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POLICY CURES RESEARCH.

SEXUAL AND REPRODUCTIVE HEALTH RESEARCH AND DEVELOPMENT: UNDERSTANDING THE SPECTRUM

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GLOSSARY

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Aggregate industry	Aggregate pharmaceutical and biotechnology companies
AIDS	Acquired immune deficiency syndrome
AMR	Antimicrobial resistance
Australian NHMRC	Australian National Health and Medical Research Council
bNAb	Broadly neutralising antibody
Brazilian FAPEMIG	Brazilian Support Foundation for Research in the State of Minas Gerais
Brazilian FINEP	Brazilian Innovation Agency
Canadian CIHR	Canadian Institutes of Health Research
CHAI	Clinton Health Access Initiative
CHAMPION Trial	Carbetocin Haemorrhage Prevention Trial
Chinese NSFC	National Natural Science Foundation of China
D_3AWN PDP	Development of Devices, Diagnostics and Drugs to Address Women's Needs Product Development Partnership
DMPA	Depot medroxyprogesterone acetate
DND*i*	Drugs for Neglected Diseases Initiative
Dutch DGIS	Dutch Ministry of Foreign Affairs - Directorate General of Development Cooperation
EAG	Expert Advisory Group
EC	European Commission
FIDEC	Fighting Infectious Diseases in Emerging Countries
Flemish EWI	Flemish Department of Economics, Science and Innovation
French ANRS	French National Agency for Research on AIDS and Viral Hepatitis
FTE	Full-time equivalent
FUNIN	Fundación Inciensa
FY	Financial Year
GARDP	Global Antibiotic Research and Development Partnership
Gates Foundation	Bill & Melinda Gates Foundation
Gavi	Gavi, the Vaccine Alliance
German BMBF	German Federal Ministry of Education and Research
German BMG	German Federal Ministry of Health
German BMZ	German Federal Ministry of Economic Cooperation and Development
German DFG	German Research Foundation
G-FINDER	Policy Cures Research's annual survey and resulting report on global funding of product innovation for diseases and health issues that disproportionately affect people in low- and middle-income countries
GHIF	Global Health Innovation Fund
HIC	2018 World Bank listed high-income country
HIV	Human immunodeficiency virus
HPV	Human papillomavirus
HSV-2	Herpes simplex virus 2
HTLV-1	Human T-cell lymphotropic virus 1
HVTN	HIV Vaccine Trials Network
IAVI	International AIDS Vaccine Initiative
ICDDR,B	International Centre for Diarrhoeal Disease Research, Bangladesh
IM	Intramuscular

GLOSSARY

IMPAACT Network	International Maternal Pediatric Adolescent AIDS Clinical Trials
Indian BIRAC	Indian Biotechnology Industry Research Assistance Council
Indian DBT	Indian Department of Biotechnology
Indian ICMR	Indian Council of Medical Research
Indian NIRRH	Indian National Institute for Research In Reproductive Health
Inserm	French National Institute of Health and Medical Research
IPM	International Partnership for Microbicides
IUD	Intra-uterine device
IUS	Intra-uterine system
IV	Intravenous
IVI	International Vaccine Initiative
IVR	Intravaginal ring
LARC	Long-acting reversible contraception
LMIC	2018 World Bank listed low- and middle-income country
LNG-IUS	Levonorgestrel-releasing intra-uterine system
LSHTM	London School of Hygiene and Tropical Medicine
MIC	2018 World Bank listed middle-income country
MNC	Multinational pharmaceutical company
MPT	Multipurpose prevention technology
MSD for Mothers	An initiative of Merck & Co., Inc
New Zealand HRC	Health Research Council of New Zealand
PDP	Product Development Partnership
POC	Point-of-care
PPH	Post-partum haemorrhage
PrEP	Pre-exposure prophylaxis
R&D	Research and development
SFI	Science Foundation of Ireland
SME	Small pharmaceutical and biotechnology firm
South African MRC	South African Medical Research Council
SRH	Sexual and reproductive health
STI	Sexually transmitted infection
Swiss SNSF	Swiss National Science Foundation
UCLA	University of California Los Angeles
UCSF	University of California San Francisco
UK	United Kingdom
UK DFID	UK Department for International Development
UK DHSC	UK Department of Health and Social Care
UK MRC	UK Medical Research Council
US	United States
US CDC	US Centers for Disease Control
US DOD	US Department of Defense
US FDA	US Food and Drug Administration
US NIAID	US National Institute of Allergy and Infectious Disease
US NICHD	US National Institute of Child Health and Development
US NIH	US National Institutes of Health
USAID	US Agency for International Development
WHO	World Health Organization
WHO/HRP	World Health Organization Special Programme of Research, Development and Research Training in Human Reproduction
WOMAN Trial	World Maternal Antifibrinolytic Trial

