1.5
Swiss SNSF	0.8	0.7	-	0.8	0.5	0.7	0.8	0.4	0.6	1.0	1.4
Institut Pasteur	2.4	1.5	1.7	2.0	1.8	2.0	1.9	0.7	2.1	0.8	1.1
Gavi		0.2	0.2		0.3	-	-	-	0.3	0.5	0.7
UK NHS								-	0.2	0.5	0.6
Subtotal of top 12^	50	60	68	69	72	96	84	91	79	74	98
Disease total	51	61	69	70	73	99	86	94	81	75	100

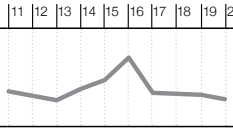
^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.

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

- No reported funding

DENGUE

2.4M DALYS
36K DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$75.2m	1.9%	-6.8%			

Global funding for dengue basic research and product development was $75m in 2020, dropping $5.5m (-6.8%) and continuing a downward trend that began in 2016.

The slight decline in dengue R&D funding was mostly due to a fourth consecutive year of decreased funding from the US NIH, alongside reductions in funding from the Colombian Minciencias (down $2.0m, -91%) and the Indian ICMR (down $1.0m, -39%). These falls were partly offset by a smaller increase in vector control funding from the Gates Foundation (up $1.7m, 26%) and a new stream of basic research funding from the US DOD ($1.4m).

Funding from industry, once again collectively the second largest funder, remained basically unchanged. This helped to ensure drug R&D funding remained stable at a little over $23m, with industry continuing to provide around three-quarters of the overall total.

Despite the increase in funding from the US DOD, dengue basic research funding fell slightly, to $29m – a record low – though it remained the largest product category. The fall in basic research was mostly due to a decline in Indian ICMR funding from its 2019 peak (down $1.7m, -69%) and further reductions from the US NIH.

Funding for biologics R&D returned to around its 2018 level following its sudden rise in 2019 (down $4.9m, -55%) – mostly due to a dip in NIH-funded early-stage research into broad-spectrum antibodies as it progressed to clinical trials.

Increased funding from the Gates Foundation helped push vector control product funding slightly higher (up $0.6m, 5.9%), reaching its highest level since we reallocated most funding targeting the dengue-transmitting *Aedes aegypti* mosquito to the multi-disease VCP category in 2017.

The growth in diagnostics funding (up $1.1m, 15%) after three years of stasis, was driven by increased investment from the US NIH (up $1.0m, 27%), offsetting a smaller reduction in diagnostics clinical development funding from the US DOD (down $0.5m, -15%).

More than half of dengue funding was for either basic ($29m, 38%) or early-stage research ($15m, 20%). Funding for clinical development & post-registration studies received $21m (28% of the total), nearly two-thirds of which was for drug development.

While industry funding was basically unchanged on a participation-adjusted basis, public funding from both LMICs (down 35%) and HICs (down 8%) fell sharply, taking public sector investment to its lowest level in over a decade.

pipeline spotlight

The CDC's Trioplex qPCR – a real-time multiplex PCR capable of detecting dengue, Zika and Chikungunya simultaneously – has been shown to have high sensitivity and specificity in a geographic area with a current dengue outbreak.[58] Meanwhile, the monoclonal antibody candidate HuMAb 3G9 exhibited neutralising properties against all dengue serotypes.[59]

Unmet R&D needs: Point-of-care antigen and antibody serological tests are available, but cannot distinguish between serotypes, lack optimal sensitivity and specificity and exhibit serotype-specific performance discrepancies.[60] There is a pressing need for diagnostics that can distinguish between current and previous infection, and distinguish dengue from other causes of fever, as well as RDTs for serostatus screening.[61] Effective therapeutic options are also needed, although most curative candidates – including direct acting antivirals and broadly neutralising monoclonal antibodies – are still in the preclinical phase.[62] Finally, there is a need for new and improved vector control products targeting the *Aedes* mosquito, including adulticidal oviposition traps and space spray insecticides, as well as biological control tools such as *Wolbachia* and genetic manipulation (with field experiments currently ongoing across Asia and Latin America). Dengue's prevalence in high- and upper-middle-income countries has been sufficient to attract commercially focused industry investment in vaccine R&D; this category has therefore been excluded from the G-FINDER scope.

Figure 6. **Dengue R&D funding by product type 2011-2020**

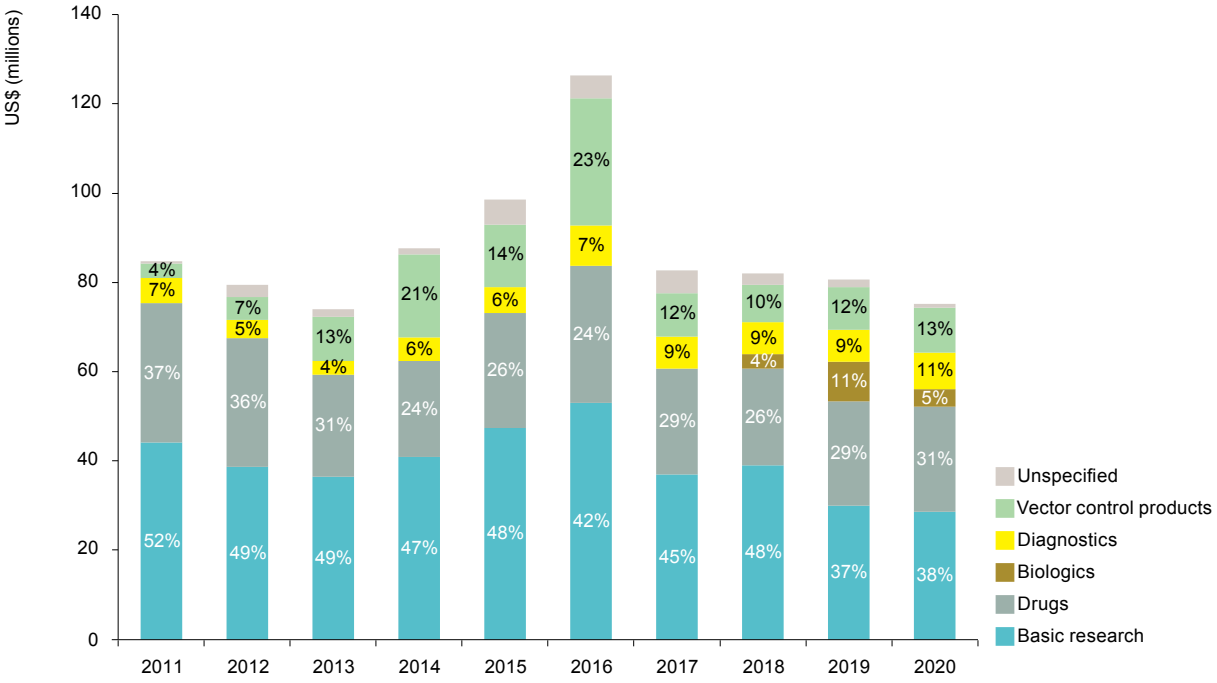


Table 15. **Top dengue R&D funders 2020**

Funder \ US$ (millions)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
US NIH	53	47	38	43	49	62	47	39	36	32	42
Aggregate industry	12	9.1	8.0	8.3	16	18	13	19	21	20	27
Gates Foundation	<0.1	1.0	11	17	7.7	17	4.9	4.5	6.8	8.4	11
US DOD	2.0	0.7	1.3	0.2	3.6	2.6	2.8	5.4	2.9	3.9	5.2
Wellcome Trust	6.0	4.8	3.4	6.0	5.6	5.5	3.4	2.6	2.4	2.5	3.3
Indian ICMR	1.4	1.2	1.9	1.7	1.9	3.6	4.8	4.2	2.5	1.5	2.0
Indian BIRAC						<0.1	<0.1	<0.1	1.1	1.0	1.3
Institut Pasteur	2.5	1.9	2.0	2.0	2.0	1.9	0.8	1.6	0.8	0.9	1.2
Australian NHMRC	1.9	2.7	1.5	2.9	0.6	0.7	0.4	1.0	0.9	0.8	1.1
Thai National Science & Technology Agency	0.1	<0.1	0.1	0.2	0.2	0.1	0.1	<0.1	<0.1	0.8	1.1
Flemish Agency for Innovation and Entrepreneurship (VLAIO)									0.2	0.8	1.0
UK MRC	0.7	0.4	0.5	0.8	1.5	1.4	0.6	0.6	0.8	0.7	0.9
Subtotal of top 12^	82	76	72	86	95	122	79	79	78	73	97
Disease total	85	79	74	88	99	126	83	82	81	75	100

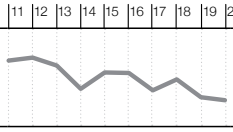
^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.

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

\- No reported funding

BACTERIAL PNEUMONIA & MENINGITIS

65M DALYS
1.2M DEATHS
IN 2017

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$66.2m	1.7%	-5.3%			

Funding for bacterial pneumonia & meningitis was $66m in 2020, a slight drop from 2019 (down $3.7m, -5.3%) which took it to its lowest level since 2007.

The Gates Foundation and industry together accounted for four-fifths of 2020's bacterial pneumonia & meningitis funding, nearly all of which (88%) was devoted to *S. pneumoniae* vaccine R&D.

The focus of Gates Foundation funding was on early-stage R&D (70% of its total funding across the entire disease group), while 99% of industry funding went to clinical development & post-registration studies – reflecting the fact that very little early-stage private sector R&D activity is LMIC-specific.

Industry funding jumped by 44% to $32m (up $9.9m), leaving it responsible for nearly half of all funding. The increase came largely from MNCs, which more-than-tripled their funding to $12m – exclusively directed to *S. pneumoniae* vaccine development. SME investment also increased, rising by 8.5% ($1.6m), with 78% of the total flowing to clinical development of *S. pneumoniae* vaccines. Despite this slight rebound, SME funding remained well below pre-2019 levels, after falling by more than half in 2019.

A second consecutive decrease in funding from the Gates Foundation (down another $9.1m, -30%) outweighed the five-fold ($1.4m) increase from the Wellcome Trust. The Gates Foundation's decrease was concentrated on early-stage research for pneumococcal vaccines, as two long-running grants came to a close: funding to PATH for a low-cost polysaccharide conjugate vaccine and the end of a dosing schedule study of Synflorix in Vietnamese infants.

S. pneumoniae received a record-high 90% of overall bacterial pneumonia & meningitis R&D funding – the combined effect of a slight increase in its own investment (up $ 4.3m, 7.9%) and a halving of *N. meningitidis* funding (down $7.3m, -53%). Funding for R&D targeting both pathogens also fell sharply to just $0.3m, all of which was for diagnostics. The fall in *N. meningitidis* funding was largely due to decreased disbursements from the UK FCDO to PATH (down $6.4m, -87%), as clinical trials for vaccine candidate NmCV-5 were completed, leading to the publication of promising results in 2021.

Funding for *S. pneumoniae* basic research increased by 82% (up $1.5m) from a record low, though it remained below its long-term average, partly thanks to an ongoing absence of data from the German DFG – historically a significant funder of *S. pneumoniae* basic research.

pipeline spotlight

Following the successful prequalification of their affordable 10-valent pneumococcal conjugate vaccine (PNEUMOSIL) in December 2019, PATH and the Serum Institute of India have just completed a Phase III trial of their low-cost pentavalent meningitis conjugate vaccine, NmCV-5.[63,64] Phase II results suggest it could be effective as a single dose.[65]

Unmet R&D needs: Pneumococcal conjugate vaccines (PCVs) are highly effective, and are increasingly being rolled out in lower-income countries with Gavi support. However, they are typically expensive to manufacture, and there is an ongoing need for low-cost candidates targeting LMIC serotypes, as gains from existing PCVs are threatened by serotype replacement.[66] Non-conjugate protein- and whole-cell based vaccines are two potential approaches offering broad protection and cheaper costs, while in 2019 WHO prequalified PNEUMOSIL, a 10-valent PCV candidate for $2/dose.[64,67,68] Since the introduction of the MenAfriVac monovalent conjugate meningitis A vaccine, meningitis A infection rates have plummeted across the African continent.[69] Other serogroups have become more prominent however, creating the need for low-cost polyvalent vaccine candidates such as PATH/SII's NmCV-5.[63] Diagnostics are also needed, including RDTs that can detect serogroups to guide vaccine response, as well as multi-pathogen point-of-care tests to guide case management in both epidemic and endemic settings.[70]

Figure 7. **Bacterial pneumonia & meningitis R&D funding by product type 2011-2020**

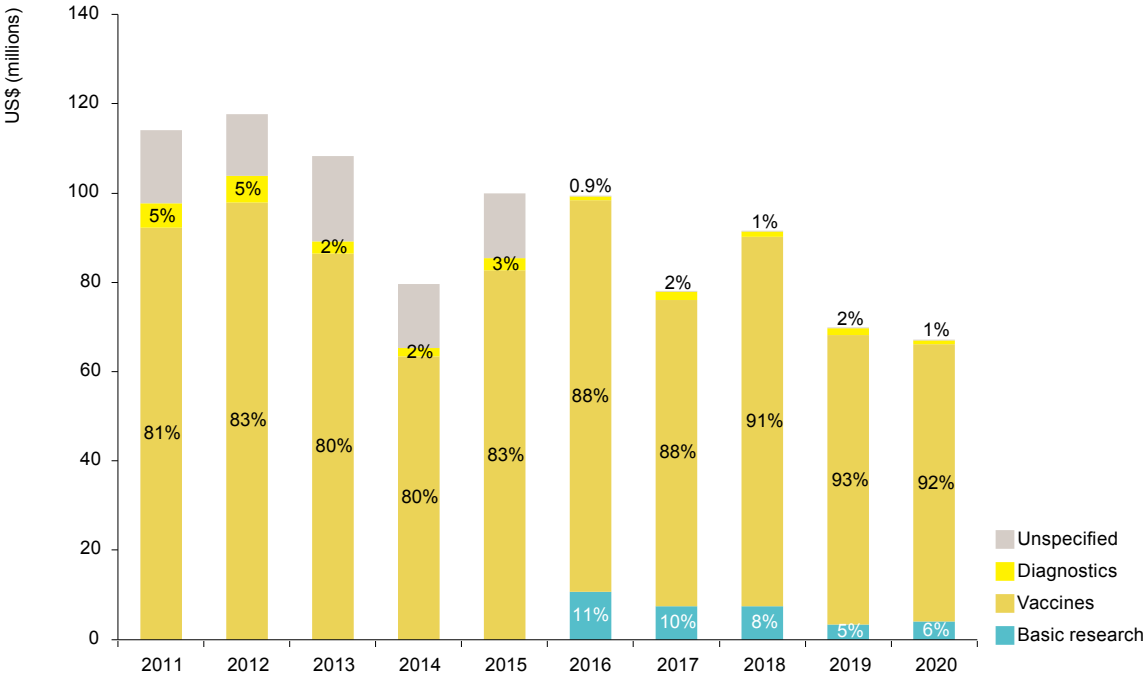


Table 16. **Top bacterial pneumonia & meningitis R&D funders 2020**

Funder	US$ (millions)										2020 % of total
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Aggregate industry	41	44	52	52	38	59	37	42	23	32	48
Gates Foundation	42	47	16	5.8	36	21	26	32	30	21	31
US NIH	17	9.4	6.9	2.4	1.3	3.6	2.4	2.4	1.3	3.2	4.8
Gavi		5.9	12		6.8	5.1	5.1	2.8	3.1	2.3	3.4
Wellcome Trust	0.7	3.2	1.8	1.9	1.1	0.9	0.3	<0.1	0.3	1.7	2.6
UK MRC	0.6	0.3	0.6	0.5	0.8	1.8	1.1	0.9	1.7	1.6	2.5
Indian BIRAC						-	-	1.2	0.7	1.5	2.3
Australian NHMRC	2.2	1.5	0.4	-	0.3	0.3	0.5	0.4	0.6	1.1	1.7
UK FCDO	-	0.1	0.8	1.9	-	3.0	0.9	6.0	7.3	0.9	1.4
Institut Pasteur	0.8	0.5	0.3	0.3	0.5	0.7	1.9	0.7	1.2	0.3	0.5
Swiss SNSF	-	-	0.2	0.2	0.2	0.1	0.2	0.1	0.2	<0.1	0.1
Indian ICMR	-	-	-	-	-	0.2	-	-	-	<0.1	0.1
Subtotal of top 12^	114	117	108	80	99	98	78	91	69	66	100
Disease total	114	118	108	80	100	99	78	91	70	66	100

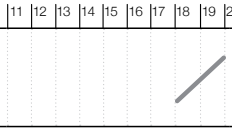
^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.

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

\- No reported funding

HEPATITIS B

17M DALYS
510K DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$17.8m	0.5%	+26%			

Funding for hepatitis B R&D increased to $18m in 2020, a 26% ($3.7m) increase representing two consecutive years of fairly rapid growth since inclusion in the G-FINDER survey.

Hepatitis B is a relatively new addition to G-FINDER, having been introduced in 2018 with a scope restricted to diagnostics, as well as LMIC-focused basic research, drug and biologics R&D.

Seven of the top ten hepatitis B funders in 2019 reduced their overall funding, headlined by a $2.5m fall (-58%) from the US DOD, although this apparent drop is somewhat misleading, since it reflects our accounting for an ongoing multi-year diagnostic device project which began in 2019 entirely in that year's DOD spending.

Overall funding rose despite these cuts due to a substantial increase from the US NIH (up $1.6m, 45%), and two new five-year European Commission funding streams for hepatitis B biologics – TherVacB and IP-cure-B – worth $4.7m in 2020. These projects represent the first time the European Commission has invested in hepatitis B R&D since its inclusion in G-FINDER, contributing to a doubling in overall biologics R&D funding (up $3.9m).

As in previous years, funding from the US NIH was split across all in-scope product areas, with a focus on LMIC-focused basic research and drug R&D. The US NIH alone has been responsible for nearly 40% of all basic research funding, and just under half of all clinical development funding for hepatitis B since 2018, including a record $1.1m in 2020 for drug development.

Drug R&D investment was further boosted by a new funding stream from the US DOD for early-stage drug research, as well as first-time hepatitis B funding from Open Philanthropy ($0.9m). Funding for diagnostic R&D, though, dropped sharply, falling by $4.5m (-92%).

The share of total hepatitis B public funding from LMICs dropped from 13% to 7.9%, precipitated by a cessation of funding from two Brazilian organisations and from India's DBT, and reinforced by rises in public investment from high-income countries (up 31%) and philanthropic funding (up 62%).

Private sector funding for hepatitis B R&D remained very limited, reaching a high of just $0.1m in 2020; though this reflects the impact on measured private-sector funding of excluding R&D which is not LMIC-specific, including, in 2020, nearly $100m in MNC investment which failed to meet these criteria for inclusion.

pipeline spotlight

Multiple drug and biologic candidates aimed at functional cure are currently in clinical development, with new approaches including combined siRNA/mAb regimens recently entering Phase II trials.[71] A therapeutic vaccine candidate (TherVacB) has been successfully tested preclinically, and will commence a Phase I/II clinical trial in 2022.[72]

Unmet R&D needs: A highly effective vaccine against HBV exists, and has been included in the national infant immunisation schedule of 185 countries. However, tools to diagnose and treat HBV are sub-optimal. Serological assays detecting HBV surface antigen (HBsAg) have been the mainstay of HBV screening and diagnosis, however their sensitivity is significantly compromised by HIV/HCV co-infection, low HBsAg titres, and S gene mutations/variants.[73,74] Available drugs are generally safe and well tolerated, however lifelong treatment is generally required; as a result there is significant interest in development of a functional cure. There is also a need for robust, low-cost, point-of-care molecular diagnostics that can quantify HBV viral load, for confirmation of diagnosis, treatment monitoring and detection of drug resistance.[75] Finally, there is a need for additional basic research to inform approaches to HBV screening, monitoring and treatment in LMICs, such as studies on the epidemiology of HBV drug and vaccine escape mutations in LMICs.[76]

Figure 8. **Hepatitis B R&D funding by product type 2018-2020**

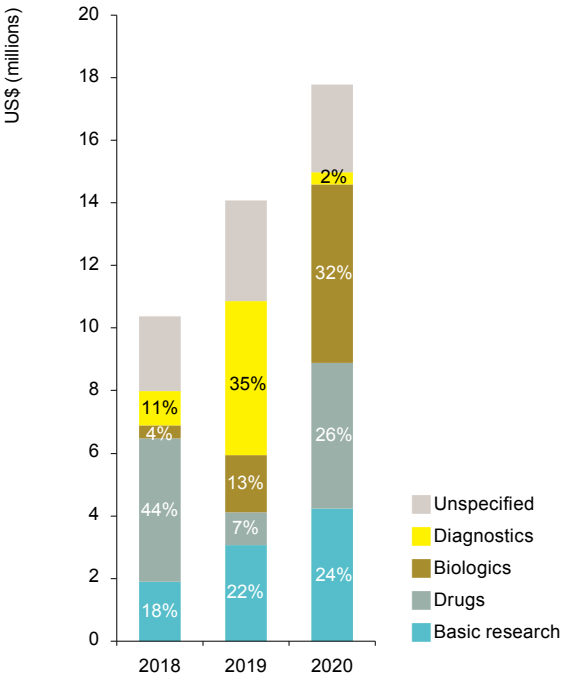


Table 17. **Top hepatitis B R&D funders 2020**

Funder	US$ (millions) 2018	2019	2020	2020 % of total
US NIH	3.5	3.5	5.1	29
EC	-	-	4.7	26
Inserm	1.7	2.2	2.1	12
US DOD	-	4.2	1.7	9.8
Open Philanthropy	-	-	0.9	5.1
Indian ICMR	0.7	0.6	0.8	4.7
Swiss SNSF	0.4	-	0.7	4.1
Wellcome Trust	-	0.4	0.5	2.5
Thai GPO	<0.1		0.3	1.9
Australian NHMRC	-	0.2	0.2	1.4
Aggregate industry	<0.1	-	0.1	0.6
Australian Centre for HIV and Hepatitis Virology		<0.1	<0.1	0.5
Subtotal of top 12^	10	14	17	97
Disease total	10	14	18	100

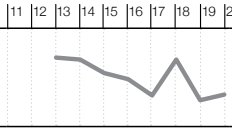
^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.

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

- No reported funding

HEPATITIS C

12M DALYS
412K DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$16.6m	0.4%	+46%			

Global funding for hepatitis C R&D totalled $17m in 2020, an increase of 46% (up $5.3m) from a record low in 2019.

Unitaid became the top contributor of hepatitis C R&D for the first time in 2020 with a total of $7.5m (45% of the total), ahead of the US NIH ($3.6m, 22%) and MSF ($2.8m, 17%). This marked the first time ever, for any G-FINDER disease, that a multilateral has provided the largest share of funding.

Unitaid increased its hepatitis C investment for the second consecutive year (up $4.3m, 138%), shared between diagnostic R&D and its first ever funding ($2.1m) for hepatitis C drug R&D. This drove a rise in diagnostics funding (up $1.2m, 23%) as Unitaid reported final disbursements to close out the FIND-led HEAD-Start project.

LMIC-specific drug R&D received the largest share of hepatitis C funding in 2020 ($7.7m, 46% of the total) increasing by 65% ($3.1m) from 2019. Along with Unitaid's new funding under the LONGEVITY project for the development of long-acting drugs ($2.1m), MSF also reported increased investment in drug R&D (up $1.2m, 74%) – almost all of which was for the ongoing Storm-C project, including a Phase II/III trial of ravidasvir and sofosbuvir in Malaysia and Thailand.

G-FINDER restrictions requiring that included funding for vaccine R&D be explicitly identifiable as LMIC-specific were removed for the collection of 2020 data. While vaccine R&D did increase by 77% (up $1.1m) in 2020, less than $0.2m of this was attributable to the expansion in scope.

The US NIH continued to be the largest funder of vaccine R&D and increased its investment by 57% (up $0.7m). This helped overall funding for vaccines to rebound from 2019's record-low.

Most of the overall increase for hepatitis C R&D went to basic & early-stage research (up $4.5m, 80%). Clinical development spending was mostly unchanged.

Several long-term funders reported no hepatitis C funding for 2020: the French ANRS, the Indian DBT and the UK MRC, which had all reported funding in every previous year.

The long-term downward trend in hepatitis C investment has been driven by a decline in funding from multinational pharmaceutical companies – the primary bellwether for hepatitis C funding – and only partially offset by the rise in philanthropic funding from MSF and historic multilateral funding from Unitaid.

As in 2019, there was no meaningful private sector funding for hepatitis C R&D.

pipeline spotlight

In June 2021, Malaysia approved ravidasvir, a low-cost, pan-genotypic direct-acting antiviral (DAA) for use in combination with sofosbuvir, an existing DAA. Developed in partnership by DND*i* and two LMIC-based pharmaceutical companies, the regimen is intended to provide a much more affordable treatment option than the currently available regimens on the market.[77]

Unmet R&D needs: DAA drugs are more effective, require a shorter duration of treatment, and have fewer side effects than previous interferon- and ribavirin-based treatments, and have revolutionised the treatment of hepatitis C. However, DAA-based regimens are expensive, and access remains limited in LMICs.[78] More research is also needed to assess DAA-based regimens in developing country populations, adolescents, children under 12, and pregnant women. Despite extensive research efforts, development of a protective vaccine has not been achieved. In a recent study, vaccine candidate AdCh3NSmut1 and MVA-NSmut applied in a prime/boost regimen, failed to prevent chronic infection with HCV in a high-risk population of IV drug users, while other vaccine candidates, containing E1/E2 glycoproteins, have not matured beyond the stage of preclinical/early clinical development.[79,80] There is also a need for HCV diagnostic tests that are affordable and simple to use in developing country contexts, especially tests for treatment monitoring, screening and tests of cure.[81]

Figure 9. **Hepatitis C R&D funding by product type 2013-2020**

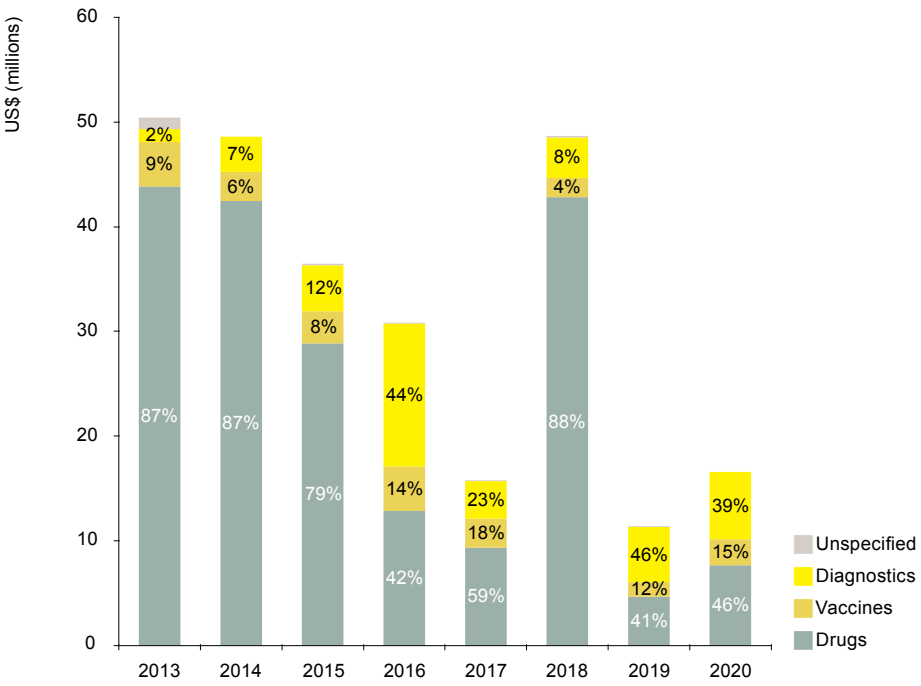


Table 18. **Top hepatitis C R&D funders 2020**

Funder \ US$ (millions)	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
Unitaid	-	-	-	6.2	-	2.9	3.1	7.5	45
US NIH	11	7.1	5.0	4.5	3.6	2.8	3.9	3.6	22
MSF	-	-	-	-	0.4	4.3	1.6	2.8	17
Thai GPO	<0.1	<0.1	0.3	0.1	0.3	0.5		1.0	6.2
Wellcome Trust	<0.1	<0.1	<0.1	<0.1	-	0.7	0.9	0.9	5.2
Australian NHMRC	0.3	0.2	-	-	0.1	0.3	0.2	0.3	1.7
Canadian CIHR	-	-	-	0.6	<0.1	<0.1	<0.1	0.1	0.8
Australian Centre for HIV and Hepatitis Virology	<0.1	0.2		0.1	0.1		0.1	0.1	0.7
Korean HIDI								0.1	0.6
Indian ICMR	-	-	-	-	-	<0.1	<0.1	<0.1	0.5
Aggregate industry	30	28	23	11	7.8	35	-	<0.1	0.2
Brazilian FAPESB	-		-	-	-	-	-	<0.1	0.1
Subtotal of top 12^	50	49	36	31	16	49	11	17	100
Disease total	50	49	36	31	16	49	11	17	100

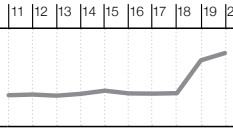
^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.

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

- No reported funding

RHEUMATIC FEVER

10M DALYS
274K DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$15.6m	0.4%	+19%			

Global funding for rheumatic fever vaccines – the only product area included within the G-FINDER scope – increased by 19% (up $2.5m) to $16m in 2020.

This increase continues the substantial growth seen in 2019, when funding increased nearly sevenfold from $2.0m to $13m. This shift, not captured in our previous report, was due to the retrospective addition of 2019 data showing $10m in disbursements from Australia's Medical Research Future Fund (MRFF) to the Telethon Kids Institute, signalling the beginning of its $24m project to accelerate the development of a vaccine for Group A *streptococcus* (GAS), which causes rheumatic fever.

The Telethon Kids Institute received a further $12m in 2020: $6.9m from the MRFF and another $5.3m in new funding from Open Philanthropy. The funding received by the Telethon Kids Institute over the last two years represents nearly 90% of total reported clinical development funding for rheumatic fever in the history of the G-FINDER report.

The third funder contributing to the increase in rheumatic fever research investment is the Combating Antibiotic Resistant Bacteria Biopharmaceutical Accelerator (CARB-X). CARB-X was founded in 2016, with 2020 marking the first year they have participated in the G-FINDER survey. In 2020, they disbursed the remaining $2.1m under an initial $2.7m commitment to Vaxcyte Inc, though the earlier portion of this funding predates their survey participation and is not included in our data.

Prior to the entrance of these three new funders, funding for rheumatic fever vaccines had remained steady, dominated by the US NIH and Australian National Health and Medical Research Council (NHMRC), with smaller, irregular contributions from other funders, including the Health Research Council of New Zealand and the Brazilian Development Bank. In 2020, US NIH funding decreased slightly (down 13%), while funding from NHMRC saw a noticeable decline – falling from $1.5m in 2019 to $0.4m in 2020.

Until the $5.3m in new funding from Open Philanthropy in 2020, there had been essentially no contributions from philanthropic organisations in the past decade, and there continues to be virtually no private sector funding for rheumatic fever.

pipeline spotlight

A research collaboration led by the Murdoch Children's Research Institute (MCRI) has developed the first controlled human infection model for Group A *streptococcus* (GAS).[82] It will shortly be used to evaluate a GAS vaccine being developed by the Australian Strep A Vaccine Initiative (ASAVI), a partnership between MCRI and the Telethon Kids Institute.[83,84]

Unmet R&D needs: Acute rheumatic fever can be treated using currently available drugs (although post-infection prophylaxis requires multiple doses of antibiotics), however, treatment of rheumatic heart disease often requires surgery. The main R&D required is therefore the development of a vaccine. Progress to date has been slow, with only four candidates progressing to clinical stages of development. There have been no recent updates identified for two of these candidates: StreptAvax, a 26-valent vaccine whose immunogenicity and safety was first confirmed in a Phase II clinical trial in 2004; and MJ8VAX(J8), where a 2018 Phase I clinical trial indicated the need for additional investigations to optimise its immunogenicity and improve dosing.[85,86] A planned Phase I clinical trial for StreptInCor, another GAS vaccine candidate that showed promising results in diverse animal models, was withdrawn in February 2021.[87] Positive Phase I results for StreptAnova, a 30-valent vaccine (which completed Phase I in 2017) were published in 2020.[88]

Figure 10. **Rheumatic fever R&D funding by product type 2011-2020**

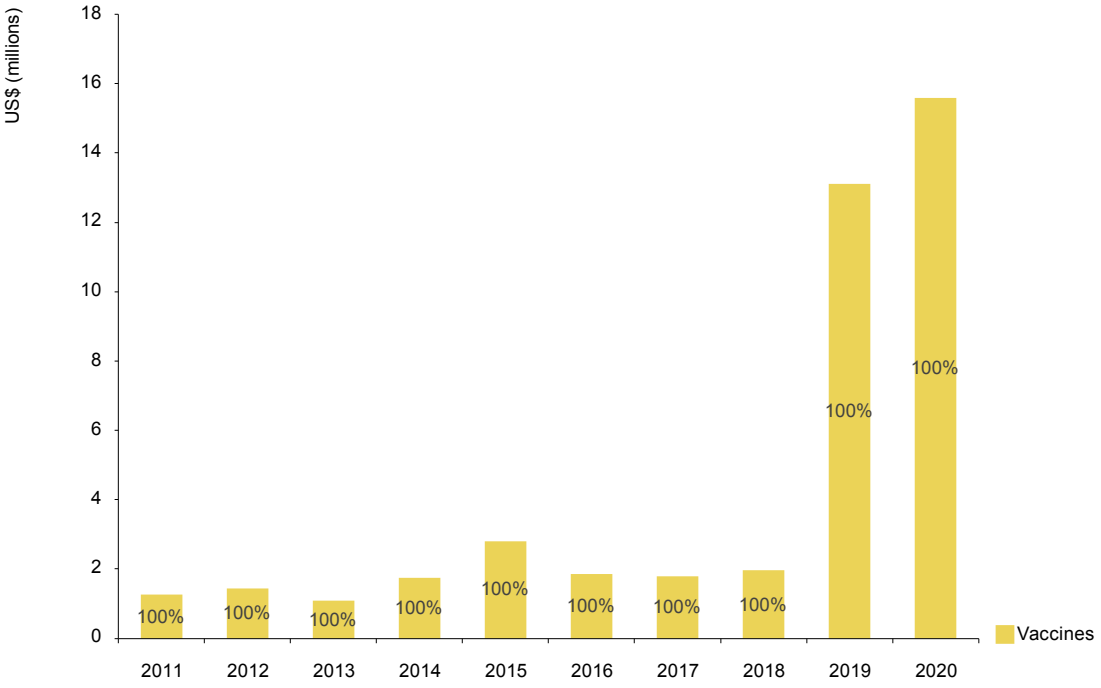


Table 19. **Rheumatic fever R&D funders 2020**

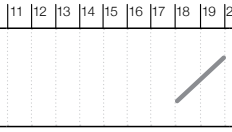
Funder / US$ (millions)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
Medical Research Future Fund									10	6.9	44
Open Philanthropy							-	-	-	5.3	34
CARB-X										2.1	13
US NIH	0.5	0.5	0.6	0.6	1.1	1.0	0.9	1.1	1.1	0.9	6.1
Australian NHMRC	0.7	0.8	0.5	1.0	0.6	0.5	0.8	0.7	1.5	0.4	2.3
Brazilian FAPESP						-	-	-	-	<0.1	0.2
Health Research Council of New Zealand (HRC)	-	-	-	-	0.6	0.3	-	0.1	0.1	-	-
Austrian Science Fund (FWF)							-		<0.1		
Austrade						-	0.2	-	-		
Brazilian BNDES				-	0.5	-	-	-	-	-	-
Aggregate industry	-	-	-	0.2	-	-	-	-	-	-	-
Swedish Research Council	0.1	0.1	-	-	-	-		-	-	-	-
Disease total	1.3	1.4	1.1	1.7	2.8	1.9	1.8	2.0	13	16	100

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

- No reported funding

SNAKEBITE ENVENOMING

63K DEATHS IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$15.2m	0.4%	+31%			

Funding for snakebite envenoming (SBE) R&D totalled just over $15m in 2020, marking the highest level of funding received since it was first included in G-FINDER in 2018. This represented an increase of close to a third (up $3.6m, 31%), which came in spite of decreases in funding from its top three 2019 funders – the UK FCDO, industry and India's BIRAC – with the latter two reporting almost no funding in 2020.

The increase in SBE R&D was linked to the progression of a drug candidate – varespladib – from pre-clinical to clinical development. In 2020 the public benefit company Ophirex received a new funding stream from the Wellcome Trust ($2.0m), as well as new and ongoing funding from the US DOD to support clinical development of its varespladib-based Broad Spectrum Snakebite Antidote as it advanced to Phase II trials.

The decline in FCDO funding (down $1.6m, -29%) came as it closed out a three-year project with IAVI to develop broadly neutralising antibodies for use as antivenom therapies. Overall funding from other UK government agencies remained stable, with continued contributions from the DHSC, MRC and NHS. Taken together, the UK government has been the largest national public funder of SBE R&D every year and has cumulatively contributed more than half (54%) of all R&D funding.

The progression in the SBE product pipeline resulted in significant shifts in the distribution of funding, including a $6.4m (878%) increase in drug R&D investment and a $5.8m (738%) increase in funding for clinical development. There was a steep fall in funding for biologics (down $1.7m, -22%), as FCDO and industry funding both declined significantly from their peaks in 2019, with industry's contributions falling below $0.1m.

These falls were somewhat offset by the emergence of several new funders of SBE R&D, most notably the EC with $0.6m in funding and the Butantan Institute of Brazil – which did not participate in last year's survey – with $0.8m. Both organisations focused on biologics R&D, with the EC funding two new projects: ADDovenom and MABSTER, helping to offset reduced biologics funding from the UK FCDO and industry and leaving biologics funding well above its 2018 level.

pipeline spotlight

Indriyam Biologics has designed a 'V-sens' snake venom detection biosensor capable of identifying species-specific venom within minutes.[89] The EC is funding the MABSTER project with the aim of discovering therapeutic human monoclonal antibodies that are recyclable, broadly cross-reactive, and capable of doing both simultaneously.[90]

Unmet R&D needs: Antivenoms can be highly effective against snakebite envenomation if given at the right time, at the right dose, and for the right snake. However, they are expensive to manufacture, can be complex to administer and store, and carry the risk of adverse reactions. There is a need for R&D to support the approval and introduction of safe, effective, high-quality and geographically appropriate antivenoms, as well as to deliver next generation antivenoms that are more effective, more affordable, safer and heat stable.[91] In low-resource settings, heat-stable venom-agnostic oral drugs are also needed as a first-line therapeutic to slow down neurotoxicity and prolong the window for victims to receive antivenom.[92] Broad-spectrum small molecule inhibitors could help bridge this gap: varespladib has progressed to Phase II clinical trials and shows promise as therapy against venom-induced myonecrosis and haemorrhagic toxicity.[93] Affordable, rapid, point-of-care diagnostics capable of identifying common species in high-burden areas, with low to no cross reactivity between venoms are also needed.

Figure 11. **Snakebite envenoming R&D funding by product type 2018-2020**

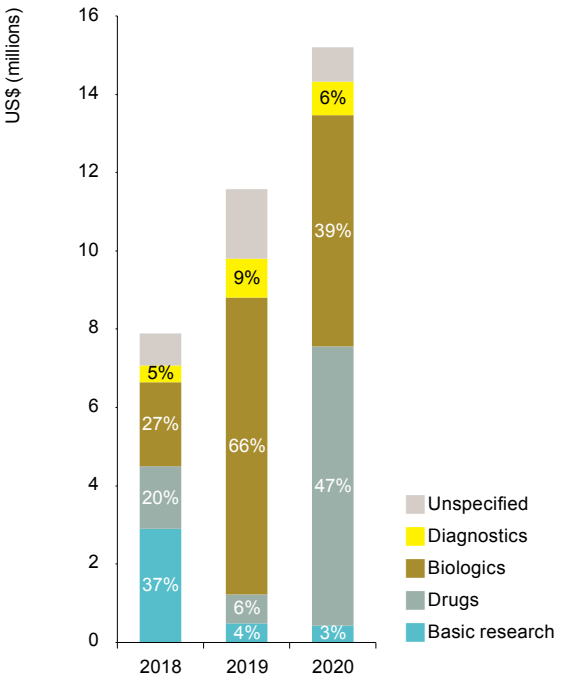


Table 20. **Top snakebite envenoming R&D funders 2020**

Funder	US$ (millions) 2018	2019	2020	2020 % of total
US DOD	1.3	0.5	4.8	31
UK FCDO	0.7	5.5	3.9	26
Wellcome Trust	0.3	0.3	2.4	16
UK DHSC	0.2	0.9	0.8	5.2
UK NHS	1.1	0.8	0.8	5.2
Butantan Institute	-		0.8	4.9
EC	-	-	0.6	4.0
UK MRC	0.3	0.2	0.3	1.7
Swiss SNSF	0.3	0.3	0.2	1.3
Hamish Ogston Foundation		0.2	0.2	1.2
US NIH	0.1	0.1	0.1	1.0
Center for Production and Research of Immunobiology		-	<0.1	0.6
Subtotal of top 12^	6.9	11	15	98
Disease total	7.9	12	15	100

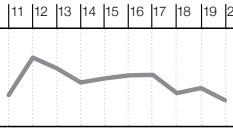
^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.

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

- No reported funding

LEPROSY

29K DALYS
0 DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$8.2m	0.2%	-17%			

Global funding for leprosy R&D totalled $8.2m in 2020, a decrease of $1.7m (-17%) from 2019. Funding for leprosy basic research and product development peaked at $14m in 2012 and has largely trended downward since. This year's decrease took funding for leprosy to its lowest level in the past decade.

The decrease in funding is almost entirely linked to a $1.7m reduction in funding for basic research (-21%), mostly driven by a significant fall in funding from the UK Medical Research Council from its peak in 2019 (down $0.8m, -82%). There was also a $0.3m decline in the Leprosy Research Initiative's funding for basic research, bringing its basic research funding to a historic low of just $12k.

Despite these falls, basic research continued to receive the largest share of leprosy funding ($6.3m, 77%), followed by drugs ($1.1m, 14%) and vaccines ($0.4m, 5.3%). The remaining 3.8% was invested in a combination of diagnostics, biologics, and funding without a specified product area. The 0.4% ($34k) of leprosy funding invested in biologics R&D, from the Indian Council of Medical Research (ICMR), represents the first funding for this product category since its inclusion in the survey in 2018.

As a result of the transition of bedaquiline from preclinical to Phase II trials, funding for drug R&D saw a sharp increase in 2018 and has remained relatively stable at its new, higher level in the years since. This Phase II drug funding doubled in 2020 (to $0.9m, up from $0.4m in 2019), while funding for vaccines fell slightly (down $0.2m, -36%), resulting from reduced funding for a Phase I trial for LepVax from the American Leprosy Mission (ALM).

As it has every year, the majority of funding for leprosy R&D came from the Indian ICMR and the US NIH – each investing $2.9m in 2020 and totalling 70% of overall funding between them. While public funding for leprosy remained stable due to consistent funding from these two organisations, philanthropic funding has been steadily declining over the past three years, due to reduced funding from several organisations, including ALM and the Leprosy Research Initiative. Given the historically vital role played by philanthropic funding, this leaves leprosy increasingly vulnerable to changes from its remaining key funders.

pipeline spotlight

Following successful Phase Ia clinical trials,[94] leprosy vaccine candidate LepVax is due to start Phase Ib/IIa trials in Brazil in early 2022.[95] Meanwhile, AMG 634, a drug candidate initially developed by Amgen and Leprosy Mission Nepal, was licensed to the Medicines Development for Global Health in 2020 for further clinical development.[96]

Unmet R&D needs: Current drug regimens used for leprosy treatment, though effective, require prolonged treatment of 6-24 months.[97] There is an ongoing need for new drugs with simpler regimens, shorter treatment duration and which provide nerve function improvement.[98] BCG represents the best available preventive vaccine for leprosy, but has only a modest ability to prevent leprosy (26% in observational studies, 41% in experimental studies),[99] and post-exposure BCG immunisation may cause paucibacillary disease in some individuals.[100] Modern vaccines are needed that confer both pre- and post-exposure immunoprophylaxis against leprosy without exacerbating nerve damage. LepVax is one such candidate currently in Phase Ib/IIa clinical development.[95,101] Leprosy diagnosis is primarily based on identifying key clinical features, leading to late diagnosis of asymptomatic cases and continued disease transmission. New and improved diagnostics are needed capable of identifying both asymptomatic and symptomatic cases of all forms. Leiden University recently prototyped a multi-biomarker finger prick point-of-care lateral flow diagnostic test, currently in pilot testing.[102]

Figure 12. **Leprosy R&D funding by product type 2011-2020**

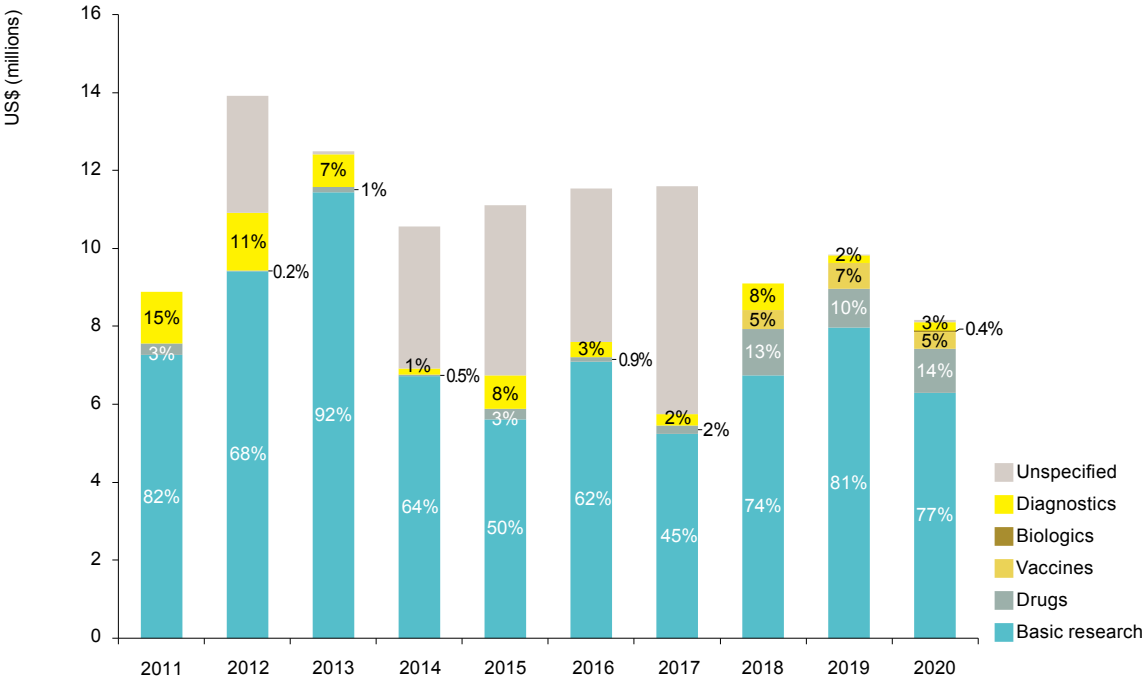


Table 21. **Top leprosy R&D funders 2020**

Funder \ US$ (millions)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
Indian ICMR	2.4	0.8	3.6	3.7	4.8	4.1	6.0	2.1	3.0	2.9	35
US NIH	4.8	10	6.4	6.1	4.6	5.2	2.5	2.4	2.6	2.9	35
Aggregate industry	0.1	-	<0.1	<0.1	0.7	0.4	0.4	1.3	0.5	0.9	11
ALM	0.6	0.4	0.2	<0.1	-	-	0.1	0.6	0.5	0.3	3.7
Turing Foundation		0.3	0.3		-	-	-	-	0.2	0.3	3.1
effect:hope						0.1	0.6	0.6	0.2	0.2	2.5
UK MRC	-	-	-	<0.1	<0.1	0.2	0.6	0.6	0.9	0.2	2.0
Institut Pasteur	<0.1	0.2	0.1	<0.1	<0.1	0.1	-	-	-	0.1	1.6
Leprosy Research Initiative					0.6	0.5	0.5	0.3	0.4	0.1	1.4
Inserm	-	-	-	-	-	<0.1	<0.1	<0.1	0.2	<0.1	1.0
Leprosy Relief		-		-		<0.1	<0.1	<0.1	<0.1	<0.1	0.9
EC	<0.1	-	<0.1	<0.1	<0.1	-	-	-	<0.1	<0.1	0.8
Subtotal of top 12^	8.9	14	12	11	11	11	11	8.9	9.4	8.0	98
Disease total	8.9	14	12	11	11	12	12	9.1	9.8	8.2	100

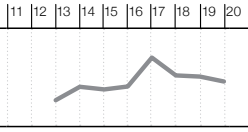
^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.

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

- No reported funding

CRYPTOCOCCAL MENINGITIS

181K DEATHS IN 2014

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$7.0m	0.2%	-14%			

Funding for cryptococcal meningitis R&D totalled $7.0m in 2020, down $1.1m (-14%) from 2019. This leaves it more than 40% below its US NIH-driven peak in 2017, though still in line with its average funding since its 2013 inclusion in the G-FINDER survey. As in previous years, the majority of this funding came from the US NIH ($6.5m, 93% of the total), with most of the remainder ($0.3m, 4.6%) provided by the Wellcome Trust. Most of the overall decline in funding was a result of reductions from the US NIH following near-record 2019 funding (down $0.9m, -12%).

For the first time since its inclusion in the survey in 2013, there was no cryptococcal meningitis funding reported by the UK MRC – historically the second largest funder behind the US NIH – following five consecutive years of declining funding. This decline results from the conclusion of a pair of long-running funding streams – one for Phase III trials of high dose AmBisome, and another for sertraline – and is likely to be only temporary, with funding for a new Phase III combined therapy trial in South Africa and Tanzania having commenced in 2021.

There are only two product categories included in scope for cryptococcal meningitis: drugs and biologics. Drug R&D received the overwhelming majority of investment ($6.8m, 98%) in 2020, with just 2% ($0.1m) invested in biologics. This funding, from the Mexico National Council of Science and Technology (CONACYT), represents the first meaningful investment in cryptococcal meningitis biologics since the product category was included in the G-FINDER survey in 2018.

Funding for drug R&D was primarily invested in early-stage research, ($4.8m, 68% of the total), with 28% ($2m) directed towards clinical development. The small amount invested in biologics was almost entirely for clinical development ($0.1m, >99%).

Clinical development funding fell for a third consecutive year, driven by the continued decline in the UK MRC's clinical trial funding. Basic & early-stage research funding also declined, due to a reduction in funding from the US NIH.

As has been the case since its inclusion in the G-FINDER survey, there was once again no industry investment in cryptococcal meningitis, with nearly all funding (95%) coming from the public sector, and the remainder from philanthropic funders.

pipeline spotlight

Results from the Phase III AMBITION-cm trial showed that a single, high-dose of AmBisome (liposomal amphotericin B) combined with seven days of oral flucytosine and fluconazole was non-inferior to – and safer than – the current WHO recommended standard of care, providing an easier to use and better tolerated treatment regimen for developing countries.[103]

Unmet R&D needs: Antifungal medications used for treating cryptococcal meningitis are effective but poorly suited for use in developing countries. Amphotericin B is expensive and requires administration at a hospital, and flucytosine requires careful blood monitoring. As a result, most developing countries resort to fluconazole use, which is only partially effective.[104] Notwithstanding the AMBITION-cm findings, there remains a need for affordable, efficacious drugs that are adapted for resource poor settings. New antifungal agents, repurposed drugs and immunotherapies targeting various biochemical processes are in different stages of development, with many candidates showing promising activity against cryptococcal meningitis.[105] Two such candidates are Mycovia Pharmaceutical's VT-1129 and VT-1598, which have both progressed to clinical stages of development.[106,107] Clinical trials are also being conducted on new oral formulations of amphotericin B (MAT2203).[108] Monoclonal antibodies and immunomodulators alone or in combination with antifungal agents have been investigated, but there are currently no biological candidates in clinical trials.[109]

Figure 13. **Cryptococcal meningitis R&D funding by product type 2013-2020**

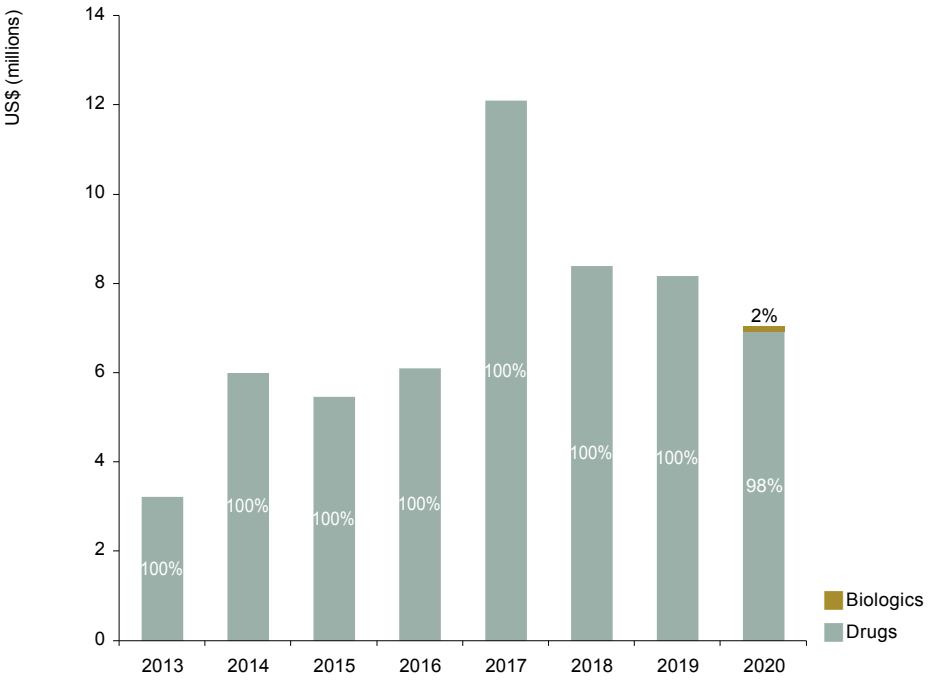


Table 22. **Cryptococcal meningitis R&D funders 2020**

Funder	US$ (millions) 2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
US NIH	1.5	4.5	3.3	4.6	7.6	5.3	7.4	6.5	93
Wellcome Trust	0.3	<0.1	<0.1	<0.1	0.4	0.4	0.3	0.3	4.6
Mexican CONACYT	-	-	-	-	-	-		0.1	1.8
Institut Pasteur	-	-	-	-	-	-	-	<0.1	0.4
Brazilian FAPEMIG			-	-	-	-	-	<0.1	0.1
Brazilian FAPESP				-	-	<0.1	<0.1	<0.1	<0.1
UK MRC	1.3	1.2	2.0	1.1	1.1	0.6	0.2	-	-
Swiss SNSF	-	-	-	-	0.1	0.1	0.1	-	-
UK DHSC					1.7	1.1	-	-	-
UK FCDO	-	-	-	-	0.8	0.7	-	-	-
French ANRS	-	-	-	0.2	0.2	-	-	-	-
Fondation Mérieux	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-
Disease total	3.2	5.9	5.4	6.0	12	8.3	8.1	7.0	100

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

- No reported funding

HISTOPLASMOSIS

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$4.0m	0.1%	N/A	11 12 13 14 15 16 17 18 19 20	Public, Philanthropic	Basic & early, Late

Histoplasmosis was added to the G-FINDER neglected disease report in 2020, receiving a total of $4.0m across the three in-scope product areas: basic research, drugs, and diagnostics.

The US NIH provided essentially all ($4.0m, 99.8%) reported histoplasmosis R&D funding, the vast majority of which ($3.5m, 86%) went to basic research, with the remainder split across diagnostics ($0.4m, 11%), and drug R&D ($0.1m, 2.5%).

The remaining funding – just $6k – was diagnostics R&D funding provided by Fungal Infection Trust ($6k, 0.2%), a UK-based charity, for the evaluation of a rapid point-of-care test. With all NIH funding devoted to basic & early-stage research, the Fungal Infection Trust's contribution represented the only clinical development funding for histoplasmosis in its first year of inclusion in the G-FINDER survey.

pipeline spotlight

In 2020, MiraVista Diagnostics launched the world's first lateral flow assay for *Histoplasma* antigen detection in serum and urine samples.[110] This point-of-care test has subsequently been validated by several clinical studies with positive results.[111–113]

Unmet R&D needs: Timely diagnosis and early initiation of treatment are critical for histoplasmosis management, as untreated or delayed disseminated histoplasmosis is often fatal. Conventional methods of diagnosis are laboratory based, making them unsuitable in low-resource settings. There is a need for highly sensitive and specific point-of-care diagnostic tests for *Histoplasma* diagnosis. MiraVista Diagnostics' recently launched antigen-based lateral flow assay is one such test.[110] Other similar test kits are needed to drive commercial availability, particularly in LMICs. Clinical guidelines for histoplasmosis management recommends a year-long treatment with liposomal amphotericin B and itraconazole.[114] Though effective, liposomal amphotericin is a parenteral drug that is not heat stable, while itraconazole has drug-drug interactions with anti-tubercular and anti-retroviral medications,[114] necessitating monitoring of its blood concentrations, thus limiting their use in LMICs. Thus, there is a need for new treatment regimens, preferably oral, with shorter duration, that are safe in combination with other drugs. Most investigational agents are in early-stage development.[115]

Figure 14. **Histoplasmosis R&D funding by product type 2020**

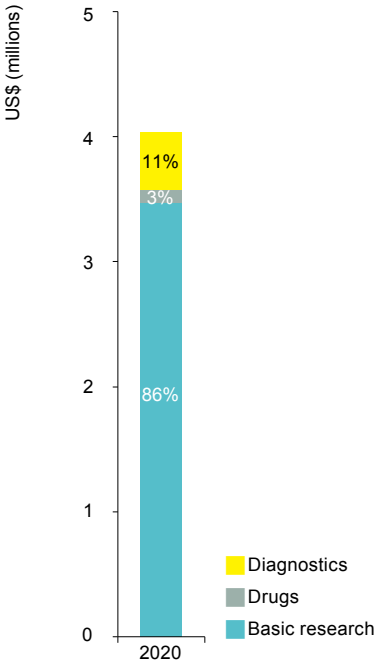
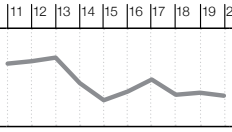


Table 23. **Histoplasmosis R&D funders 2020**

Funder	US$ (millions) 2020	2020 % of total
US NIH	4.0	99.8
Fungal Infection Trust	<0.1	0.2
Disease total	4.0	100

BURULI ULCER

1.2K CASES IN 2020

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$2.5m	<0.1%	-13%			

Global funding for Buruli ulcer basic research and product development was $2.5m in 2020, falling $0.4m (-13%) to a five-year low. This continued the overall stagnation in funding for Buruli ulcer at a level far below that of its sustained peak between 2010 and 2013.

The overall landscape of funders for Buruli ulcer research remained relatively stable in 2020, with most 2019 funders continuing to provide support for their ongoing projects at similar levels. One potentially significant change was the resumption in funding from the Anesvad Foundation, which matched its 2017 disbursement of $0.2m to FIND for diagnostics research, after two years without any reported contributions.

Funding from the US NIH declined slightly, falling for a fourth consecutive year and leaving its funding well below its long-term average, though it remained the top overall funder. The bulk of the overall decrease, though, was due to reductions from industry and from the Australian NHMRC, each of which saw their 2020 disbursements fall sharply.

Most funding for Buruli ulcer R&D in 2020 went toward basic & early-stage research ($1.9m, 77%). Of this, $1.0m was for early-stage drug development, accounting for 41% of all funding in 2020. This is broadly in line with the trend observed over the past decade, with a little over half of all funding since 2011 going to either basic research or early-stage drug development.

There was just $0.3m in clinical development funding in 2020, the first such funding reported since 2017, again going exclusively to FIND for the development of a rapid diagnostic test.

Other than $5m invested between 2011 and 2013, mostly as a part of the EC's BuruliVac project, there had been no additional funding for vaccine research until 2020, when the Australian NHMRC recorded an initial disbursement to the University of Melbourne for preclinical development of a Buruli ulcer vaccine. While the 2020 amount – just $23k – is small, it may signal a renewed interest in vaccine development from a nation that has experienced small, but ongoing, outbreaks of Buruli ulcer.

pipeline spotlight

Funded by GHIT, FIND and collaborating partners are conducting field evaluation of the first mycolactone-specific prototype rapid diagnostic test (BU-MYCOLAC RDT).[116] Meanwhile, the US FDA has granted orphan and fast track status to Qurient's telacebec drug for Buruli ulcer, with planning underway for a global Phase II trial.[117]

Unmet R&D needs: Current diagnostics are costly, complex and unsuitable for the point of care in endemic areas.[118] There is a need for simple rapid diagnostic tests to allow prompt diagnosis at the community level. Several tests are currently under development, including the BU-MYCOLAC Rapid Test and Aptagen's point-of-care diagnostic based on RNA aptamers.[119,120] Recent research calls for ongoing monitoring to detect any emerging drug-resistant strains, highlighting the need for new drugs that can be given in an intermittent or shorter period. One recent study demonstrated that an 8-week all-oral drug regimen was non-inferior to the traditional oral/injectable treatment, while telacebec, an investigational TB drug, shows promise as a single-dose candidate with the potential of reducing treatment period to 2 weeks.[121,122] There is currently no approved vaccine for Buruli ulcer. The (anti-TB) BCG vaccine provides short-term protection, but is not an adequate substitute for a specifically targeted vaccine; current vaccine development efforts are in the very early preclinical phase.[123]

Figure 15. **Buruli ulcer R&D funding by product type 2011-2020**

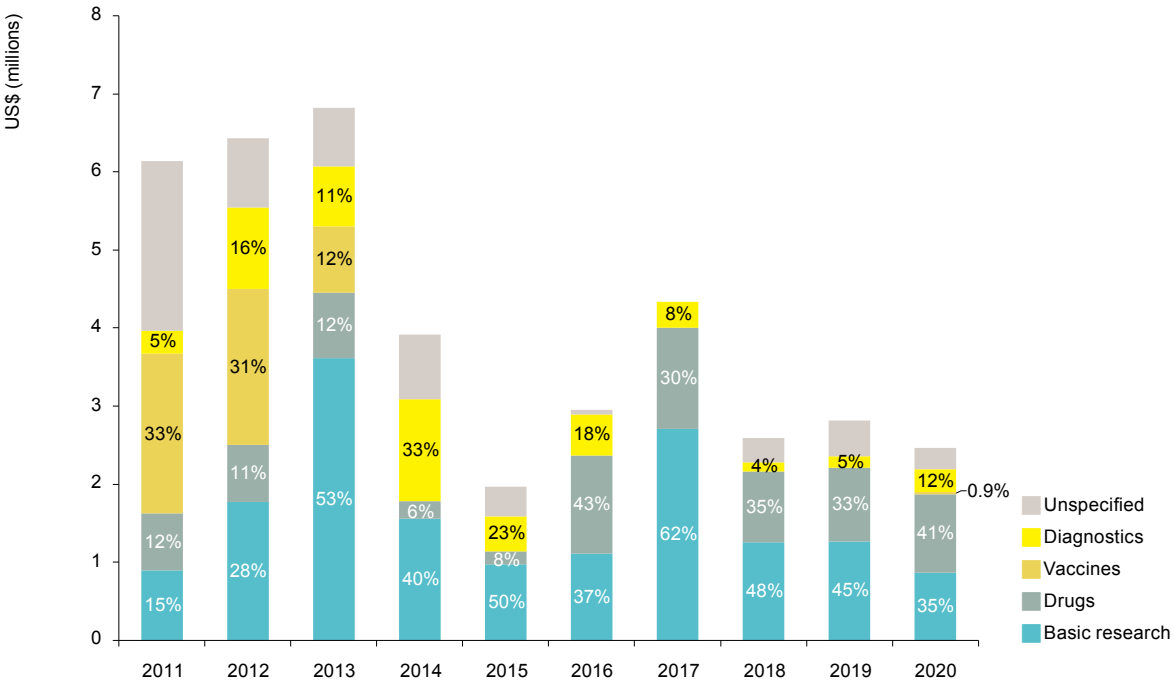


Table 24. **Buruli ulcer R&D funders 2020**

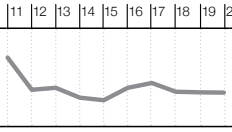
Funder \ US$ (millions)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
US NIH	1.4	1.1	1.1	-	-	1.1	1.0	0.9	0.9	0.9	35
Institut Pasteur	0.2	0.4	0.3	0.4	0.5	0.5	0.3	0.1	0.2	0.3	13
Aggregate industry	-	-	-	-	-	-	-	0.3	0.5	0.3	11
Australian NHMRC	0.1	<0.1	-	0.1	<0.1	<0.1	1.3	0.3	0.5	0.3	10
Wellcome Trust	0.3	0.3	0.3	0.2	<0.1	<0.1	0.3	0.3	0.2	0.2	9.7
Inserm	-	-	-	-	-	<0.1	<0.1	0.2	0.1	0.2	9.0
Anesvad Foundation							0.2			0.2	6.2
Medicor Foundation	0.1	0.2	0.2	0.2	0.4	0.1	0.3	<0.1	0.1	0.1	5.3
Japan Society for the Promotion of Science (JSPS)								-	<0.1	<0.1	0.6
ALM	-	<0.1	0.2	0.2	-	-	-	-	<0.1	<0.1	0.4
Flemish EWI						0.3	0.2	0.2	0.1		-
Raoul-Follereau Foundation	-	0.2	0.2	0.2					<0.1		-
Disease total	6.1	6.4	6.8	3.9	2.0	2.9	4.3	2.6	2.8	2.5	100

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

- No reported funding

TRACHOMA

0.2M DALYS
0 DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$1.9m	<0.1%	-0.7%			

Funding for trachoma R&D totalled $1.9m in 2020, remaining effectively unchanged for the second year running.

The G-FINDER scope for trachoma is limited to diagnostic and vaccine R&D, with vaccines receiving the bulk of R&D investment since 2015. The last significant investment for trachoma diagnostics R&D was from a single SME and occurred between 2009 and 2013, resulting in the 2013 launch of a new diagnostic. In the years since, less than $0.6m, total, has gone to diagnostics research, with no reported funding at all in 2020.

While overall trachoma R&D funding has declined since its peak in 2011 – largely driven by the fall in diagnostics investment – vaccine R&D funding has, conversely, trended upwards: rising from a decade low of $0.8m in 2011 and stabilising at just under $2m annually for the last three years.

The US NIH played a significant role in trachoma funding between 2008 and 2016, providing a total of $11m USD across both product areas over that time; but it has not provided any funding for trachoma R&D since.

In 2017, immediately following the cessation of NIH funding, the European Commission began funding for its TracVac project, which has left it as the only significant funder of trachoma every year since. Over the past four years, the EC has provided 86% of all trachoma funding, with almost all of the remainder coming via a single $1.0m disbursement in 2017 from the German DFG.

As a result, the funding for trachoma in 2020 was entirely directed to the ongoing European Commission TracVac early-stage vaccine research project, divided across the four consortium members: Imperial College London, French Alternative Energies and Atomic Energy Commission, Statens Serum Institute and the London School of Hygiene and Tropical Medicine.

The scheduled conclusion of the TracVac project in February of 2022 raises questions about the future of trachoma vaccine funding. With little global funding for trachoma diagnostics since 2014, the end of ongoing vaccine funding from the EC in the coming years would leave no obvious path for addressing the remaining unmet needs of trachoma sufferers.

pipeline spotlight

DjinniChip, a novel, rapid, low-cost molecular assay for diagnosing ocular *C. trachomatis* has demonstrated promising results during clinical testing, particularly in its ability to detect low concentrations of *C. trachomatis* and its usability in poorly resourced field conditions. This device was developed by the Fraunhofer IZI MicroDiagnostics Unit in Germany.[124]

Unmet R&D needs: An effective vaccine would be a major development, given the challenges associated with successful implementation (and sustainability) of the SAFE (surgery; antibiotics; facial cleanliness; environmental improvement) strategy,[125] which is the only currently available tool to reduce trachoma transmission. The most advanced trachoma vaccine candidate is NIAID's live-attenuated (plasmid-deficient) trachoma vaccine which is still in preclinical development.[126,127] Clinical diagnosis of trachoma is not always reliable, and current diagnostic tests are expensive and complex to use. Studies have shown that an antibody-based multiplex assay could be used to diagnose trachoma in low-prevalence settings. One candidate, the Pgp3 LFA-cassette, has been evaluated in field studies in Nepal, showing high specificity (99%) but low sensitivity (40%).

Figure 16. **Trachoma R&D funding by product type 2011-2020**

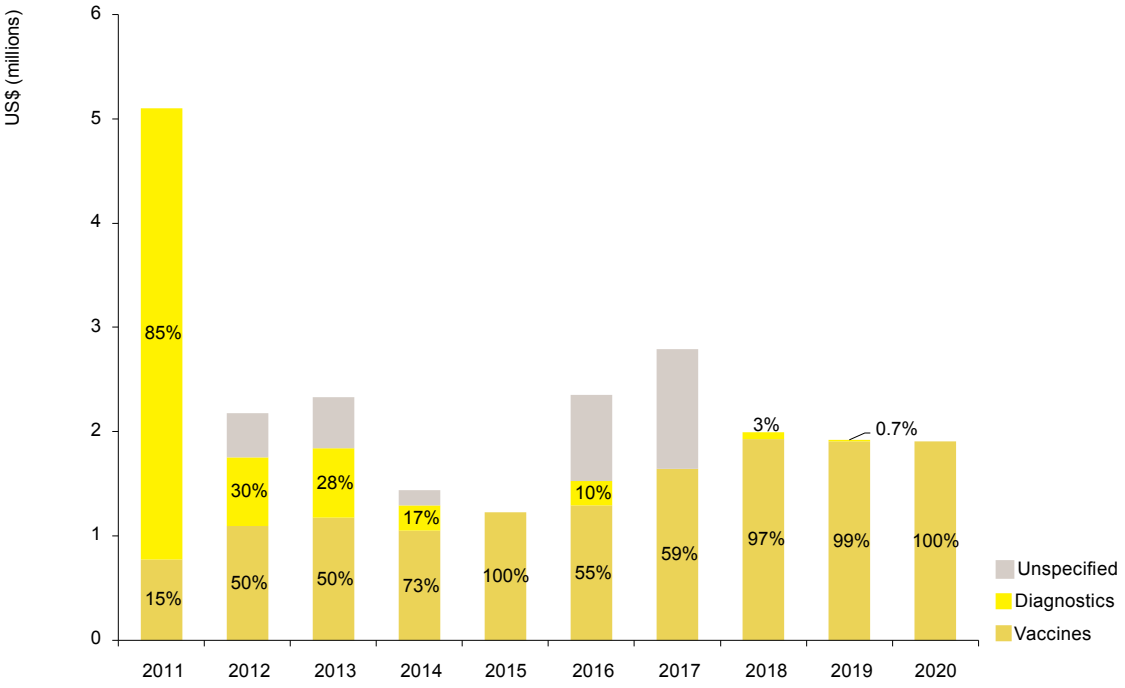


Table 25. **Trachoma R&D funders 2020**

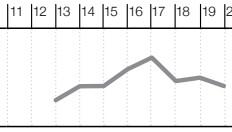
Funder \ US$ (millions)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
EC	-	-	-	-	-	-	1.6	1.9	1.9	1.9	100
The Task Force for Global Health								<0.1	<0.1	-	-
German DFG	-	-	0.2	-	-	0.7	1.0	-			-
Institut Pasteur	<0.1	-	0.1	0.1	-	0.1	0.1	-	-	-	-
US NIH	1.2	1.6	1.6	0.9	1.0	1.5	-	-	-	-	-
Wellcome Trust	-	0.5	0.4	0.3	0.2	<0.1	-	-	-	-	-
US CDC	-	-	-	0.1	-	-	-	-	-	-	-
Aggregate industry	3.7	-	-	-	-	-	-	-	-	-	-
Lygature	0.1										-
Disease total	5.1	2.2	2.3	1.4	1.2	2.4	2.8	2.0	1.9	1.9	100

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

- No reported funding

LEPTOSPIROSIS

2.9M DALYS
59K DEATHS
IN 2015

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$1.3m	<0.1%	-29%			

Funding for leptospirosis diagnostic R&D – the only product area included in the G-FINDER scope – totalled $1.3m in 2020, dropping by just over a quarter (down $0.6m, -29%). Annual funding had averaged $1.7m since 2013 and now sits around 20% below that level.

Only two organisations provided funding for leptospirosis R&D in 2020. The vast majority was intramural funding by the Indian Council of Medical Research (ICMR) ($1.3m, 98%) with the remainder coming from France's Institut Pasteur. Since 2016, these two organisations have been reliable funders of leptospirosis R&D, alongside intermittent – but not insignificant – investment from the US NIH.

A further drop in funding from Institut Pasteur (down $0.2m, -84% since last year, and down 98% since 2017) marks their lowest investment ever, continuing a decline in its funding since its peak in 2017. Together with the absence of funding from the US NIH (down from $0.6m in 2019), the continued rebound in funding from the ICMR from a low in 2018 has left it as essentially the lone supporter of leptospirosis R&D in 2020. The ICMR's funding has remained fairly steady at just over $1.2m annually, accounting for 55% of the global total since it first began funding leptospirosis R&D in 2016, and making leptospirosis the only majority LMIC government-funded disease in the G-FINDER survey over that period.

None of the reported funding for 2020 was allocated to a specific R&D stage.

pipeline spotlight

A novel *Onsite* Leptospira IgG/IgM Combo Rapid Test has been developed by CTK Biotech to be used for the simultaneous detection and differentiation of IgG and IgM antibodies to *Leptospira interrogans* in human samples – serum, plasma or whole blood – aiding in the early diagnosis of leptospirosis in resource-limited settings.[128]

Unmet R&D needs: Effective, appropriate drugs exist for leptospirosis, meaning that infection can be successfully treated if diagnosed. However, diagnosing leptospirosis can be challenging due to the non-specific symptoms of early infection as well as asymptomatic infection in some affected individuals. Accurate diagnosis of leptospirosis during the acute phase of the disease is currently only possible with sophisticated laboratory tests, which are unsuitable for remote settings. There is a real need for new, easy-to-use tests that can quickly and accurately diagnose acute infection in the field. Several rapid point-of-care tests are available on the market, but none of these are widely approved due to their lack of specificity and sensitivity.[129] The promising diagnostic LEPkit assay has demonstrated higher sensitivity and specificity than existing rapid diagnostic tests, but its development status has not been updated since 2017.[130]

Figure 17. **Leptospirosis R&D funding by product type 2013-2020**

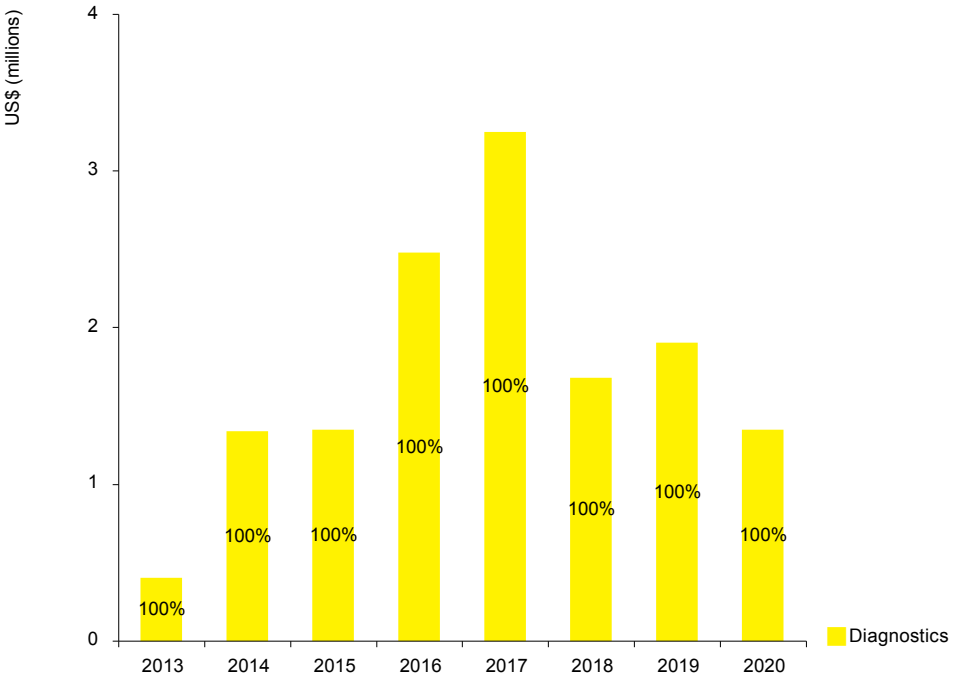


Table 26. **Leptospirosis R&D funders 2020**

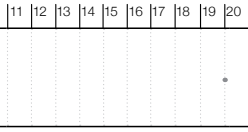
Funder	US$ (millions) 2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
Indian ICMR	-	-	-	1.2	1.4	0.9	1.1	1.3	98
Institut Pasteur	0.4	0.9	1.0	1.1	1.8	0.4	0.2	<0.1	2.4
US NIH	-	0.3	0.3	-	-	0.3	0.6	-	-
Aggregate industry	-	-	-	-	<0.1	<0.1	-	-	-
Inserm	-	-	-	0.2	-	-	-	-	-
Colombian Minciencias		<0.1	-	-	-	-	-	-	-
plan:g	<0.1	-	-	-	-	-	-		-
Disease total	0.4	1.3	1.4	2.5	3.2	1.7	1.9	1.3	100

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

- No reported funding

SCABIES

4.8M DALYS
0 DEATHS
IN 2019

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$1.2m	<0.1%	N/A			

This year marked the first time data on R&D funding for scabies was captured in the G-FINDER survey, with participants reporting overall investment of $1.2m in 2020.

The basic research category, which includes only R&D relevant to the burden of disease in LMICs, represented more than half of all reported funding for scabies R&D ($0.7m, 56% of the total). Only $0.2m (18%) was reported specifically for drug R&D, consisting of a single grant from the Australian National Health and Medical Research Council (NHMRC) to the Queensland Institute of Medical Research for novel drug discovery.

Though no funding was reported for diagnostics alone, more than half of the remaining $0.3m (26% of the total) went to projects targeting multiple product areas, including both diagnostic and drug-related R&D, but could not be apportioned to individual products.

While there was no reported funding for clinical development in 2020, we are aware of clinical development of new scabies biomedical products being undertaken by funders and product developers not yet captured by the G-FINDER survey. This includes a range of Phase II, III and IV trials of new and repurposed drugs for scabies treatment.

Overall, nearly two-thirds (65%) of scabies funding came from the public sector, with the remaining 35% from philanthropic funders. Almost four-fifths (79%) of reported scabies funding came from Australian funders (Australian NHMRC and Macquarie Group Foundation) and was directed to Australian recipients. Although this Australia-centric picture of scabies funding may in part result from a reporting bias in G-FINDER's first year of scabies data collection, it likely also reflects a genuine focus on scabies R&D in Australia, where the disease is particularly prevalent among Indigenous communities.

pipeline spotlight

Following positive results from two Phase III trials, a new topical treatment (spinosad 0.9%) received US FDA approval in 2021.[131] Medicines Development for Global Health is currently evaluating the oral drug candidate moxidectin in dose-finding trials in France, Austria and Australia.[132] A Phase IIb trial is planned for 2022.

Unmet R&D needs: Due to the high price and limited availability of the most efficacious scabicide (permethrin 5% cream)[133], many LMICs often rely on less effective and less well-tolerated alternatives, such as benzyl benzoate and sulphur ointments. Oral ivermectin is highly effective against scabies but does not kill scabies eggs, necessitating repeat doses and increasing the difficulty of mass drug administration interventions.[134] Additionally, ivermectin's use is contraindicated for children weighing less than 15kg, and pregnant and breastfeeding women. New oral drugs are urgently needed that have prolonged skin activity, thereby effectively killing newly hatched eggs, and a proven safety profile in children and pregnant women. Moxidectin, a US FDA-approved antiparasitic agent related to ivermectin, is currently undergoing Phase II clinical trials.[132] There is also a need for a low-cost point-of-care test for individual level diagnosis and management, to facilitate mapping and surveillance at the population level and monitor potential mites' resistance towards ivermectin-based mass drug administration.[133]

Figure 18. **Scabies R&D funding by product type 2020**

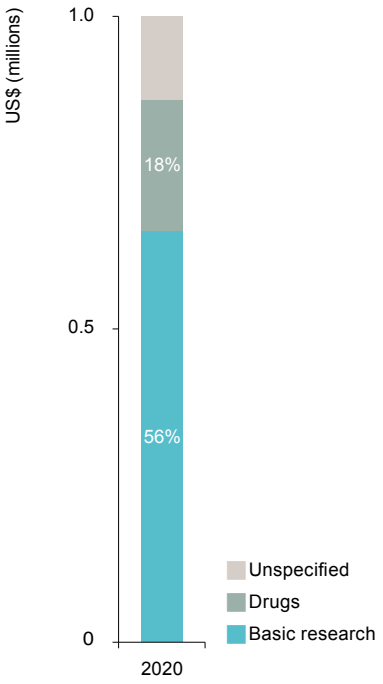
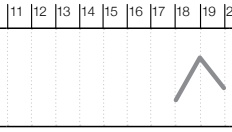


Table 27. **Scabies R&D funders 2020**

Funder	US$ (millions) 2020	2020 % of total
Australian NHMRC	0.5	44
Macquarie Group Foundation	0.4	35
UK DHSC	0.3	21
Disease total	1.2	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.

MYCETOMA

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$0.7m	<0.1%	-22%			

Overall funding for mycetoma R&D was $0.7m in 2020, a $0.2m drop which left it 22% below its 2019 level, though still higher than in 2018 – which was the first year for which mycetoma funding data was gathered.

Just over half of mycetoma funding in 2020 was for basic research ($0.4m, 55%) with the remaining 45% ($0.3m) going to drug R&D. For the third year in a row there was no diagnostic R&D reported.

However, as in previous years, these figures do not include onward funding from PDPs and other intermediaries, since these amounts are already accounted for in the G-FINDER report in the form of the untied core-funding payments made *to* these organisations. In 2020, this onward funding included $0.3m from DND*i* for mycetoma drug development.

The most consistent funding for mycetoma R&D over the three years has been basic research funding from the UK Department of Health and Social Care (DHSC) to the University of Sussex's Global Health Research Unit on Neglected Tropical Diseases, which includes research on other neglected tropical skin infections alongside mycetoma. Even with measured funding dropping a third in 2020 – likely a result of more detailed reporting rather than a genuine reduction – the DHSC remains the largest overall contributor to mycetoma R&D for the third year running.

Investment in drug R&D remained steady at $0.3m in 2020, again largely due to continued funding from Canton of Geneva to DND*i* for drug development, supporting the world's first mycetoma clinical trial in Sudan and partnering with a virtual drug-discovery community to identify new chemical entities for the treatment of mycetoma.

As in all previous years, all funding for mycetoma R&D in 2020 was from the public sector in high-income countries.

pipeline spotlight

Niclosamide, a broad-spectrum anthelmintic on the WHO Essential Medicines List, was recently shown to be active in vitro against *Madurella mycetomatis*, the main causative agent of eumycetoma in Sudan, and *Acinetomadura* spp., the causative agent of actinomycetoma.[135]

Unmet R&D needs: Despite the availability of several drugs for mycetoma treatment, including the antifungals ketoconazole and itraconazole, and antibiotics amikacin and co-trimoxazole, significant R&D gaps still exist in mycetoma treatment.[136] Antifungals targeting eumycetoma are only 25-35% effective, are costly, and require year-long administration with serious side effects.[137] There is a need for more efficacious drug regimens, with shorter duration, lower costs and fewer side effects, for use in high-burden settings. Recently, the DND*i*-supported MycetOS project identified at least 287 compounds active against mycetoma, with fenarimol being the most potent *in vitro*,[138] while niclosamide was also shown to have good activity in preclinical studies.[135] Existing mycetoma diagnostic tools are invasive, time-consuming, and laboratory-based, and are thus inappropriate for LMIC use. There is a need for cheap, rapid and accurate point-of-care diagnostics to facilitate early mycetoma diagnosis. In 2020, the Global Health Innovative Technology Fund supported the MycEXomics project, which aims to develop field-friendly point-of-care diagnostic tests for mycetoma.[139]

Figure 19. **Mycetoma R&D funding by product type 2018-2020**

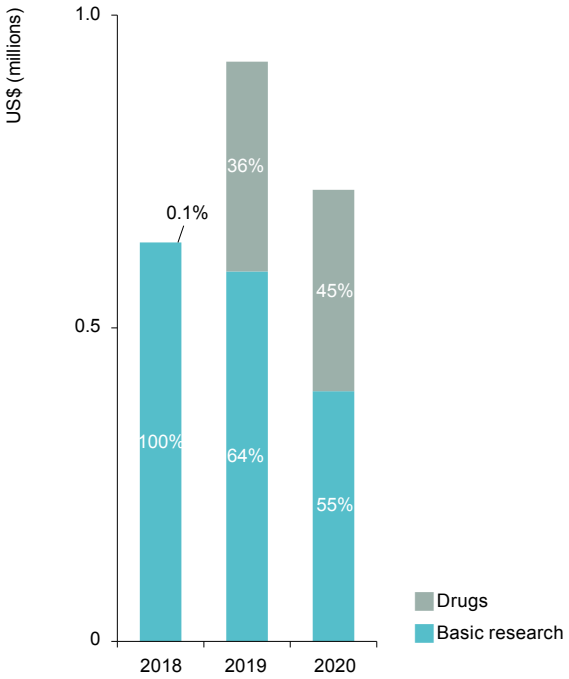


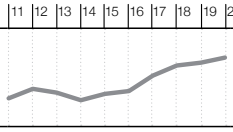
Table 28. **Mycetoma R&D funders 2020**

Funder	US$ (millions) 2018	2019	2020	2020 % of total
UK DHSC	0.5	0.6	0.4	55
Canton of Geneva	-	0.2	0.2	29
US NIH	0.2	0.1	0.1	16
Japan Society for the Promotion of Science (JSPS)	-	-	<0.1	0.7
Aggregate industry	<0.1	-	-	-
Disease total	0.6	0.9	0.7	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.

- No reported funding

R&D FOR MORE THAN ONE DISEASE

Total R&D spend in 2020	% of global funding	% change from 2019	Total R&D spend 2011-2020	Sector share	R&D stage
$583m	15%	+8.8%			

G-FINDER includes four categories of funding that cannot be allocated to a specific neglected disease: core funding of a multi-disease organisation, platform technologies; multi-disease vector control products; and other R&D.

Core funding refers to non-earmarked funding given to organisations that work in multiple disease areas, where the distribution of funding across diseases is not determined by the funder.

Platform technologies are tools that can be applied to a range of areas, but which are not yet focused on a particular disease or product. The platform technology category includes adjuvants and immunomodulators, delivery technologies and devices, and general diagnostic platforms.

The **multi-disease vector control product** category captures R&D funding for products that target vectors capable of transmitting several different diseases, including fundamental vector control research, biological and chemical VCPs and reservoir targeted vaccines.

The **Other R&D** category captures any remaining grants that cannot be otherwise allocated across individual diseases or other multi-disease categories.

Funding for neglected disease R&D that was not targeted at a specific disease was $583m in 2020, making up 15% of global funding. This is an increase of $47m (8.8%) from 2019, and the fourth consecutive record high for this category, driven by a rebound in core funding (up $30m) and further increases for platform technologies (up $33m).

An historic increase in its non-disease-specific funding made the Gates Foundation by far the largest funder in 2020 ($166m, 28% of the total), almost double the next largest funder – the EC – at $90m (15%). The US NIH was the third largest funder ($70m, 12%) – up $21m from 2019 – followed by the Wellcome Trust and the UK Foreign, Commonwealth & Development Office (FCDO).

The $49m increase in Gates non-disease-specific funding (up 42% from 2019) continued the ongoing increase in the share of the Foundation's neglected disease investments going to core and platform funding rather than disease-specific funding.

Overall funding for Other R&D fell by $15m (-22%), while funding for multi-disease VCP remained basically unchanged (down 1.7%).

Over half (55%) of all non-disease-specific funding came from the public sector – predominantly from US, UK and EU government agencies. Philanthropic funding was close behind at 43% – mostly from the Gates Foundation and the Wellcome Trust. The private sector accounted for just 1.8% of non-disease-specific funding in 2020, the third consecutive year of declining industry funding. The low level of non-disease-specific private sector funding reflects the fact that industry provides almost no core funding, along with the limited share of private sector platforms meeting our requirement that specifically target LMICs, as required for their inclusion in the G-FINDER scope.

CORE FUNDING

Core funding of multi-disease organisations reached $340m in 2020 – 58% of non-disease-specific funding. This was a $30m (9.7%) increase from 2019, bringing funding levels back to just below their 2018 record high following a big drop in 2019.

The majority of the increase in Gates Foundation multi-disease funding came in the form of core funding, which rose by 77% to just under $100m – making it the leading provider of core funding for the first time since 2017. European Commission funding also grew slightly (up $7.0m, 9.0%), but the largest non-Gates increase was from the UK FCDO, which nearly tripled from last year's record high. The only major falls in core funding were from the UK Department of Health & Social Care, and the Japanese Government – which saw typical fluctuations in its disbursements to GHIT, but no change to its ongoing commitment of $100m between 2018 and 2022.

The majority of the Gates Foundation's increase came in the form of a $24m rise in its disbursements to PATH, primarily for vaccine development. The remaining increase went primarily to the Gates Medical Research Institute (MRI), more than doubling their 2019 MRI funding. Together, these two recipients accounted for nearly three-fifths of core funding provided by the Gates Foundation, though a record twelve organisations received at least some core funding from Gates in 2020 – including three first-time recipients: the Scripps Research Institute, University of Oxford, and Shenzhen Health Development and Research Center.

The EDCTP remained the largest recipient of non-disease specific core funding, as it has been since 2017, receiving 29% of the global total and a record $83m from the EC, a fourth-consecutive record high. Despite retaining its top recipient position, overall funding to EDCTP decreased by $14m in 2020, caused by a significant decline from the UK DHSC – which reduced its EDCTP funding by around $20m for the second consecutive year – and the absence of disbursements from the UK MRC.

PLATFORM TECHNOLOGIES

Funding for platform technologies rose to $129m in 2020 – a $33m (34%) increase from 2019 and another record high after three consecutive years of growth, taking platform funding to more than three times its 2017 level.

The increase in funding was seen, to some degree, across all categories of platform technologies. As usual, the lion's share of funding for platform technologies went to general diagnostic platforms ($51m, 39% – up $16m from 2019) and vaccine delivery technologies and devices ($47m, 37% – up $14m). Adjuvants and immunomodulators received $24m (18%, up just $0.4m) and the remaining $7.5m went to drug delivery technologies and devices (5.8%, up $1.9m). These shifts in funding resulted in a six-percentage point fall in the share of platform funding going to adjuvants and immunomodulators – a near-historic low – and a record share of funding for vaccine delivery technologies.

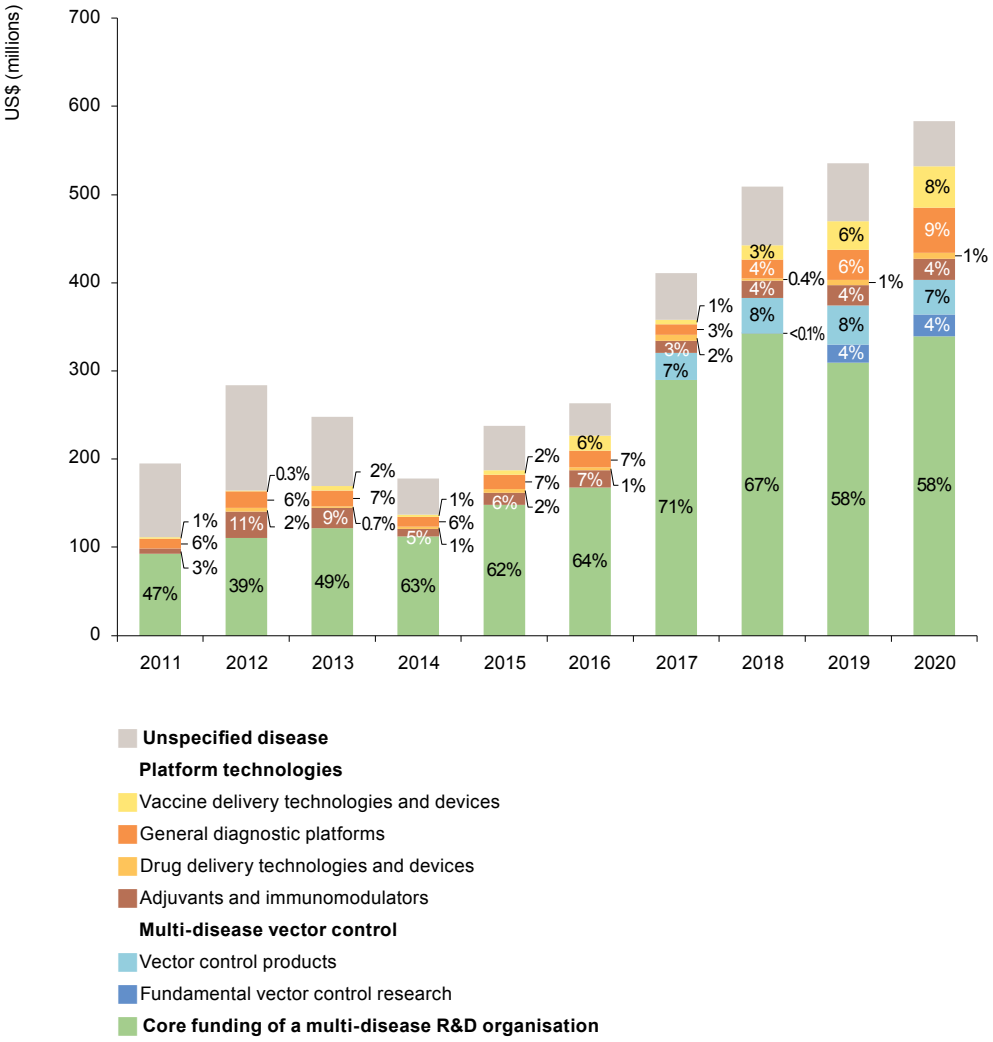
The Gates Foundation was once again the biggest funder of platform technologies, providing 40% of all funding ($51m, up $13m). This is the third consecutive year of significant growth in Gates investment in platform technologies, as their neglected disease funding portfolio shifts towards research and development targeting multiple diseases.

The Foundation's funding for adjuvants and immunomodulators actually fell sharply, mostly due to the conclusion of a five-year project aimed at lowering the commercial cost of monoclonal antibodies in low-income settings. The increase in Gates' funding was instead concentrated in diagnostic platforms and especially vaccine platform funding, which grew by $13m (72%). The increase in vaccine platform funding went mostly to the University of Washington and via new funding streams to a range of first-time industry recipients.

The majority of the remaining platform funding, and almost all of the remaining growth, came from US government agencies – with the US NIH providing an additional $6.5m (up 33% to $26m) and the US DOD an additional $15m (up 118%). Like the Gates Foundation's, US DOD platform funding has also shown years of consistent growth, rising from $0.7m in 2016 to $28m in 2020. The US DOD continued to focus heavily on diagnostic platforms, which received nearly 80% of its platform funding and accounted for most of the overall increase in 2020.

Open Philanthropy also emerged as a significant funder of platform technology in 2019, contributing to the record high funding for this category over the past two years, and making them the fourth-largest funder in both 2019 and 2020.

Figure 20. **Non-disease-specific funding by product type 2011-2020**



MULTI-DISEASE VECTOR CONTROL PRODUCT

Investment into multi-disease vector control products (VCPs) was $64m in 2020, remaining mostly unchanged from 2019 (down $1.1m, -1.7%). Funding has more than doubled since its inclusion in the G-FINDER survey in 2017, however, mostly driven by our 2019 expansion of the category to include fundamental vector control research, which in 2020 grew to $25m – accounting for nearly 40% of funding.

Funding for vector control product R&D – as distinct from fundamental VCP research – decreased by $5.4m. This drop fell exclusively on chemical VCP funding (down $6.3m), while biological VCP funding rose by $0.9m. The fall in chemical VCP funding was due to a drop in Gates investment and the lack of participation from a key industry funder.

This shift away from chemical VCP left biological VCPs with a 62% share of vector control product R&D, while chemical VCPs accounted for the other 38% – a record low, though one which likely understates its true share of spending due to differences in participation.

The US NIH remained the major funder of multi-disease vector control in 2020, providing nearly half of all funding, after a further $11m increase. NIH growth largely offset a $7.8m decrease in funding from the Gates Foundation, as well as smaller decreases from a range of other funders. The US DOD and the Wellcome Trust, the second and third largest funders, saw their funding remain relatively stable. We also saw $1m in first-time funding from Unitaid for the clinical development of chemical vector controls targeting disease-carrying mosquitos.

OTHER R&D

Funding allocated to Other R&D fell by $15m in 2020, taking it to $51m, its lowest level since 2016. The decrease was almost solely the result of the 2019 disbursement of a large one-off grant (worth $23m) by the German BMZ.

Table 29. Top non-disease-specific R&D funders 2020 (US$ millions)

Funder	Core funding	Multi-disease vector control products	Platform technologies	Unspecified disease	Total	%
Gates Foundation	99	5.3	51	11	166	28
EC	85	1.4	2.1	1.4	90	15
US NIH	0.2	31	26	12	70	12
Wellcome Trust	51	6.8	-	3.2	61	10
UK FCDO	42	-	2.0	-	44	7.5
US DOD	-	7.9	28	-	36	6.2
Aggregate industry	7.6	2.4	<0.1	0.7	11	1.8
UK MRC	3.4	0.3	0.1	5.7	9.5	1.6
Japanese government (including MOFA and MHLW)	9.4				9.4	1.6
Open Philanthropy	-	-	7.5	-	7.5	1.3
German BMBF	4.7	0.6	0.8	0.3	6.4	1.1
UK DHSC	4.4	-	1.5	-	5.9	1.0
Subtotal of top 12	306	56	120	34	516	89
Non-disease-specific total	340	64	129	51	583	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.

\- No reported funding

NEGLECTED DISEASE FUNDERS

Global funding for neglected disease basic research and product development totalled $3,937m in 2020, falling by $172m, or just over 4%. Unlike last year, when the headline fall was mostly an artefact of reduced survey participation, the drop in 2020 funding looks much the same even after adjusting for participation and the new disease areas included in this year's survey scope.

Public funders continued to provide around two-thirds of global funding for neglected disease R&D. High-income country (HIC) governments once again provided the vast majority of this public funding ($2,480m, 95% of public funding, and 63% of the global total), with the remainder divided between multilateral organisations ($54m, 2.1% of public funding) and low- and middle-income country (LMIC) governments ($88m, 3.3%).

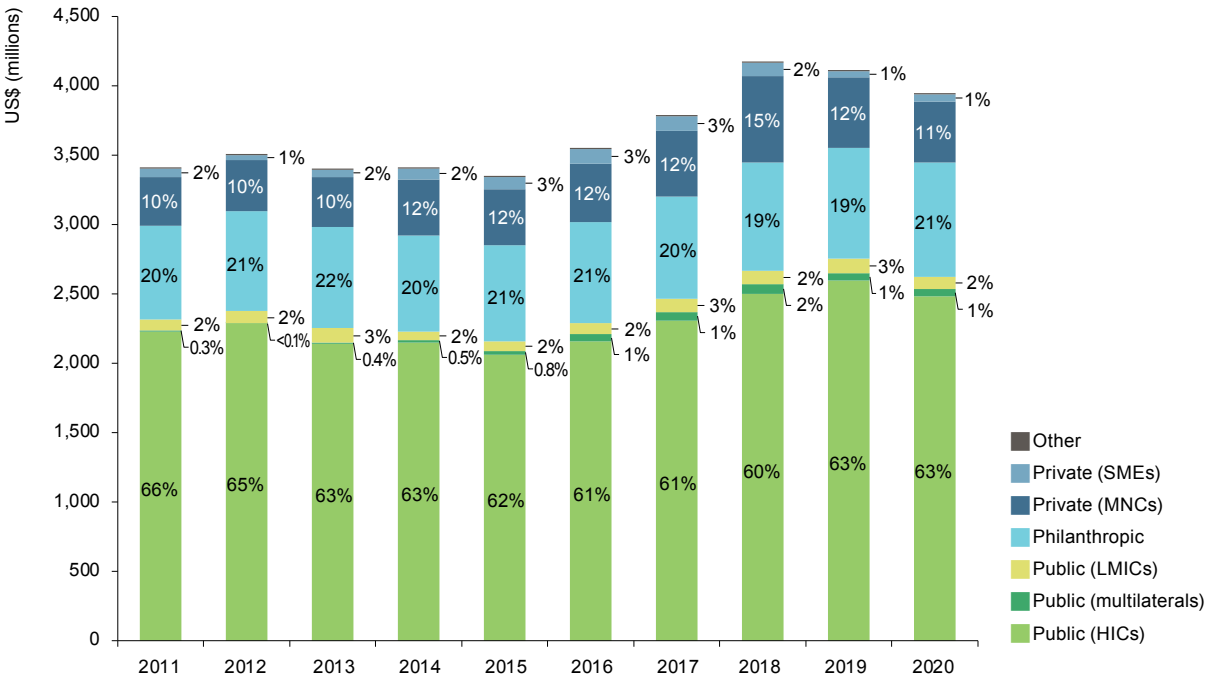
The philanthropic sector provided just over a fifth of total funding ($823m, 21%), its largest contribution since 2008. Industry funding fell to $491m (12% of total funding) of which multinational pharmaceutical companies (MNCs) provided the vast majority ($440m, 90%), with the remaining 10% ($51m) coming from small pharmaceutical and biotechnology firms (SMEs).

The fall in overall funding was made up of reductions from almost every sector, with the key exception of philanthropic funding, which grew by $28m (3.6%) to its highest level in more than a decade.

Though high-income country public funding saw the largest fall in absolute terms, declining by $113m (-4.4%) after four consecutive years of growth, it still remained at the third highest level ever recorded, behind only 2018 and 2019. The largest proportional declines were from MNCs – down by $69m, or -14% – and LMIC governments, which fell by more than 16% (-$17m) from what the retrospective addition of Indian funding data revealed to be a record high in 2019.

The slight headline rise in funding from SMEs – up $1.1m, 2.1% – reflects improved participation rather than a genuine increase. After adjusting for participation, the real change in SME funding was actually a drop of $2.6m (-5.7%).

Figure 21. Total R&D funding by sector 2011-2020



Public funding

The public sector invested $2,622m in neglected disease basic research and product development in 2020. This was a decrease of $133m (-4.8%) from the previous year, and represents the first drop in public funding since 2015.

Even after the fall, though, public funding remained well above its long-term average and at its third-highest level since the start of the G-FINDER survey.

Table 30. Top public R&D funders 2020

Country	US$ (millions)										2020 % of total
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
United States of America	1,712	1,813	1,620	1,655	1,574	1,700	1,720	1,845	1,930	1,888	72
United Kingdom	113	79	110	116	95	104	197	220	215	187	7.1
EC	113	97	115	114	138	83	119	125	124	164	6.3
India	46	46	55	42	47	55	75	67	75	68	2.6
Germany	32	55	45	49	55	49	65	69	83	55	2.1
Australia	38	47	23	34	21	27	24	41	51	46	1.8
France	61	54	79	65	64	50	49	42	46	40	1.5
Switzerland	15	17	18	20	22	19	19	18	20	18	0.7
Canada	13	18	19	11	7.5	14	14	16	12	12	0.5
Japan	3.6	2.7	12	12	14	18	19	35	34	12	0.5
Netherlands	24	15	24	18	5.3	25	25	20	19	11	0.4
Sweden	17	16	5.9	5.9	8.4	15	4.7	15	13	11	0.4
Subtotal of top 12^	2,196	2,273	2,131	2,143	2,056	2,159	2,339	2,513	2,622	2,512	96
Total public funding	2,317	2,375	2,250	2,225	2,153	2,289	2,465	2,665	2,755	2,622	100

^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020

FUNDING FROM HIGH-INCOME COUNTRIES AND MULTILATERALS

As in every previous year, high-income countries and public-sector multilaterals were responsible for the vast majority of public funding in 2020, together providing a total of $2,534m – 97% of the public sector total.

This was a decrease of $115m (-4.4%) from 2019, nearly all of which was accounted for by a $113m drop (-4.4%) from high income country governments – their first decrease since 2015, and one which reversed all of last year's growth. Funding from multilaterals fell by a similar proportion (down $2.7m, -4.7%), which, despite last year's record fall, still leaves their funding well above its long-term average level.

The US government remained by far the largest public funder at $1,888m, accounting for just over three-quarters of total high-income country public funding. The UK government was the second-largest contributor ($187m, 7.6%) for the fifth year running, followed by the European Commission ($164m, 6.7%).

While the largest absolute drop in HIC funding came from the US (down $41m, -2.1%) – largely due to their declining investment in HIV – this fall was outpaced by even larger proportional reductions across the remaining public funders (collectively down 9.8%, -$63m).

The only funder to buck the overall downward trend was the European Commission.[1] Funding provided by the EC increased by $41m (33%), following two years of relative stability, taking its funding to the highest level ever recorded by G-FINDER – $27m above its previous peak in 2015.

The rise in EC funding was largely driven by a nearly fourfold increase in its funding for TB (up $23m), resulting from the start of a new five year, $208m drug R&D project. Core funding from the EC also grew, to $85m (up $7.0m, 9.0%), a fourth-consecutive record high, with the EDCTP once again the main recipient – and the sole beneficiary of the increase.

Beyond falling US funding and the compensating increase from the EC, funding from other large public funders either remained stable or fell: German funding was down $28m (-34%) returning to around its ten-year average levels following a large one-off grant in 2019 from the BMZ to Adjuvant Capital, a recently-established global health investment fund – which accounts for most of its overall decrease in 2020. The fall in UK public funding (down $28m, -13%) was due to a $30m drop in funding from its Department of Health and Social Care (DHSC), leaving DHSC funding at a third of its 2019 level. This, in turn, was the result of a second consecutive sharp reduction in the DHSC's funding to the EDCTP, which fell by a further $21m to less than 10% of its 2018 peak.

Funding from the Japanese Government also fell (down $22m, -65%) resulting from a $23m reduction in its funding to the GHIT fund – though its overall five year, $100m commitment to the fund remained unchanged. Funding from the Netherlands was also down, falling by 43% (down $8m), as the DGIS's six-year PDP funding cycle came to an end.

Around three-quarters of public funding from HICs and MLs was focused on HIV/AIDS, TB and malaria, together accounting for $1,849m (73%) in 2020 – down very slightly from last year's record low. This falling share of funding reflects both decreased funding for all three diseases, as well as the rising share of high-income country public funding going instead towards non-disease-specific investments. In 2020 HIV/AIDS funding was down $60m (-5.3%), TB by $23m (-5.1%) and malaria by $10m (-3.0%), while multi-disease investments fell only slightly (down $4.2m, -1.3%), leaving them with a record-setting share of HIC public and multilateral funding for the third consecutive year.

Funding for the WHO neglected tropical diseases (NTDs) included in the G-FINDER survey experienced a disproportionate share of the overall fall in HIC and multilateral funding, dropping by 5.2% (-$11m), mostly due to a 7.9% decline in HIC government funding for dengue and declining helminth funding from both HIC governments and multilaterals.

Public multilaterals saw a steep decline in funding for HIV, which fell by $6.8m (-24%). The only areas to see a substantial increase in multilateral funding were hepatitis C – a $4.3m (138%) increase driven by Unitaid – and rheumatic fever, for which CARB-X – a new survey participant this year – reported the first-ever multilateral funding.

[1] The term 'EC' used here and throughout the report refers to funding from the European Union budget that is managed by the European Commission or related European Union partnerships and initiatives.

Table 31. Public (HIC and multilaterals) R&D funding by disease 2011-2020^

Disease or R&D area	US$ (millions)										2020 % of total
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
HIV/AIDS	1,072	1,095	999	1,022	944	986	1,011	1,128	1,143	1,083	43
Tuberculosis	304	291	291	330	338	392	400	429	461	437	17
Malaria	302	308	306	319	307	326	363	338	340	329	13
Kinetoplastid diseases	100	96	91	97	89	100	106	96	95	92	3.6
Diarrhoeal diseases	97	92	94	90	78	61	69	75	67	71	2.8
Helminth infections (worms & flukes)	50	63	53	49	45	47	65	55	66	58	2.3
Dengue	62	58	49	53	66	80	55	50	43	39	1.6
Salmonella infections	35	43	43	42	41	56	43	46	45	35	1.4
Hepatitis B								9.0	11	15	0.6
Hepatitis C			15	20	13	19	6.8	8.1	8.3	12	0.5
Snakebite envenoming								6.0	8.3	12	0.5
Rheumatic fever	1.3	1.4	1.1	1.6	2.3	1.9	1.8	2.0	13	10	0.4
Bacterial pneumonia & meningitis	30	18	27	20	17	12	9.5	13	13	7.3	0.3
Cryptococcal meningitis			2.9	5.9	5.3	5.9	12	7.8	7.7	6.5	0.3
Histoplasmosis										4.0	0.2
Leprosy	4.9	10	6.6	6.2	4.8	6.2	3.6	3.6	4.0	3.3	0.1
Trachoma	1.2	1.6	1.9	1.2	1.0	2.3	2.8	2.0	1.9	1.9	<0.1
Buruli ulcer	3.7	3.6	4.3	0.7	1.0	2.4	3.5	1.9	1.9	1.7	<0.1
Scabies										0.8	<0.1
Mycetoma								0.6	0.9	0.7	<0.1
Leptospirosis			0.4	1.3	1.4	1.3	1.8	0.7	0.8	<0.1	<0.1
Platform technologies	11	28	31	12	18	19	16	27	44	68	2.7
General diagnostic platforms	9.1	7.9	9.1	6.3	12	6.2	5.1	10	17	33	1.3
Adjuvants and immunomodulators	2.0	20	18	3.6	3.8	12	7.5	16	12	17	0.7
Vaccine delivery technologies and devices	0.4	0.4	4.4	1.7	0.8	0.2	2.3	1.0	14	15	0.6
Drug delivery technologies and devices	-	0.1	-	0.6	0.6	0.7	0.7	0.9	1.1	2.3	0.1
Multi-disease vector control products							25	29	39	48	1.9
Core funding of a multi-disease R&D organisation	87	70	70	63	81	66	134	203	186	168	6.6
Unspecified disease	76	112	62	35	35	23	37	42	51	32	1.3
Total public funding (HICs/multilaterals)	2,239	2,292	2,149	2,167	2,088	2,207	2,365	2,573	2,650	2,534	100

Hepatitis C, cryptococcal meningitis and leptospirosis were added to G-FINDER in 2013. Multi-disease vector control products were added in 2017. Hepatitis B, mycetoma, and snakebite envenoming were added in 2018. Histoplasmosis and scabies were added in 2020.

^ Please note that some of the diseases listed are actually groups of diseases, such as the diarrhoeal illnesses and helminth infections.

- No reported funding

FUNDING FROM LOW- AND MIDDLE-INCOME COUNTRIES

Public funding from LMICs fell sharply in 2020, dropping by $17m (-16%) despite a net increase in survey participation. This comes after three years of relatively high LMIC public funding, which culminated in a record high in 2019. The high levels of growth in the years leading up to 2020 means that, even after this year's fall, LMIC contributions remained slightly above their ten-year average.

Despite falling by $6.6m (-8.8%) from last year's near-record level, the Indian government remained the biggest provider of LMIC public funding, as it has been every year since 2008, when we first began to obtain detailed Indian funding data. Declining funding from other nations pushed India's share of LMIC funding up to 78% in 2020 – a record high.

The biggest of these other falls in funding came from Brazil, which saw its funding drop by $7.0m (-57%) to $5.4m, its lowest level ever reported. Since peaking at $24m in 2009, Brazilian public funding has trended downwards. Both the ongoing decline and this year's drop are primarily the result of reduced funding from DECIT and FAPEMIG, especially for dengue and malaria R&D.

Alongside India and Brazil, funding from South Africa declined by just under a third ($3.3m, -30%) and Colombian funding dropped sharply from last year's record high, falling by 86% (-$4.2m) to $0.7m, mostly as a result of reduced Minciencias funding for dengue and TB.

The only headline increases in LMIC public funding were from Thailand, Mexico and the Philippines, but these mostly reflect this year's improved survey participation; only Thailand saw an increase in funding from consistent survey participants, with its participation-adjusted funding rising by 161% to $1.3m.

Compared to HIC governments, public funding from LMICs continued to focus much less on TB, malaria and especially HIV/AIDS, although they still accounted for a little over half (55%) of LMIC funding – down slightly from last year.

The share of LMIC public funding going to WHO NTDs also fell, dropping by three percentage points to 21% – a seven-year low. The fall in LMIC funding for WHO NTDs mostly reflects substantial drops in their funding for both dengue (down $2.6m, -35%) and kinetoplastid disease (down $2.7m, -29%).

The only areas to see meaningful increases in LMIC public funding in 2020 were diarrhoeal diseases (up $1.2m, 24%, thanks to increased Indian funding), hepatitis C (up $0.6m, 113%) and bacterial pneumonia & meningitis (up $0.5m, 44%).

Table 32. Public (LMIC) R&D funding by disease 2011-2020^

Disease or R&D area	US$ (millions)										2020 % of total
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Tuberculosis	17	17	31	14	16	23	29	30	28	24	27
Malaria	13	20	18	9.6	13	14	20	20	22	18	21
Kinetoplastid diseases	9.0	11	8.0	8.0	7.9	10	9.1	6.3	9.2	6.6	7.5
Diarrhoeal diseases	10	4.3	5.5	5.6	5.9	7.6	7.4	6.8	5.0	6.2	7.1
HIV/AIDS	18	11	19	5.6	5.7	4.1	8.9	6.4	8.5	6.2	7.1
Dengue	4.2	6.0	3.3	3.3	3.9	5.6	6.9	6.5	7.5	4.8	5.5
Helminth infections (worms & flukes)	1.9	2.8	1.8	2.5	1.9	1.8	3.1	2.4	3.4	3.0	3.5
Leprosy	2.6	1.8	4.5	3.7	4.9	4.2	6.2	2.3	3.7	2.9	3.3
Salmonella infections	0.5	0.4	0.6	0.6	0.2	0.6	0.2	1.8	2.4	2.1	2.4
Bacterial pneumonia & meningitis	<0.1	0.2	<0.1	0.2	<0.1	0.5	<0.1	1.6	1.1	1.6	1.8
Hepatitis B								1.4	1.9	1.4	1.6
Leptospirosis			-	<0.1	-	1.2	1.4	0.9	1.1	1.3	1.5
Hepatitis C			5.8	0.2	0.8	0.4	0.7	0.8	0.5	1.1	1.3
Snakebite envenoming								0.8	1.3	1.0	1.1
Cryptococcal meningitis			-	-	-	-	-	<0.1	<0.1	0.1	0.2
Rheumatic fever	-	-	-	-	0.5	-	-	-	-	<0.1	<0.1
Platform technologies	0.4	4.6	0.6	0.3	1.3	3.0	1.3	1.0	2.7	1.4	1.6
General diagnostic platforms	0.4	0.5	<0.1	<0.1	<0.1	0.6	0.8	0.7	2.1	0.7	0.8
Vaccine delivery technologies and devices	<0.1	-	0.4	-	1.2	2.3	0.2	0.2	<0.1	0.5	0.6
Drug delivery technologies and devices	-	4.0	<0.1	0.2	<0.1	<0.1	0.2	0.1	0.4	<0.1	0.1
Adjuvants and immunomodulators	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Multi-disease vector control products							2.3	0.6	1.5	0.9	1.0
Core funding of a multi-disease R&D organisation	0.4	-	0.5	0.3	2.8	3.9	2.1	1.6	0.5	0.6	0.6
Unspecified disease	0.3	3.4	2.4	3.5	0.2	1.9	1.5	1.6	4.1	4.6	5.3
Total public funding (LMICs)	78	83	101	58	66	82	100	92	105	88	100

Hepatitis C, cryptococcal meningitis and leptospirosis were added to G-FINDER in 2013. Multi-disease vector control products were added in 2017. Hepatitis B and snakebite envenoming were added in 2018.

^ Please note that some of the diseases listed are actually groups of diseases, such as the diarrhoeal illnesses and helminth infections.

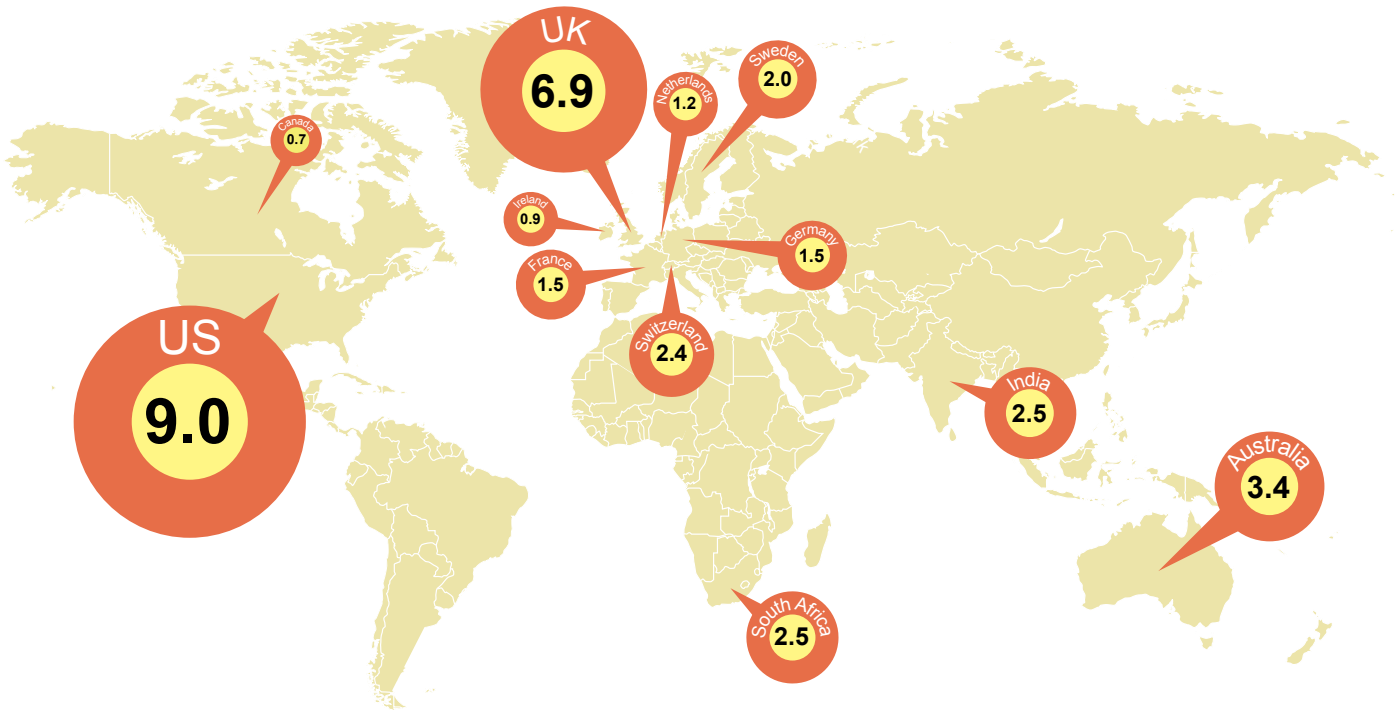
- No reported funding

PUBLIC FUNDING BY GDP

Absolute funding can be a misleading measure of public investment in neglected disease R&D, since it can understate the proportional contributions of smaller countries and LMICs. For this reason, we also analyse countries' investments as a share of their gross domestic product (GDP).

When analysing by proportion of GDP rather than absolute funding, a slightly different picture of public funding emerges – one which gives greater recognition to the contributions of nations with smaller populations or lower income per head. While the United States remains the top public funder by this measure – devoting $9.02 per $100k of GDP to neglected disease R&D – and the UK the second largest, India falls to fifth place and Germany to ninth. They are replaced in the top four by Australia, which devotes $3.39 per $100k to neglected disease R&D, and South Africa ($2.55 per $100k) – which provides the thirteenth most funding in absolute terms, but the fourth-most relative to its GDP.

Figure 22. Public R&D funding by GDP 2020^*
(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

Philanthropic funding

The philanthropic sector provided $823m of funding towards R&D for neglected diseases in 2020. This was an increase of $28m (3.6%) from 2019 – the fifth consecutive annual increase and the highest level of investment from philanthropic organisations since 2008.

As in previous years, the Gates Foundation was the top philanthropic funder, providing $629m – just over three-quarters of philanthropic funding, and a nearly identical amount to its overall investment in 2019.

Table 33. Top philanthropic R&D funders 2020

Funder / US$ (millions)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
Gates Foundation	560	555	574	570	579	598	567	597	629	629	76
Wellcome Trust	81	125	115	108	85	104	106	123	117	126	15
Open Philanthropy							8.2	4.4	14	25	3.0
MSF	5.2	5.8	6.0	4.8	6.3	11	12	17	13	14	1.7
Fundació La Caixa	3.5	2.9	3.2		3.7	3.6	5.2	3.2	4.7	5.4	0.7
Funds raised from the general public	0.6	0.4	0.7	0.9	1.3	1.2	1.6	2.3	1.7	4.5	0.6
Mundo Sano Foundation		<0.1			<0.1	<0.1	<0.1	1.8	1.7	2.9	0.3
Gavi		10	20		11	6.3	7.7	3.5	3.8	2.8	0.3
Korea Support Committee for IVI										1.9	0.2
Children's Investment Fund Foundation (CIFF)								-	1.4	1.5	0.2
Fondation Botnar									0.8	1.5	0.2
All other philanthropic organisations	22	25	16	11	7.9	6.5	32	28	7.6	8.7	1.1
Total philanthropic funding	671	725	735	694	693	730	740	779	795	823	100

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

\- No reported funding

The increase in philanthropic funding came via a $9.1m rise in funding from the Wellcome Trust (up 7.8% to $126m) – which has consistently been the second largest philanthropic funder – and an additional $11m from Open Philanthropy (up 78% to $25m). Open Philanthropy became the third-largest philanthropic funder in 2019 and retained that position in 2020, just four years after it first began providing funding for neglected disease R&D. Nearly 95% of all philanthropic funding in 2020 came from these three organisations alone.

Philanthropic funding in 2020 continued to move towards investments targeting multiple diseases – especially platform technologies – with 30% of funding now going to non-disease-specific programmes, up from just 5.6% over the first seven years of the G-FINDER survey. This was the sixth consecutive annual increase in philanthropic funding for non-disease-specific R&D taking the total to $249m – an increase of $56m from 2019, largely due to increased funding from the Gates Foundation.

A record-low 52% of philanthropic funding was invested across the three most heavily-funded G-FINDER diseases: malaria, TB and HIV/AIDS. This was the combined result of the increase in non-disease-specific funding, and a sharp decrease in philanthropic HIV/AIDS funding, which fell by $24m, wiping out last year's growth and leaving it at its lowest level in more than a decade. There was also a large decrease in philanthropic funding for diarrhoeal diseases (-$18m, -42%), and a smaller decline for bacterial pneumonia and meningitis (-$9.1m, -30%). All three of these declines were the result of reduced funding from the Gates Foundation.

Just over a third (35%) of philanthropic funding went towards basic & early-stage research ($287m), while only 17% was explicitly directed towards clinical development & post-registration studies – a decline of nearly 23% after four years of relative stability. However, as usual these figures fail to capture any clinical development ultimately carried out by recipients of philanthropic core funding. This core funding accounted for a further fifth of philanthropic funding ($177m), the largest recipients of which were PATH ($33m) and the Gates Medical Research Institute ($21m), both receiving funding exclusively from the Gates Foundation.

Half of all philanthropic funding in 2020 went to academic and other research institutions; PDPs received another 24%, broadly in line with last year's record low. While philanthropic funding to SMEs was stable, funding to MNCs increased by $8m, largely as a result of Gates Foundation funding for a Phase II TB drug trial and new early-stage research into HIV biologics.

Table 34. Philanthropic R&D funding by disease 2011-2020^

Disease or R&D area	US$ (millions)										2020 % of total
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Malaria	212	181	169	184	148	151	147	161	149	159	19
Tuberculosis	124	129	154	160	153	119	116	132	139	137	17
HIV/AIDS	162	170	158	144	139	155	151	142	159	135	16
Diarrhoeal diseases	39	52	67	50	53	60	60	55	53	36	4.3
Salmonella infections	9.7	13	15	11	17	16	19	19	24	26	3.2
Bacterial pneumonia & meningitis	43	56	29	7.8	44	27	32	35	33	25	3.0
Kinetoplastid diseases	24	22	21	35	16	28	20	21	17	19	2.3
Helminth infections (worms & flukes)	31	28	34	31	24	23	18	20	12	11	1.4
Dengue	6.4	6.1	14	23	13	22	8.3	7.2	9.2	11	1.3
Rheumatic fever	-	-	-	-	-	-	-	-	-	5.3	0.6
Hepatitis C			0.1	0.1	<0.1	<0.1	0.4	5.0	2.5	3.7	0.4
Snakebite envenoming								0.4	0.6	2.6	0.3
Hepatitis B								-	0.8	1.4	0.2
Leprosy	1.3	1.6	1.3	0.5	0.6	0.7	1.4	1.9	1.6	1.0	0.1
Buruli ulcer	2.5	2.8	2.6	3.2	1.0	0.6	0.8	0.4	0.5	0.5	<0.1
Scabies										0.4	<0.1
Cryptococcal meningitis			0.3	<0.1	<0.1	<0.1	0.4	0.4	0.3	0.3	<0.1
Histoplasmosis										<0.1	<0.1
Trachoma	0.1	0.5	0.4	0.3	0.2	<0.1	-	-	-	-	-
Leptospirosis			<0.1	-	-	-	-	-	-	-	-
Platform technologies	7.5	21	16	12	20	37	21	29	49	60	7.2
Vaccine delivery technologies and devices	1.6	0.6	-	0.9	3.1	14	2.7	15	18	32	3.8
General diagnostic platforms	1.7	9.9	8.9	4.1	4.4	12	6.0	9.7	15	17	2.0
Adjuvants and immunomodulators	4.2	10	5.3	5.5	9.3	7.5	6.2	3.9	12	6.2	0.8
Drug delivery technologies and devices	-	0.2	1.8	1.7	3.1	2.7	5.8	1.2	4.0	5.1	0.6
Multi-disease vector control products							2.2	6.8	20	12	1.5
Core funding of a multi-disease R&D organisation	5.1	40	45	32	51	78	128	124	113	163	20
Unspecified disease	3.5	2.5	8.2	1.4	14	11	13	18	11	14	1.7
Total philanthropic funding	671	725	735	694	693	730	740	779	795	823	100

Hepatitis C, cryptococcal meningitis and leptospirosis were added to G-FINDER in 2013. Multi-disease vector control products were added in 2017. Hepatitis B, mycetoma, and snakebite envenoming were added in 2018. Histoplasmosis and scabies were added in 2020.

^ Please note that some of the diseases listed are actually groups of diseases, such as the diarrhoeal illnesses and helminth infections.

\- No reported funding

Private sector funding

The private sector invested a total of $491m in neglected disease basic research and product development in 2020, accounting for 12% of global funding. This represented a decrease of 12% ($68m) from 2019. As in all previous years, multinational pharmaceutical companies (MNCs) were responsible for the vast majority of this funding ($440m, 90%), with small pharmaceutical and biotechnology firms (SMEs) contributing the remainder ($51m, 10%).

Investment in 2020 sits just above that reported for 2014, reversing much of the growth leading up to the 2018 peak in private sector funding. The impact of the decrease in industry investment was felt most heavily in HIV R&D (down $46m, -24%), followed by malaria (down $10m, -8.4%) and diarrhoeal diseases (down $9.1m, -19%).

MULTINATIONAL PHARMACEUTICAL COMPANIES

Investments from MNCs dropped by 14% (down $69m), falling to $440m. The majority of the decline was due to vaccine-focused drops in funding for HIV (down $49m, -26%), and – to a lesser extent – malaria (down $7.0m, -6.0%) and diarrhoeal diseases (down $8.9m, -21%). HIV and diarrhoeal diseases also saw smaller drops in MNC's drug R&D.

Overall, MNC funding for the top three diseases – HIV, TB and malaria – declined by $59m (-15%), while still receiving three-quarters of all MNC investment ($330m, 75%) – broadly in line with their long-term average share. MNC funding for the WHO neglected tropical diseases (NTDs) also fell, declining to $52m (down 10%) from last year's near record high, but still double their average MNC investment over the first 10 years of the survey.

MNC HIV vaccine R&D fell by more than a third (down $35m, -35%), almost-exclusively due to reductions in clinical development (95% of the decrease), reflecting the impact of the COVID-19 pandemic on the execution of clinical trials. MNC funding for malaria vaccines fell by more than a fifth (down $8.5m, -22%) despite ongoing post-implementation studies for RTS,S. Funding for diarrhoeal disease vaccines dropped by $5.4m (-17%), mostly due to falls in *Shigella* vaccine funding (down $4.0m, 74% of the decrease) across all R&D stages.

MNC HIV drug R&D investment decreased by 16% (down $14m) as late-stage clinical trials concluded. Funding for diarrhoeal disease drug R&D declined by more than a third (down $3.5m, -35%), due to a drop in preclinical development for cryptosporidiosis drugs (down $3.7m, -40%) in preparation for the advancement of several candidates to clinical trials.

Bucking the overall trend, however, were malaria drugs and bacterial pneumonia & meningitis vaccines, each of which saw rises which were overshadowed by the more substantial declines in other areas. Malaria drug investment increased marginally (up $1.9m, 2.5%) mostly for ongoing clinical development and early-stage research. MNC investment in pneumococcal vaccine R&D tripled (up $8.3m, 222%), driving a big increase in LMIC-focused post-registration studies which, unlike many earlier-stage clinical trials, appear to have been able to continue despite the pandemic.

Overall vaccine funding from MNCs fell by $41m (-23%) to $139m – its lowest level since 2011 – while drug R&D fell by $20m (-6.4%), leaving it still comfortably above its ten-year average.

Two-thirds of MNC investment was for clinical development & post-registration studies ($294m, 67%), with most of the remainder for early-stage research ($103m, 22%). Despite consecutive reductions in MNC funding for clinical development & post-registration studies from its peak of $426m in 2018, it remains far above its average of $205m over the first decade of the G-FINDER survey.

Table 35. MNC R&D funding 2011-2020^

Disease or R&D area / US$ (millions)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
HIV/AIDS	15	16	10	43	51	84	142	201	188	139	32
Malaria	89	104	74	117	142	139	135	161	117	110	25
Tuberculosis	156	138	117	104	99	91	91	100	83	81	18
Diarrhoeal diseases	24	30	41	33	21	15	27	41	42	33	7.6
Kinetoplastid diseases	10	18	17	12	17	13	17	28	33	29	6.6
Dengue	12	8.7	7.7	7.8	15	16	9.7	15	18	18	4.1
Bacterial pneumonia & meningitis	35	38	33	34	13	22	2.0	3.7	3.7	12	2.7
Helminth infections (worms & flukes)	2.8	3.7	9.0	7.3	12	8.5	10	14	6.9	4.4	1.0
Salmonella infections	5.3	4.4	4.4	4.0	3.6	4.1	2.1	1.5	1.7	3.6	0.8
Leprosy	-	-	<0.1	<0.1	0.7	0.4	0.4	1.2	0.4	0.9	0.2
Buruli ulcer	-	-	-	-	-	-	-	0.3	0.5	0.3	<0.1
Hepatitis C			30	28	23	7.3	5.4	34	-	<0.1	<0.1
Rheumatic fever	-	-	-	0.2	-	-	-	-	-	-	-
Mycetoma								<0.1	-	-	-
Multi-disease vector control products							-	3.9	3.9	-	-
Core funding of a multi-disease R&D organisation	-	-	4.2	11	14	20	25	13	10	7.6	1.7
Unspecified disease	3.1	1.5	5.9	1.4	0.7	0.7	0.6	4.6	<0.1	0.7	0.2
Total MNC funding	352	363	353	403	411	420	468	623	509	440	100

Hepatitis C was added to G-FINDER in 2013. Multi-disease vector control products were added in 2017. Mycetoma was added in 2018.

^ Please note that some of the diseases listed are actually groups of diseases, such as the diarrhoeal illnesses and helminth infections.

- No reported funding

SMALL PHARMACEUTICAL & BIOTECHNOLOGY COMPANIES

Small pharmaceutical & biotechnology companies allocate their neglected disease R&D funding very differently to MNCs: funding for the top three diseases accounts for just 24% of their total, reflecting a post-2012 shift away from these diseases, which has reduced their share of SME funding by half. Instead, funding from SMEs has favoured bacterial pneumonia & meningitis and *Salmonella* infections, which collectively received 57% of total SME investment in 2020 ($29m).

After falling by nearly half in 2019, investment from SMEs remained relatively stable in 2020 at $51m (up $1.1m, 2.1%), although well below their long-term annual average of around $75m. The slight headline rise seen in 2020 was the result of a net increase in survey participation, with participation-adjusted funding actually falling slightly by $2.6m (-5.7%).

This fairly steady investment in 2020 hid participation-related changes across a number of diseases. Malaria R&D funding decreased by 69% (down $3.2m) and dengue by 43% (down $1.4m), but both reductions were the result of non-participation by a key funder, which led to an artefactual drop in reported VCP funding. On the other hand, HIV R&D (up $3.8m, 241%) and non-disease-specific funding (up $2.4m, from zero in 2019) significantly increased as first-time participants reported investment in HIV vaccine clinical development ($3.9m) and multi-disease vector control products ($2.4m).

Table 36. SME R&D funding 2011-2020^

Disease or R&D area / US$ (millions)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
Bacterial pneumonia & meningitis	6.2	5.6	19	18	25	37	35	38	19	20	40
Salmonella infections	<0.1	0.3	6.2	12	12	22	22	25	8.1	8.5	17
Diarrhoeal diseases	5.5	2.8	6.5	9.3	14	17	9.4	8.0	5.7	5.4	11
HIV/AIDS	10	8.1	6.8	6.8	9.0	8.0	15	7.7	1.6	5.3	10
Tuberculosis	16	9.9	5.4	8.8	11	9.7	15	6.3	6.0	5.2	10
Dengue	0.5	0.5	0.3	0.5	1.1	2.5	3.2	3.3	3.4	1.9	3.8
Malaria	7.7	7.6	6.3	6.8	7.1	5.5	5.3	5.2	4.7	1.5	2.9
Hepatitis B								<0.1	-	0.1	0.2
Kinetoplastid diseases	4.1	0.8	0.7	7.2	4.8	1.7	0.1	<0.1	<0.1	<0.1	0.2
Snakebite envenoming								0.7	1.5	<0.1	0.1
Helminth infections (worms & flukes)	4.4	0.8	<0.1	6.6	0.7	<0.1	0.1	<0.1	0.2	<0.1	<0.1
Leprosy	0.1	-	-	-	-	-	-	0.1	<0.1	-	-
Hepatitis C			-	-	-	3.8	2.4	0.4	-	-	-
Leptospirosis			-	-	-	-	<0.1	<0.1	-	-	-
Trachoma	3.7	-	-	-	-	-	-	-	-	-	-
Multi-disease vector control products							0.8	-	-	2.4	4.7
Core funding of a multi-disease R&D organisation	-	-	2.0	6.0	-	-	-	-	-	-	-
Unspecified disease	-	<0.1	-	-	-	-	-	-	-	-	-
Total SME funding	59	37	53	83	85	107	108	96	50	51	100

Hepatitis C and leptospirosis were added to G-FINDER in 2013. Multi-disease vector control products were added in 2017. Hepatitis B and snakebite envenoming were added in 2018.

^ Please note that some of the diseases listed are actually groups of diseases, such as the diarrhoeal illnesses and helminth infections.

- No reported funding

LMIC-based SMEs continued to provide a clear majority of global SME investment in neglected diseases as they have since 2013, accounting for three-quarters of SME funding in 2020 ($38m, 75%) – virtually all of which came from India-based SMEs.

The vast majority (82%) of SME funding was for clinical development & post-registration studies, which dipped slightly (by $2.0m, -5.4%) to $42m after adjusting for differences in survey participation. Most of the remaining funding went to early-stage research ($7.5m, 15%). This distribution is broadly in line with the averages over the preceding four years, but represents a big shift from the first nine years of the G-FINDER survey, when late-stage development received less than a third of SME funding.

Top funding organisations

The top 12 funders of basic research and product development for neglected diseases remained unchanged between 2019 and 2020. These 12 funders (including the aggregate total for industry, which we treat as a single funder for these purposes) provided 91% of global funding for neglected disease R&D in 2020 – a slight increase from 89% in 2019, despite a $74m (-2.0%) fall in their collective funding.

As in every previous year, the US NIH, Gates Foundation and (aggregate) industry were the top three funders, together providing 72% of all 2020 funding. Funding from the US NIH – the top funder of neglected disease R&D in 2020 and all previous years – decreased in 2020 (-$47m, -2.7%), however this came after two years of growth which saw its funding grow by more than $270m. At $1.7bn, NIH investment still accounted for 43% of neglected disease R&D funding, 2.7 times the investment from the second largest funder, the Gates Foundation. The drop in NIH funding was due to a substantial fall in its funding for HIV (-$55m) alongside a smaller decrease in funding for tuberculosis (-$21m) – partially offset by a $21m increase in NIH funding for non-disease-specific R&D, and an $11m increase in diarrhoeal disease funding.

Overall funding from the Gates Foundation was almost entirely unchanged from 2019 ($629m, an increase of just $0.2m). This follows two years of growth, and leaves the Foundation with a 16% share of global neglected disease R&D funding.

There was a significant decrease in funding from industry (-$68m, -12%), marking two straight years of decline from its peak in 2018, and taking it to its lowest level since 2013.

Funding from the EC, on the other hand, rose by $41m (33%), which was by far the largest increase from any funder in 2020. This followed two years of relatively stable funding, with the increase going mostly to TB and as core funding to the EDCTP.

Funding from the next three largest funders - the Wellcome Trust, UK FCDO and US DOD – also increased, while the remaining top funders all decreased their 2020 funding, albeit by relatively small amounts.

Table 37. Top neglected disease R&D funders 2020

Funder / US$ (millions)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 % of total
US NIH	1,497	1,604	1,402	1,403	1,379	1,488	1,474	1,645	1,747	1,700	43
Gates Foundation	560	555	574	570	579	598	567	597	629	629	16
Aggregate industry	411	399	406	486	496	528	576	719	559	491	12
EC	113	97	115	114	138	83	119	125	124	164	4.2
Wellcome Trust	81	125	115	108	85	104	106	123	117	126	3.2
UK FCDO	64	39	62	67	54	57	105	119	115	120	3.1
US DOD	95	95	117	137	100	113	126	96	104	108	2.7
USAID	102	103	89	84	80	86	95	76	65	61	1.5
Indian ICMR	23	24	37	35	35	43	66	55	56	55	1.4
Unitaid	-	0.4	9.1	17	21	50	52	73	52	49	1.2
UK MRC	46	41	43	42	36	43	42	37	45	42	1.1
German BMBF	8.6	17	16	18	25	32	43	46	49	41	1.0
Subtotal of top 12^	3,070	3,158	3,039	3,117	3,056	3,225	3,375	3,727	3,661	3,587	91
Total R&D funding	3,400	3,505	3,393	3,406	3,344	3,548	3,782	4,164	4,109	3,937	100

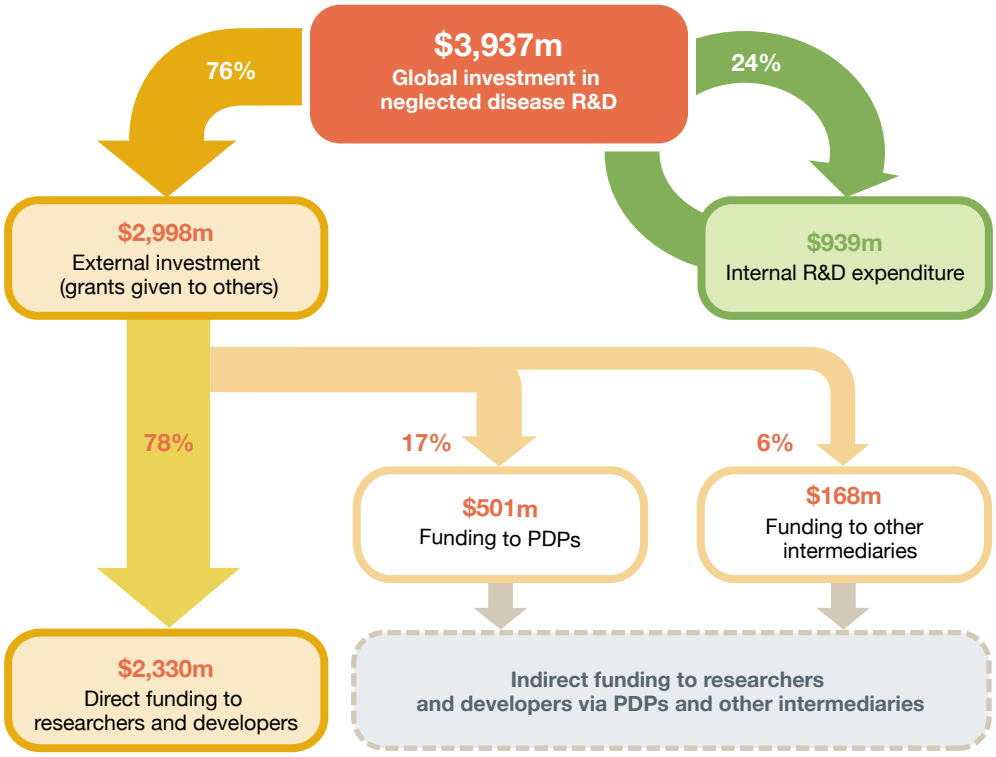
^ Subtotals for 2011-2019 top 12 reflect the top funders for those respective years, not the top 12 for 2020.
- No reported funding

FUNDING FLOWS

Organisations can invest in neglected disease basic research and product development in two main ways: by funding their own in-house research (internal investment, also referred to as intramural funding or self-funding); or by giving grants to others (external investment). External investment can either be given directly to researchers and developers, or it can be provided via product development partnerships (PDPs) and other intermediaries.

Some organisations invest only internally (most pharmaceutical companies, for example); others, like the Wellcome Trust, only invest externally (i.e., they do not conduct R&D themselves). There are also organisations, such as the US NIH, which use a mixed model, providing external grants to others as well as funding their own research programmes.

Figure 23. **R&D funding flows 2020**



Different types of funders generally invest in different types of recipients. Government agencies primarily focused on the advancement of science and technology ('S&T agencies'), for example, mainly provide funding directly to researchers and developers, usually accounting for around three-quarters of their funding. Philanthropic foundations and aid agencies are the source of the vast majority of PDP funding (typically 80-90%). However, the share of PDP's funding from S&T agencies has been trending upwards, reaching 15% in 2020 after four consecutive years of growth – up from an average of just 6.1% over the first decade of the G-FINDER survey. In contrast, non-PDP intermediary organisations ('Other Intermediaries'), such as the European and Developing Countries Clinical Trials Partnership (EDCTP) generally have a broad funding base, supported by both S&T and aid agencies, as well as philanthropic foundations.

As a result, changes in S&T agency 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 the least vulnerable to changes from any one funding stream.

Funding flow trends

Over three-quarters of all funding for neglected disease basic research and product development in 2020 was given via external funding in the form of grants or contracts ($2,998m, 76%), with the remaining 24% ($939m) spent internally via intramural or self-funded R&D, broadly in line with last year's shares.

Both internal and external R&D funding decreased slightly between 2019 and 2020. Internal funding dropped 5.2% ($51m), marking a second consecutive decline from its 2018 peak of $1,146m – after having grown relatively slowly over the course of the preceding decade. The fall in internal funding came in spite of slight increases in public and philanthropic intramural funding and generally consistent self-funded R&D from SMEs; and was instead driven by a $68m (-14%) decline in MNC's self-funding.

The $121m drop in external funding, while much larger in absolute terms, was likewise only a small proportional fall – representing just 3.9% of the 2019 total. This left external funding at its third-highest level ever, representing only a slight dip from its peak of $3,119m in 2019, which came after four years of steady growth.

The 2020 fall in external investment was felt mainly in funding to Other Intermediaries, which decreased by more than a quarter between 2019 and 2020 (-$61m, down 27%), and in direct funding to researchers and developers ($59m, down 2.5%). In contrast, funding to PDPs remained essentially stable (down just $1.4m, -0.3% compared with 2019), though their share of overall funding remained only slightly above last year's record low. The overall fall in external funding was driven by a $123m drop in high-income country public sector funding, headlined by a $60m fall in funding from the US NIH and accompanied by cuts from several other major funders, including cyclical falls from the UK DHSC and the Japanese Government.

To some extent this was offset by a $27m increase in philanthropic external funding, which saw substantial increases in their funding to Other Intermediaries (going mostly to GHIT) and to researchers and developers (largely due to a $17m increase in Gates Foundation funding to the Gates Medical Research Institute). External philanthropic funding – which makes up the overwhelming majority of philanthropic funding – has been increasing steadily for the last five years, growing by a total of $121m (17%) since 2015; broadly in line with the growth in overall contributions from the philanthropic sector.

Funding from both Science and Technology (S&T) agencies and aid agencies fell slightly in 2020. A $40m reduction from S&T agencies (to $2,167m) marked their first drop in funding after four consecutive years of growth, falling mostly on direct funding to researchers and developers (down $49m, a drop of 2.9%). This left funding from S&T agencies only slightly below last year's NIH-driven record high.

Funding from aid agencies fell by $32m (-13%). This fall came after three years of consistently high funding, which had been surpassed only by the highs observed over the first three years of the G-FINDER survey. While a record 96% of aid agencies' funding was directed to PDPs (up $5.8m to $214m), funding given directly to researchers and developers and funding for Other Intermediaries both fell sharply. The record-low in aid agency funding to Other Intermediaries, after a drop of 90% ($29m), was largely due to a $23m one-off disbursement to Adjuvant Capital from the German BMZ in 2019.

Funding by R&D stage

In 2020, almost half of all funding for neglected disease R&D was invested in basic & early-stage research ($1,860m, 47%), and just over a quarter in clinical development & post-registration studies ($1,104m, 28%). The rest was invested in core funding and other R&D ($391m, 9.9%), platform technologies ($129m, 3.3%), and funding which did not specify an R&D stage ($453m, 12%).

Funding to basic & early-stage research remained relatively unchanged between 2019 and 2020 (down $18m, -0.9%), after a record high in 2019 ($1,878m) which followed four consecutive years of growth. Despite fairly static overall funding between 2019 and 2020, there were, however, meaningful shifts in its component elements: basic research (down 2.9%) and early-stage vaccine funding (down 5.1%) both fell slightly, offset by increases in early-stage funding for biologics (up $23m, 110%) and drug R&D (up $16m, 4.9%).

Funding for clinical development & post-registration studies, in contrast, dropped 10% in 2020, a decrease of $124m which marked a second consecutive sharp decline from an all-time high of $1,405m in 2018. This was primarily the result of double-digit reductions from each of the top three funders of clinical development R&D: the US NIH (down $20m) and industry (down $38m) – each falling for the second year in a row – and the Gates Foundation (down $45m), which saw its clinical development funding fall for the eighth year running, to its lowest level since 2007 – partly reflecting its increasing investment in core and platform funding over that period.

The overall reduction in clinical development funding fell mostly on development of vaccines (down $67m, -11%) and drugs ($47m, -11%). The drop in vaccine development was largely due to reductions in funding from both industry ($24m, -15%) and the Gates Foundation ($40m, -40%), each marking their second consecutive year of sharp decline – which has seen their collective contributions drop by $126m since 2018. Both falls were mostly due to a decline in HIV vaccine clinical development, which had helped to drive 2018's peak in clinical development funding. Industry also contributed to the drop in drug clinical development funding, this time alongside the US NIH, with each having seen their funding drop by a third from their peaks in 2018.

Funding for platform technology R&D increased significantly again in 2020, reaching an all-time high of $129m (up $33m, an increase of 34%). This was driven by rising funding across all platform technology product areas, particularly general diagnostic platforms (up $16m, an increase of 47%), and vaccine delivery technologies and devices (up $14m, 44%). In both cases, this marked the third consecutive year of sharp increases in funding.

Funding for product development partnerships

Total funding to product development partnerships (PDPs) remained largely unchanged at $501m in 2020, a fall of just 0.3% (-$1.3m) from 2019, which nonetheless represented a marginal increase on last year's record-low share of global funding.

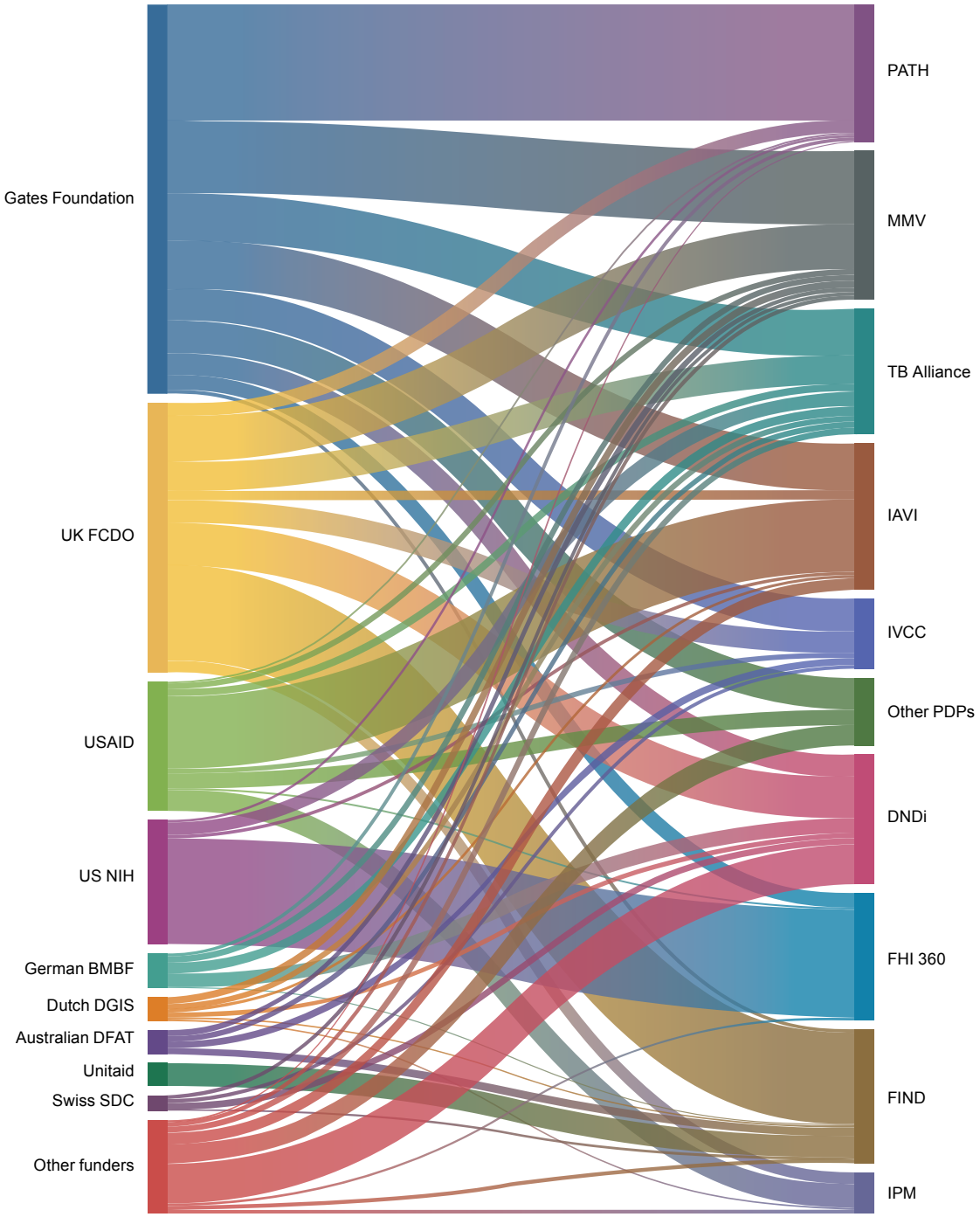
The biggest reductions in funding to PDPs were from the Dutch DGIS (-$8.2m, -44%), falling for the third straight year since its 2017 peak as it neared the end of its PDP III funding cycle; the US NIH (-$5.5m, - 9.1%), mostly due to the cessation of its funding to IDRI; and the Gates Foundation (-$5.9m, -3.3%). Though the Gates Foundation remained the top funder of PDPs, as it has been every year since the inception of the G-FINDER survey, this was the sixth consecutive fall in the share of its investment going to PDPs, taking it to its lowest ever level – down from over half of the Foundation's funding in 2014 to a little more than a third in 2020. The reductions were primarily felt in Gates funding for MMV (down $3.8m, -10%), TB Alliance (down $3.1m, -13%) and neglected-disease-specific funding for FHI 360 (down $4.2m, -39%).

The most notable increases in funding to PDPs in 2020 came from USAID (up $6.7m, 13%), mostly reflecting new funding streams to IPM and CONRAD for HIV/AIDS-focused projects; the UK FCDO (up $5.6m, 4.9%), continuing the rapid growth which began in 2016, and reaching a record high which left it responsible for just under a quarter of PDP funding; and UNITAID (up $4.7m, 89%), which again provided a clear majority (87%) of public multilateral funding to PDPs, as it has every year since 2013.

All four of 2019's top PDP recipients received notably lower funding in 2020: funding to TB Alliance was down $11m (-16%), MMV by $6.6m (-9.1%), IAVI by $9.0m (-12%), and PATH by $7.5m (-11%). Funding to IDRI also fell sharply (down $9.8m, -99%) following a 2019 restructure which saw it shut down several of its research programmes. Funding to FIND, on the other hand, was up $30m to by far its highest-ever funding total, placing it among the top five recipients of PDP funding for the first time. CONRAD's funding rebounded by $3.7m from last year's record low thanks to an increase from USAID – its sole funder since 2016 – while DND*i* and IVI each saw proportionally smaller increases.

Public HIC investment to PDPs declined only slightly in 2020 (down $2.2m, -0.7%) with no reported public LMIC funding for the first time since 2011. Philanthropic funding to PDPs increased marginally (up $0.8m, 0.4%) despite the fall in funding from the Gates Foundation – usually the bellwether for philanthropic PDP funding – thanks mostly to a record high $4.5m in funds provided to DND*i* by foundations and individual donors – a rise of $2.9m, 179%.

Figure 24. **PDP funding 2020**



Funding for other intermediaries

Funding for non-PDP intermediaries ('Other Intermediaries') was $168m in 2020. This was down $61m (-27%) from 2019's peak of $228m, leaving their funding nearer to 2017's total of $175m. Other Intermediaries received 4.3% of all neglected disease funding in 2020, down more than a percentage point from last year's historic high of 5.6%.

The European Commission remained the top funder of Other Intermediaries for the fourth consecutive year, increasing its commitments by a further $7.0m (9.3%) from last year's record high, nearly all of which (99.8%) again went to the European and Developing Countries Clinical Trials Partnership (EDCTP).

Other than the European Commission, the only funders to significantly raise their contributions to non-PDP intermediaries were Unitaid and the Gates Foundation. Unitaid increased its funding for the second year running (up a further $2.9m, 21%), again split between the Clinton Health Access Initiative and ISGlobal, while the Gates Foundation's $2.5m (22%) increase was largely due to a near-tripling of its contributions to the RIGHT fund.

There were significant drops from the Japanese Government and the German BMZ to Other Intermediaries in 2020. However, these falls reflected disbursement schedules rather than changing levels of commitment, with the German BMZ having retrospectively reported a large one-off payment to Adjuvant Capital in 2019, and the Japanese Government's annual payments to GHIT fluctuating within its fixed four-year $100m commitment. Funding from the UK DHSC – again exclusively for the EDCTP – fell sharply for a second consecutive year as its five-year funding period drew to a close. It dropped by a further $21m (-83%) to $4.4m, leaving it $40m below its historic high in 2018.

In 2020, USAID largely ended over a decade of continuous funding for Other Intermediaries, mostly resulting from the completion of The Union's Treat TB project. USAID had disbursed at least $5m annually to The Union every year since 2008, providing a total of $91m. The UK MRC, too, ended its long-term funding stream in 2020, providing no funding to the EDCTP and ending five consecutive years of funding which totalled $13m.

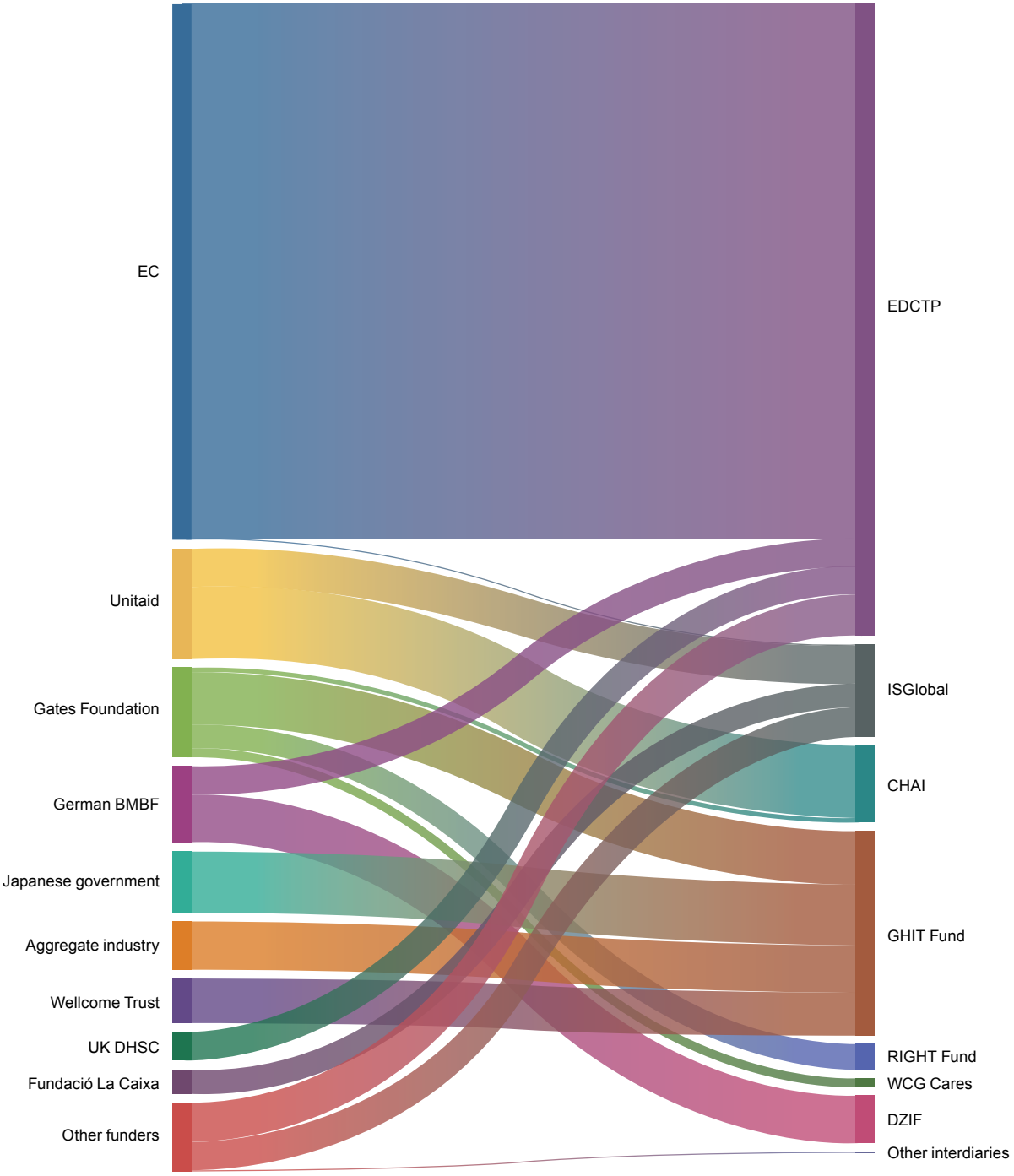
These falls meant that, despite receiving further increases from the European Commission, funding to the EDCTP dropped again from 2018's record high (down another $14m, -12%). However, it retained its position as the top recipient of global funding for Other Intermediaries, accounting for 58% of the total in 2020. The next highest shares were for the GHIT Fund (with 19%) and ISGlobal (with 8.5%).

ISGlobal and the Clinton Health Access Initiative were the only organisations to enjoy an increase in funding, with the remaining organisations seeing decreases of varying scales, headlined by the big USAID-driven fall for The Union.

As in past years, the vast majority of investment to Other Intermediaries – 84% ($141m) in 2020 – was for core funding, with the remaining shares divided between HIV/AIDS, malaria and tuberculosis, with essentially no other disease-specific funding being disbursed.

Philanthropic funding for Other Intermediaries increased by 65% (up $10m) from the previous year to a record high of $25m. This was the combined result of a $2.5m increase from the Gates Foundation, and a $6.8m disbursement from the Wellcome Trust to the GHIT Fund following a cyclical trough in last year's funding. These increases, along with substantial declines from public and private sector funders, drove the share of Other Intermediary funding provided by philanthropic organisations to a record-high 15%, more than doubling its 2019 share of 6.8%. The share of public funding from high-income country governments, on the other hand, dropped to a record low of 70%.

Figure 25. **Intermediary funding 2020**



DISCUSSION

Despite funding remaining relatively stable in 2020, the pandemic and its aftermath remain a threat to neglected disease R&D

Funding for neglected disease R&D fell only slightly in the first year of the COVID-19 pandemic, after remaining basically unchanged at a near-record high in 2019. Global funding fell by a little over 4%, but remained 16% higher than its average level over the first ten years of the G-FINDER survey, even after adjusting for increased survey participation over that period.

As evidence of the immediate impact of the pandemic on neglected disease R&D funding, this is mostly good news: funding appears resilient in the face of an unprecedented global crisis, and we continue to enjoy the benefits of record funding growth in the years leading up to 2019. However, there are a number of ways that a global pandemic could ultimately influence neglected disease R&D funding, and little reason to assume we have seen all of those effects in a single year of funding data.

Beyond the heartening level of ongoing commitment shown to neglected disease R&D from most funding organisations, three major trends emerge from the 2020 data: another sharp fall in clinical development, and a related reduction in funding from multinational pharmaceutical companies; further growth in funding for platform technologies; and a big increase in philanthropic funding, which partly offset falls from the public and private sectors.

We remain concerned, however, that any long-term impacts of the shifts we observed this year might ultimately be dwarfed by the future effects of the pandemic on neglected disease R&D funding: either because a focus on COVID directly diverts the attention and resources of traditional neglected disease funders, or because a post-pandemic fiscal contraction shrinks the pool of public funds available for global health. We explore each of these possibilities in more detail below.

COVID-19 interrupted clinical trials in low- and middle-income countries, contributing to another drop in funding for clinical development, especially from multinational pharmaceutical companies

While the major impacts of COVID are likely to be felt over the next decade, one immediate effect was on the ability of product developers to conduct clinical trials. Global funding for clinical development & post-registration studies fell by $124m in 2020, a drop of 10%, with participation-adjusted falls from every sector and across all major product categories (with the exception of biologics).

One major private sector funder of neglected disease clinical development confirmed that their ongoing clinical trials experienced pandemic-related disruptions throughout 2020, reducing their spending on clinical development, likely representing part of a broader pattern of disrupted trials across all types of funders. This is especially likely to be true of clinical development carried out by multinational pharmaceutical companies, since they report internal expenditures rather than the kinds of contractual disbursements to third parties which may not immediately respond to disruption in the actual conduct of trials.

One complicating factor, though, is the $177m (-13%) drop in funding for clinical development & post-registration studies we saw in 2019, prior to any pandemic-based disruption of trials. Unlike the broad-based fall in clinical development seen in 2020, 2019's drop was largely a result of reduced private sector investment. At the time, we suggested that this was largely a result of normal fluctuations in the pipeline – especially the conclusion of a late-stage hepatitis C drug trial. Coming as it did after record growth in industry's clinical development funding in 2018, and record high levels of funding resulting from consistent growth over the preceding three years, we concluded that the drop was not a cause for concern.

A second-consecutive double digit drop in MNC funding, though, begins to look like a trend – albeit one which still leaves their funding slightly above its ten-year average. Unless we treat 2020 funding as an aberration caused by the disruption of clinical trials, we might reasonably worry that a half decade of soaring MNC funding is coming to an end.

One piece of evidence for an independent, rather than COVID-related, decline in private sector funding is that, unlike in 2019, this year's drop in MNC funding fell more heavily on basic & early-stage research (down 17%) than on clinical development (down 11%). This suggests that the reduction in clinical development is part of a wider trend, rather than solely due to a one-off disruption in trials. Bolstering the COVID disruption theory, on the other hand, is the fall in clinical development from outside the private sector, which also fell by around the same proportion (down 10%) – consistent with a broader interruption of clinical trials in 2020.

While it is challenging to make predictions about an event as singular as the COVID-19 pandemic, we conclude that the 2020 decline in clinical development is probably mostly due to pandemic-disrupted trials. But we remain alert to the possibility that the consecutive declines in industry investment across both early-stage and clinical development might represent the start of a trend.

Funding targeting multiple diseases, especially platform technologies, continued to grow rapidly

One of the notable stories of the last few years has been the rapid growth in funding for platform technologies with potential application across a wide range of disease groups, and this continued apace in 2020. Total platform technology funding grew by $33m (34%) in 2020, after increasing by $37m in 2019, with funding more than tripling in the three years since 2017.

Figure 26. **Platform funding by type 2007-2020**

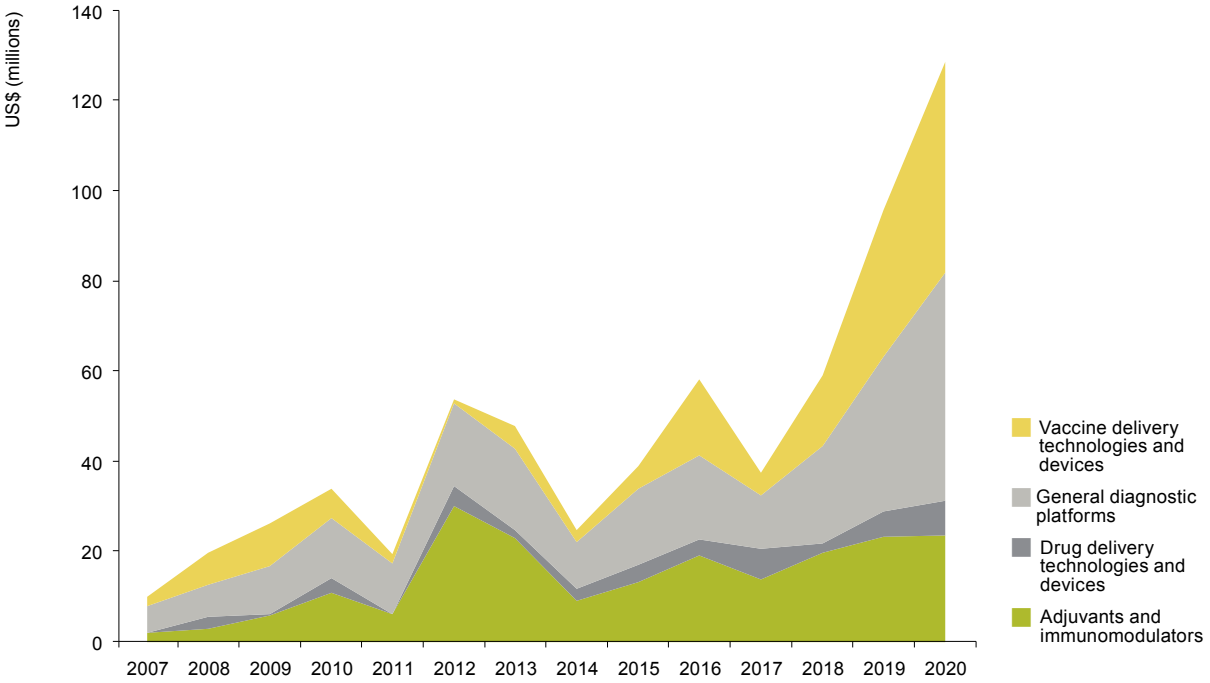


Figure 26 shows the drivers of the recent growth in platform funding. Funding for both vaccine platforms (up nearly 800% since 2017) and general diagnostic platforms (up 326% over the same period) has grown rapidly over the last three years, accounting for nearly 90% of the growth in platform funding. These two areas now account for three quarters of all platform funding – up from just 45% in 2017.

In both cases, these increases were heavily influenced by rising funding from the Gates Foundation, the US NIH and the US DOD. These organisations have been the top three funders of platform technologies over the life of the G-FINDER survey and in each of the last three years, jointly providing just under 80% of global platform funding over both periods.

The growth in funding for vaccine platforms mostly reflects increased attention from the Gates Foundation, with funding for vaccine platform R&D accounting for a growing share of – and most of the growth in – the Foundation's platform funding since 2017. The growth in funding for diagnostic platforms, on the other hand, has been driven by increased investment from the US DOD, for whom diagnostic platforms are a primary focus, as well as the emergence of Open Philanthropy as a funder of platform technologies.

While the increase in neglected disease-related platform funding predates the COVID pandemic, several grants underpinning this data do cite COVID as a potential target, suggesting that the pandemic has helped to speed the shift towards platform technologies. As the global health R&D community begins to explore the potential application of innovative COVID-related technologies for neglected diseases, we predict that the hastened pace of investment in platform technologies will continue.

Growth in philanthropic funding helped to offset falling public and private sector funding

Outside of the big increases from the US DOD and NIH, the rapid growth in platform funding between 2017 and 2020 came mostly from philanthropic funders, especially the Gates Foundation, which tripled its platform funding. An $11m (22%) increase in philanthropic platform funding in 2020 formed part of a $28m (3.6%) rise in overall philanthropic funding, making it the only major sector not to reduce its 2020 funding.

This increase took philanthropic contributions to neglected disease R&D to their highest level since 2008. While in 2008 the Gates Foundation provided nearly 90% of philanthropic funding, this year its share fell to a record low 76% – despite its funding remaining basically unchanged – thanks to ongoing funding growth from the Wellcome Trust and the recent emergence of Open Philanthropy.

Open Philanthropy began funding neglected disease R&D in 2017, the same year it was spun out as an independent entity from its parent, GiveWell. It has since increased its neglected disease R&D funding rapidly, from $8.2m in 2017 to $25m in 2020, focusing on diagnostic platforms, biological vector control for malaria and rheumatic fever vaccines, alongside significant contributions for COVID and multiple EIDs.

Despite growing funding from Open Philanthropy and the Wellcome Trust – consistently the second largest philanthropic funder – the Gates Foundation remained, by a significant margin, the largest philanthropic funder of neglected disease R&D. The Gates Foundation made substantial cuts to its disease-specific funding in 2020, with its stable overall neglected disease R&D funding again shifting towards greater investment in core funding – particularly for the Gates Medical Research Institute – and platform technologies. It now accounts for over a third of global ND-relevant platform technology funding, and has been the top funder of platform R&D every year since 2014 – when its funding was less than quarter of its current level.

In contrast to the global response to COVID-19, funding for neglected disease R&D remains dominated by the same few contributors, with some diseases dependent on only one or two funders

A 2020 report from the OECD[3] highlights the role played by private philanthropic foundations, many of them new to global health, in responding to the COVID pandemic, recording commitments from 48 different foundations totalling $1.6 billion in the first half of 2020 alone. Our own tracking of COVID funding commitments made in 2020 shows a total across all sectors of nearly $7.5 billion in committed R&D funding, from at least 126 different funders spread across 36 different nations and the European Commission. These commitments resulted in disbursements of at least $4.0 billion for COVID-specific product R&D from G-FINDER participants – not counting a huge increase in funding for EID-specific platform technologies, which jumped by $107m to $165m.

This represents a heartening global response to the pandemic, but also underlines the historically narrow level of philanthropic engagement in neglected disease, with the typical year seeing fewer than ten philanthropic organisations providing even a million dollars in funding for neglected disease R&D.

A similar contrast to the broad global response to COVID can be seen across other sectors, with a few large organisations providing the vast majority of global funding, and a short tail of smaller funders providing almost all of the remainder. Several of the most neglected diseases count on an even narrower pool of funders: leprosy, cryptococcal meningitis, leptospirosis and most helminth infections have relied on just one or two funders for more than 70% their R&D funding over the past decade. This leaves them vulnerable to shifts in a single organisations' resources or funding priorities and in practice makes any progress in treating them reliant on the gradual progression of just one or two product candidates through the pipeline.

The global R&D response to the COVID pandemic from dozens of funders shows how the quantity and diversity of a funding base can speed development timelines and build a pipeline that is able to withstand the inevitable failures of individual candidates. Having seen what prioritising research and development can achieve, it is clearer than ever that neglected diseases only persist because we choose to let them.

The full impact of COVID-19 on neglected disease R&D likely won't be felt for several years

As the pandemic began to spread, one immediate fear was that COVID R&D would directly displace traditional sources of neglected disease funding. But the evidence from the 2014 West African Ebola pandemic suggested that this would not necessarily be the case: the huge increase in funding for Ebola R&D between 2013 and its peak in 2015 was accompanied by relatively stable funding for neglected disease.

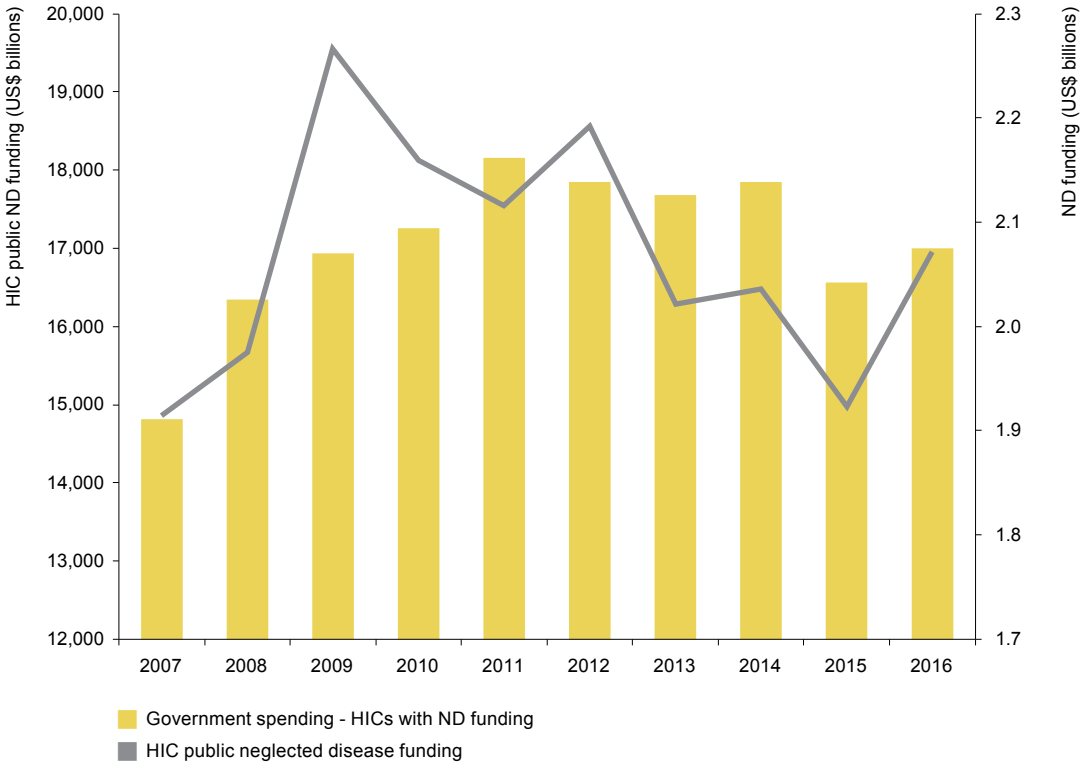
The response to COVID-19 was, of course, far larger and faster than for Ebola. And there is some evidence in our data which suggests that organisations' funding for COVID-19 R&D has been at least partly at the cost of their neglected disease R&D funding, in the form of a statistically significant negative relationship between an organisation's funding for COVID R&D and the change in their neglected disease R&D funding in 2020. Our analysis suggests that every additional million dollars of COVID R&D funding provided by an organisation was associated with a $30k reduction in neglected disease funding, though the overall relationship is driven by the substantial reductions in funding from three large funders of COVID R&D: the US NIH, the German BMBF and the UK DHSC. This analysis suggests there may be a small but meaningful trade-off between COVID and neglected disease R&D, one that does not appear in a similar analysis of earlier Ebola funding.

In the medium term, the risk from COVID is less the direct displacement of funding and attention, and more that the economic impact of the crisis will reduce governments' willingness or ability to continue their funding for other areas of global health.

[3] OECD(2020), COVID-19 Survey – Main Findings, see https://one.oecd.org/document/DCD/DAC/STAT(2020)35/en/pdf

One potential analogy for how a post-pandemic reduction in government spending might impact neglected disease funding are the aftereffects of the 2008 global financial crisis (GFC). High-income country public funding – then as now the biggest contributor to ND R&D – grew sharply in 2009 as overall government spending maintained its pre-GFC growth, driven in both cases by stimulus spending. This was followed by a lengthy period of economic recession and slower growth in overall government spending, characterised by growth in most nations' welfare costs and falling discretionary spending. It was this period that saw the deficit-driven reductions in HIC public funding for neglected disease R&D, with steep falls in 2010 and 2013 before funding bottomed-out in 2015, leaving it, in real terms, slightly below its pre-GFC level seven years after the crisis, as shown in Figure 27, below.

Figure 27. High-income country neglected disease and overall government funding 2007-2016



If post-COVID neglected disease R&D funding had matched its rough trajectory following the GFC, we would have hoped to see a stimulus-driven boost in funding in 2020. Instead, to the extent increased public spending targeted health R&D, it unsurprisingly focused on COVID-19. We enter a period of potentially stagnant or falling government expenditure without the buffer that was provided to neglected disease R&D by the post-GFC fiscal stimulus. We can, however, take some comfort in the knowledge that funding now sits far above it's 2008 level and has proved durably high over the last several years, potentially allowing it to weather a post-COVID period of belt-tightening relatively unharmed.

Statistical analysis conducted by PCR based on 13 years of G-FINDER data across 24 different countries shows a clear relationship between government spending and neglected disease R&D funding. It suggests that a global dip in government spending like that seen in 2015 would lead to a $177m drop in neglected disease R&D funding, which would be the largest reduction we had ever seen.

As much as the costs of the pandemic might raise concerns about the availability of funding, it has also been a stark demonstration of the harm caused by an uncontrolled infectious disease, and of how rapidly a global R&D response can turn the tide. COVID has made global health more salient in the minds of policy makers and philanthropists, attracting new funders to emerging infectious disease R&D and providing evidence that tools for controlling infectious disease are both valuable and within reach.

Beyond making the case for investment in global health, the R&D response to COVID has provided us with a range of potential tools, including big steps forward in vaccine and diagnostic platforms, new funding mechanisms, new technologies and improved methods of research and regulation. The challenge for global health stakeholders is to ensure the adoption of, and financial support for, these innovations once the immediate crisis of COVID has passed.

ANNEXURE A - ADVISORY COMMITTEE MEMBERS

ADVISORY COMMITTEE MEMBER	ORGANISATION	TITLE
Dr Ripley Ballou	International AIDS Vaccine Initiative	ADVANCE Program Lead and Principal Investigator
Professor Balram Bhargava	Indian Council of Medical Research	Director General
Dr François Bompart	Drugs for Neglected Diseases *Initiative*	Access Committee Chair
Dr Wanderley de Souza	Financiadora de Estudio e Projetos (FINEP)	Former President
Dr Emily Erbelding	National Institute of Allergy and Infectious Diseases, National Institutes of Health	Director, Division of Microbiology and Infectious Diseases
Dr Arnaud Fontanet	Institut Pasteur	Head of Emerging Diseases Epidemiology Unit
Dr Sue Kinn	UK Foreign, Commonwealth & Development Office	Head of Southern Africa Regional Hub for Science, Innovation and Technology
Dr Jean Lang	Sanofi Pasteur	Associate Vice President
Dr Firdausi Qadri	International Centre for Diarrhoeal Disease and Research (icddr,b)	Senior Scientist and Head of Immunology
Dr John Reeder	World Health Organization; Special Programme for Research and Training in Tropical Disease	Director
Professor Nelson Sewankambo	Makerere University College of Health Sciences	Professor of Internal Medicine
Dr Soumya Swaminathan	World Health Organization	Chief Scientist
Wendy Taylor	Jhpiego	Vice President, Technical Leadership and Innovation
Dr Tim Wells	Medicines for Malaria Venture	Chief Scientific Officer

ANNEXURE B - METHODOLOGY

Survey methodology

IDENTIFICATION OF SURVEY PARTICIPANTS

The G-FINDER project aims to survey all key public, private and philanthropic organisations involved in R&D for global health. Although the primary focus is on funders, we also survey key research, intermediary and industry groups to allow us to better track funding flows.

In 2008 (the first year of the project, then focused exclusively on neglected diseases), survey participants were identified through various avenues, including: our own database of contacts; previous surveys covering HIV/AIDS, tuberculosis, and malaria R&D; and research to find previously unknown funding organisations in countries with high R&D expenditure as a percentage of gross domestic product. In the following year we focused on groups and countries that were missing or poorly represented in 2008, developing proactive strategies to both increase the number of survey participants and improve response rates in these areas. Major Indian public agencies involved in funding R&D for neglected diseases were identified and incorporated in our list of participants, and additional diagnostics organisations and small pharmaceutical and biotechnology firms were also included.

Since then we have put in place a number of targeted strategies to further increase survey participation of major public funders and product developers in low- and middle-income countries, including those in South America, Africa and Asia. In addition, each time that a new disease or health issue is added to the survey scope, organisations known to be active in these areas are identified and surveyed.

DATA COLLECTION

The G-FINDER project operates according to two key principles:

1. capturing and analysing data in a manner that is consistent and comparable across all funders and diseases; and
2. presenting funding data that is as close as possible to 'real' investment figures.

G-FINDER was originally designed as an online survey. An online survey platform was developed to capture grant data and is still used by the majority of survey participants. An offline grant-based reporting tool is also available. Industry (pharmaceutical companies and biotechnology firms) investment in R&D is not grant-based, so the reporting tool has been tailored for these participants. Instead of grants, companies enter the number of staff working on global health programmes, their salaries, and direct project costs related to these programmes. Companies are required to exclude 'soft' figures such as in-kind contributions and costs of capital.

For some organisations with very large datasets, the online survey and equivalent offline reporting tool are difficult to use. The G-FINDER team therefore uses publicly available databases to identify the relevant funding. For the Biomedical Advanced Research and Development Authority (BARDA), funding information is identified using the international and domestic 'Project Maps' retrieved from the Medical Countermeasures website. Information on funding from the US Department of Defense (DOD) is collected using the Defense Technical Information Center's 'DOD investment budget search' tool. Funding from the European Commission (EC) is retrieved from the Community Research and Development Information Service (CORDIS) public database and the Innovative Medicines Initiative's (IMI) online project list. Supplementary data is provided by the EC. Information about R&D projects funded by Innovate UK is extracted from spreadsheets available on its website. For the US National Institutes of Health (NIH), grants are collected using the Research Portfolio Online Reporting Tools (RePORTER) and the Research, Condition and Disease Categorization (RCDC) databases.

All participating organisations are asked to only include disbursements (or receipts), rather than commitments made but not yet disbursed. In general, only primary grant data is accepted; the only exception is in the case of data collection collaborations between G-FINDER and other R&D funding surveys, such as the Resource Tracking for HIV Prevention Research & Development Working Group. Data from all sources is subject to verification using the same processes and inclusion criteria.

THE SURVEY

Survey participants – funders, intermediaries and product developers – are asked to enter grant-by-grant expenditures incurred or disbursements received during their financial year with the largest overlap with the previous calendar year (which is different from the financial year in many countries). Survey participants are asked to enter details of every global health investment they disbursed or received, including:

- a specific disease or health issue, from a predefined list
- a product type (e.g. drugs, vaccines, microbicides), from a predefined list
- an R&D stage within the product type (e.g. discovery and pre-clinical, clinical development, Phase IV/pharmacovigilance studies of new products), from a predefined list
- the name of the funder or recipient of the grant
- a brief description of the grant
- an internal grant identification number
- the grant amount

Where survey participants cannot provide data to this level of detail, they are asked to provide the finest possible level of granularity. Where survey participants are not able to allocate the grant to a single disease, five options are available:

1. 'Core funding of a multi-disease / issue organisation' such as funding to an organisation working in multiple diseases or sexual & reproductive health issues, where the expenditure per health issue was not known to the funder
2. 'Platform technologies', further allocated as investment into diagnostic platforms; adjuvants and immunomodulators; or delivery technology and device platforms. These categories capture investments into technologies which were not yet directed towards a specific disease or product
3. 'Multi-disease vector control products', which captures funding for vector control product R&D that is not yet targeted at a specific disease, or that is targeted at multiple vector-borne diseases
4. 'Multi-purpose prevention technologies' which target more than one sexual & reproductive health issue
5. 'Unspecified R&D' for any grants that still cannot be allocated to any of the above categories

Data validation and analysis

VALIDATION

All grants reported in the G-FINDER survey are verified against the inclusion criteria. Cross-checking of grants reported by funders and recipients is then conducted using automated reconciliation reports – which match investments reported as disbursed by funders with investments reported as received by intermediaries and product developers – followed by manual grant-level review. Any discrepancies are resolved by contacting both groups. For grants from the US NIH, funding data is 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 figures are reviewed against industry portfolio information held by Policy Cures Research and against full-time equivalent (FTE) and direct costs provided by other companies. Costs that fall outside the expected range, for example, above average FTE costs for clinical staff, are queried with the company and corrected.

DATA AGGREGATION

All pharmaceutical industry funding data is aggregated and anonymised to protect respondents' confidentiality. Rather than being attributed to individual companies, pharmaceutical company investment is instead reported according to the type of company, with a distinction made between multinational pharmaceutical companies (MNCs) and small pharmaceutical and biotechnology firms (SMEs).

INFLATION ADJUSTMENTS

All funding data we collect is adjusted for inflation and converted to US dollars for the relevant financial year to eliminate artefactual effects caused by inflation and exchange rate fluctuations, allowing accurate comparison of year-on-year changes. Due to these adjustments, historical funding data in tables and figures in the G-FINDER data portal and our most recent reports will differ from data published in older reports.

All reported data is adjusted for inflation using consumer price index (CPI) estimates from the International Monetary Fund (IMF) and any data entered by survey participants in their local currency is converted to USD based on the average annual exchange rate of the relevant financial year as reported by the IMF, Bank of England, United Nations Treasury and OANDA. The G-FINDER data portal also allows all data to be converted to Euros (EUR) or British pound sterling (GBP).

ANNUAL CHANGES IN SURVEY PARTICIPATION

While survey participation from the major funders has stabilised over the history of the G-FINDER survey, there remains significant annual variation in survey participation, as a result of survey dropout, increased response from long-term funders and entry of new players in the global health sector. The net effect of these changes is typically relatively small, other than between 2007 and 2008 (the first and second survey years). However, care should be taken in interpreting apparent changes in funding, which may, in some cases, have been contributed to by the artefactual effects of changes in survey participation. Detailed analysis of these changes and their effects is provided by the G-FINDER reports for the relevant year.

VARIATION BETWEEN SURVEYS

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

Data limitations

While the survey methodology has been refined over the past decade, there are limitations to the data presented, including survey non-completion, time lags in the funding process, an inability to disaggregate some investments, and non-comparable or missing data.

SURVEY NON-COMPLETION

Some global health R&D funding may not be captured because organisations are not identified as active in this field and are therefore not invited to participate, or because organisations are invited to participate, but do not respond. Despite this, we are confident that the majority of neglected disease, emerging infectious disease, and sexual & reproductive health R&D funding is captured by G-FINDER, because large funders active in this area and target groups identified by our Advisory Committee are typically responsive and, where they are not, are prioritised during survey follow-up.

TIME LAGS IN THE FUNDING PROCESS

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

INABILITY TO DISAGGREGATE INVESTMENTS

A small proportion of funding (now typically well less than 3%) is reported to the survey each year as 'unspecified', usually for multi-disease/multi-issue programmes where investment cannot easily be apportioned by disease or issue. A proportion of funding for some health issues is also 'unspecified', for instance, when funders report a grant for research into TB basic research and drugs without apportioning funding to each product category. This means that reported funding for some diseases or issues and products will be slightly lower than actual funding, with the difference being included as 'unspecified' funding.

Another small, though increasing, fraction (to date always less than 10%) of global funding is given as core funding to R&D organisations that work in multiple health areas, for example, the European and Developing Countries Clinical Trials Partnership (EDCTP) and the Coalition for Epidemic Preparedness Innovations (CEPI). As this funding cannot accurately be allocated by disease or health issue, it is reported as unallocated core funding. In cases where grants to a multi-disease or multi-issue organisation are earmarked for a specific health area or product, they are included under the specific disease/issue-product area.

NON-COMPARABLE DATA

Due to a significant increase in the size of survey participation in 2009 (when we collected FY2008 data), data from 2008 (when we collected FY2007 data) is the least comparable to other years. Furthermore, the current public official databases for the US NIH data, the RCDC and RePORTER, used for data collection from 2009 onwards, uses a different structure than the US NIH database used in 2008, making this data less comparable. As such, apparent shifts in funding between 2007 and 2008 should be interpreted with caution.

MISSING AND INACCURATE DATA

G-FINDER can only report the data as it is given to us. Although strenuous efforts are made to check the classification, accuracy and completeness of grants, in a survey of this size it is likely that some data will have been incorrectly entered or that funders may have accidentally omitted some grants. We periodically make amendments to historical G-FINDER data after the publication of a report if better data is provided or errors are identified, which take immediate effect on the G-FINDER data portal. We believe that the checks and balances built into the G-FINDER process mean that mistakes, if present, have only a minor overall impact.

ANNEXURE C - SURVEY PARTICIPANTS

- AbbVie
- Adjuvant Capital
- Aelix Therapeutics*
- Against Malaria Foundation
- Allergan
- American Leprosy Missions (ALM)
- amfAR, The Foundation for AIDS Research*
- AMR Action Fund
- Ares Trading SA
- Assiut University
- Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- Australian Department of Foreign Affairs and Trade (DFAT) (including the Indo-Pacific Centre for Health Security)
- Australian National Health and Medical Research Council (NHMRC)
- Australian Research Council (ARC)
- Bahir Dar University (BDU)
- Barcelona Centre for International Health Research (CRESIB)
- Barcelona Institute for Global Health (ISGlobal) (including FCRB, CRESIB and CREAL)
- Baruch S. Blumberg Institute
- BASF SE
- Bayero University, College of Health Sciences
- Baylor College of Medicine
- BC Women's Health Foundation
- Becton, Dickinson and Company (BD)
- Bernhard Nocht Institute for Tropical Medicine (BNITM)
- Bill & Melinda Gates Foundation#
- Biological E Limited
- Biotechnology Industry Research Assistance Council (BIRAC)
- Brazilian Araucária Support Foundation for Scientific and Technological Development in the State of Paraná (FAPPR)
- Brazilian Development Bank (BNDES)
- Brazilian Ministry of Health: Department of Science and Technology (DECIT)
- Brazilian Ministry of Health: National STD and AIDS Programme
- Brazilian Support Foundation for Research and Innovation in the State of Espirito Santo (FAPES)
- Brazilian Support Foundation for Research and Innovation in the State of Santa Catarina (FAPESC)
- Brazilian Support Foundation for Research and Technological Innovation in the State of Sergipe (FAPITEC)
- Brazilian Support Foundation for Research in the State of Alagoas (FAPEAL)
- Brazilian Support Foundation for Research in the State of Amapá (FAPEAP)
- Brazilian Support Foundation for Research in the State of Amazonas (FAPEAM)
- Brazilian Support Foundation for Research in the State of Bahia (FAPESB)
- Brazilian Support Foundation for Research in the State of Minas Gerais (FAPEMIG)
- Brazilian Support Foundation for Research in the State of Rio Grande do Sul (FAPERGS)
- Brazilian Support Foundation for Research in the State of São Paulo (FAPESP)
- Brazilian Support Foundation for Science and Technology in the State of Pernambuco (FACEPE)
- Brazilian Support Foundation for Scientific and Technological Development in the State of Ceará (FUNCAP)
- Brazilian Support Foundation for the Development of Education, Science and Technology in the State of Mato Grosso do Sul (FUNDECT)
- Brazilian Support Foundation for the Development of Scientific and Technological Actions and Research in the State of Rondônia (FAPERO)
- Burnet Institute
- Butantan Institute, Fundacao Butantan
- California Institute for Regenerative Medicine (CIRM)#
- Campbell Foundation*
- Canadian Department of Foreign Affairs, Trade and Development (Global Affairs Canada, DFATD)
- Canadian Institutes of Health Research (CIHR)
- CARB-X
- Carlos III Health Institute, Instituto de Salud Carlos III
- Cebu Leprosy and Tuberculosis Research Foundation (CLTRF)
- CEMAG Care (formerly CEMAG Consulting)
- Center for Production and Research of Immunobiology (CPPI)
- Chan Zuckerberg Initiative#
- Children's Investment Fund Foundation (CIFF)
- Chilean National Fund for Scientific and Technological Development (FONDECYT)
- Coalition for Epidemic Preparedness Innovations (CEPI)
- Colombian Ministry for Science, Technology and Innovation (Minciencias)

# Denotes organisations where funding data was taken from publicly available sources

* Denotes organisations where funding data was only received via the Resource Tracking for HIV Prevention Research and Development Working Group

- Concept Foundation
- Confluence For Health Action And Transformation Foundation (India Health Fund, IHF)
- CONRAD
- Contrel Europe
- Crucell
- Czech Republic Ministry of Agriculture, Ministerstvo zemedelství (eAGRI / MZe)#
- Czech Republic Ministry of Education, Youth and Sport, Ministerstvo školství, mládeže a telovýchovy (MSMT)#
- Czech Republic Ministry of Health, Ministerstvo zdravotnictví (MZCR)#
- Czech Republic Ministry of Industry and Trade, Ministerstvo prumyslu a obchodu (MPO)#
- Czech Science Foundation, Grantová agentura Ceské republiky (GACR)#
- Daiichi Sankyo Company, Ltd
- Damien Foundation (DFB)
- Danish Ministry of Foreign Affairs and/or Danish International Development Agency (DANIDA)#
- Drugs for Neglected Diseases initiative (DND*i*)
- Dutch Ministry of Foreign Affairs - Directorate General of Development Cooperation (DGIS)
- Dutch Ministry of Health, Welfare and Sport (VWS)
- effect:hope (The Leprosy Mission Canada)
- Eijkman Institute for Molecular Biology
- Eisai Co., Ltd.
- European & Developing Countries Clinical Trials Partnership (EDCTP)
- European Commission (EC)#
- European Vaccine Initiative (EVI)
- Evofem Inc.
- Ezequiel Dias Foundation, Fundação Ezequiel Dias (FUNED)
- FAIRMED - Health for the Poorest
- FHI 360
- Fondazione Cariplo
- Fontilles
- Formas, Swedish Research Council for Sustainable Development#
- Forte, Swedish Research Council for Health, Working Life and Welfare#
- Foundation for Innovative New Diagnostics (FIND)
- Foundation for Neglected Disease Research (FNDR)
- 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)
- French Research Institute for Development (IRD) (including CERMES)
- Fundació La Caixa
- Fungal Infection Trust (FIT)
- Gavi, the Vaccine Alliance
- GeneOne Life Science
- German Centre for Infection Research (Deutsches Zentrum für Infektionsforschung) (DZIF)
- 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)
- Gesea Biosciences
- GlaxoSmithKline (GSK)
- Glenveigh Medical
- Global Action Fund for Fungal Infections (GAFFI)
- Global Antibiotic Research and Development Partnership (GARDP)
- Global Health Innovative Technology Fund (GHIT Fund)
- Grand Challenges Canada (GCC)
- GSK Bio
- Gynuity Health Projects
- Hamish Ogston Foundation
- Health Research Council of New Zealand (HRC)
- Hepatitis B Foundation
- Huesped Foundation, Fundacion Huesped*
- Ibero-American Program of Science and Technology for Development (CYTED)
- 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 (DST)
- Indian National Snakebite Initiative, including IndianSnakes.org
- Innovate UK (IUK)#
- Innovative Medicines Initiative (IMI)#
- Innovative Vector Control Consortium (IVCC)
- INOSAN Biopharma SA
- Institut Pasteur
- Institute of Tropical Medicine Antwerp/Prince Leopold Institute of Tropical Medicine (ITM)
- Instituto Nacional de Producción de Biológicos (ANLIS)
- Integral Molecular
- International AIDS Vaccine Initiative (IAVI)
- International League of Dermatological Societies (ILDS), including the International Foundation for Dermatology (IFD)

# Denotes organisations where funding data was taken from publicly available sources

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- International Partnership for Microbicides (IPM)*
- International Vaccine Institute (IVI)
- Inviragen, Inc.
- Irish Aid
- Isca Technologies Ltd
- Italian Association Amici di Raoul Follereau (AIFO)
- Italian National Institute of Health, Istituto Superiore di Sanita (ISS)*
- James Cook University (including the Australian Institute of Tropical Health and Medicine (AITHM))
- Janssen Australia (previously Janssen-Cilag)
- Janssen Biotech Inc (formerly Centocor Biotech)
- Janssen Korea Ltd
- Janssen Sciences Ireland UC
- Janssen Vaccines & Prevention B.V.
- Japan Society for the Promotion of Science (JSPS)#
- Jhpiego
- Johnson & Johnson
- KfW Group
- Laboratoire 7 MED (7 MED Industrie)
- Laboratório Farmacêutico do Estado de Pernambuco (LAFEPE)
- Laboratorios Probiol
- Lepra
- Lepra India - Blue Peter Public Health & Research Centre (BPHRC)
- Leprosy Relief, Secours aux Lepreux (SLC)
- Leprosy Research Initiative (LRI)
- Liverpool School of Tropical Medicine (LSTM)
- London School of Hygiene and Tropical Medicine (LSHTM) (including MEIRU)
- Ludwig Maximilians University of Munich (LMU) (including Klinikum der Universität München)
- Luna Innovations (including Advanced Photonix)
- Lyndra Therapeutics
- Male Contraceptive Initiative (MCI)
- Mapp Biopharmaceutical
- Max Planck Society - Max Planck Institute for Infection Biology (MPIIB)
- Médecins Sans Frontières (MSF)
- Medical Research Future Fund (MRFF)#
- Medical Research Network of the Consortium of the Thai Medical schools (MedResNet)
- Medicines Development for Global Health (MDGH) Ltd
- Medicines for Malaria Venture (MMV)
- Medicor Foundation
- Melbourne Children's
- Meningitis Research Foundation (MRF)
- Meningitis Vaccine Project (MVP)
- Mérieux Foundation, Fondation Mérieux
- Metabolomic Diagnostics Ltd
- Mexican National Institute of Public Health, Instituto Nacional de Salud Publica (INSP)
- Mexico National Council of Science and Technology (CONACYT) (including FOINS)
- MicroPharm Ltd
- Monash University (including CDCO)
- MSD (Merck)
- MSD for Mothers
- Mundo Sano Foundation (Fundación Mundo Sano)
- Murdoch Children's Research Institute (MCRI)
- Mymetics
- Nigeria Centre for Disease Control
- Novartis
- Oak Foundation*
- Okairos
- Ontario HIV Treatment Network*
- Open Philanthropy#
- Ophirex Inc
- Ortho-Clinical Diagnostics, Inc
- Osel*
- Otsuka Pharmaceutical Co. Ltd
- Parsemus Foundation
- PATH (including Meningitis Vaccine Project (MVP) and Malaria Vaccine Initiative (MVI))
- Philippine Council for Health Research and Development
- Population Council
- Redeemer's University
- Reproductive Health Investors Alliance (RHIA Ventures)
- Research Centre Borstel
- Research Council of Norway
- Research Foundation Flanders (FWO)*
- Research Investment for Global Health Technology Fund (RIGHT Fund)
- Royal Norwegian Ministry of Foreign Affairs (including NORAD)
- Royal Society of New Zealand (RSNZ)
- Rush University Medical Center
- Sabin Vaccine Institute
- San Raffaele Scientific Institute IRCCS, Ospedale San Raffaele*
- Sanofi
- Sanofi Pasteur
- Sasakawa Health Foundation (SHF)
- Science Foundation Ireland (SFI)
- Sechenov Institute of Evolutionary Physiology and Biochemistry of Russian Academy of Sciences

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- Serum Institute of India (SII)
- Shantha Biotechnics
- Shionogi & Co., Ltd.
- South African AIDS Vaccine Initiative (SAAVI)
- South African Department of Science and Innovation (DSI, formerly Department of Science and Technology, DST)
- South African Medical Research Council (MRC)
- South African National Health Laboratory Service (NHLS) (including NICD and SAVP)
- Spanish Clinical Foundation for Biomedical Research (FCRB)
- Spanish Ministry of Foreign Affairs, European Union and Cooperation (MAEUEC) (including AECID)
- St Vincent's Hospital Sydney
- Stichting Aids Fonds*
- Sumagen Co. Ltd.*
- Swedish Heart-Lung Foundation, Hjärt-Lungfonden#
- Swedish International Development Agency (SIDA)#
- Swedish Research Council#
- Swiss Agency for Development and Cooperation (SDC)
- Swiss National Science Foundation (SNSF)#
- Swiss Tropical & Public Health Institute (Swiss TPH)
- Sysmex Japan
- Takeda Pharmaceutical Company
- Tara Health Foundation
- TB Alliance
- Technology Agency of the Czech Republic (TA CR), Technologická agentura CR#
- Telethon Kids Institute
- Texas Children's Hospital (including Baylor International Pediatric AIDS Initiative (BIPAI))
- Thai Government Pharmaceutical Organisation (GPO)
- Thai National Center for Genetic Engineering and Biotechnology (BIOTEC)
- Thai National Science and Technology Development Agency (NSTDA)
- The David and Lucile Packard Foundation
- The Leprosy Mission International (TLMI)
- The Peter Doherty Institute for Infection and Immunity
- The Task Force for Global Health
- The Union
- The United Nations Joint Programme on HIV/AIDS (UNAIDS)*
- The Wellcome Trust
- The William and Flora Hewlett Foundation
- Theramex
- Tibotec
- TuBerculosis Vaccine Initiative (TBVI)
- Turing Foundation
- UK Department of Health and Social Care (DHSC)
- UK Foreign, Commonwealth & Development Office (FCDO, formerly DFID)
- UK Medical Research Council (MRC)
- UK National Health Service (NHS) (including National Institute for Health Research NIHR)#
- Unitaid
- University Hospital Bonn, Universitätsklinikum Bonn (UKB)
- University of Dundee
- University of Ibadan
- University of Khartoum (including the Mycetoma Research Center)
- University of Lagos
- University of Melbourne (including the Australian Venom Research Unit, AVRU)
- University of Monastir
- University of Nebraska Medical Center
- University of Pittsburgh
- University of Sussex (including the Brighton and Sussex Medical School Centre for Global Health)
- University of Tübingen (including the Natural and Medical Sciences Institute, NMI)
- University of Wollongong
- US Agency for International Development (USAID)
- US Biomedical Advanced Research and Development Authority (BARDA)#
- US Centers for Disease Control and Prevention (CDC)
- US Department of Defense (DOD) including DARPA, DTRA, JPEO-CBD, MEDCOM, NMRC, USAMMDA, USAMRIID, and WRAIR#
- US National Institutes of Health (NIH) including NIAID, NCI, and NICHD#
- Vaccine Research Insitute (VRI)
- Vaccitech Limited
- Vibliome Therapeutics
- ViiV Healthcare
- Vinnova
- Vir Biotechnology
- Volkswagen Foundation, Volkswagen-Stiftung
- WHO: Special Programme for Research and Training in Tropical Diseases (WHO / TDR)
- WHO: Special Programme of Research, Development and Research Training in Human Reproduction (WHO / HRP)
- Women's Global Health Innovations (WGHI)
- Women's Health Research Institute (WHRI)
- ZonMw*

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ANNEXURE D - REFERENCES

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media@policycuresresearch.org

55 Brisbane Street
Surry Hills NSW 2010
Australia
Tel: +61 (2) 8218 2109

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