EXECUTIVE SUMMARY

This report is part of Policy Cures Research's flagship G-FINDER project, which tracks annual investment in research and development (R&D) for new products and technologies designed to address persistent global health challenges that disproportionately affect people in low- and middle-income countries (LMICs).

The G-FINDER project has collected and reported on R&D funding for neglected infectious diseases since 2007, and for emerging infectious diseases since 2014. However, this is just the second report to look at funding for sexual and reproductive health (SRH) R&D. The previous edition – published in 2014 – analysed the global funding landscape for FY2013. This report marks the five-year review of that effort, assessing global funding for FY2018. Changes in scope between the two reports prevent any meaningful comparison of funding, so this report is again presented as a single snapshot in time. Moving forward, we plan to collect SRH R&D funding data annually, which will enable meaningful trend analyses in the future.

Collectively, a total of $1.7 billion was invested in 2018 into R&D for selected sexual and reproductive health issues, of which more than $1.4 billion was for HIV/AIDS. However, given the diverse range of issues and diseases included in the scope of this report, neither the headline funding total nor a comparison of funding levels between issues is particularly meaningful, or the point. The data captured in this report instead offers insight into the current landscape of global investment in LMIC-appropriate R&D for each SRH issue, and serves as a baseline for future tracking efforts.

Findings

Funding by SRH issue

Contraception

Global funding for contraception product development in 2018 was $64m, with the majority for products intended for female end-users ($46m, 71%) compared with just $9.2m (14%) for male end-users. Over a third of all funding ($24m, 37%) was directed at developing short-acting contraception, followed by investments in long-acting reversible contraception (LARCs, $18m, 28%) and contraception with multiple or unspecified durations ($15m, 24%). Remaining funding went to on-demand methods ($3.7m, 5.7%) and permanent methods ($3.6m, 5.6%).

Just under half of all contraception R&D funding in 2018 went to the development of contraceptive drugs ($31m, 48%). The majority of this was spent on the development of new short-acting methods ($19m, 61%), reflecting an evolving pipeline of research into novel, short-term contraceptive drugs that are effective for longer, more convenient and easily user-controlled, and are less or non-hormonal. In contrast, investment in device & combination products was $19m (30%) and was largely invested in LARCs ($13m, 65%), reflecting the technical need for devices for stable, sustained release of drugs in long-term pregnancy prevention. Included in this total were large industry investments in late-stage R&D into hormone-releasing intra-uterine devices (IUDs) with extended durations of action. Overall, clinical development & post-registration studies received the largest share ($27m, 42%), with $17m (26%) going to early-stage research.

Funding was concentrated in the two top funders – the Gates Foundation ($24m, 37%) and the US NIH ($21m, 33%) – while industry was the third largest funder overall ($8.6m, 14%), notably driven by investment largely from women-focused organisations. There were 70 reported recipients of funding for contraception R&D in 2018. While investment through industry accounted for 40% ($26m) of all funding, FHI 360 was the largest single recipient in 2018 ($8.6m, 13%).

HIV/AIDS

Global funding for basic research and product development for HIV/AIDS in 2018 was $1,442m. More than half of this was for preventive vaccines ($778m, 54%), nearly two-thirds of which came from a single funder: the US NIH ($494m, 64%). The next largest investments were in drugs ($214m, 15%) – mostly for long-acting injectables and pre-exposure prophylaxis (PrEP) clinical trials – and in basic research ($205m, 14%). All other product categories received less than 10% each of total funding: microbicides ($132m, 9.2%); diagnostics ($68m, 4.7%); unspecified R&D ($28m, 1.9%); and therapeutic vaccines ($17m, 1.2%). More than half of all funding went to clinical development & post-registration studies ($729m, 51%).

Funding for HIV/AIDS R&D was concentrated among three top funders: US NIH ($885m, 61%); industry ($206m, 14%), and Gates Foundation ($133m, 9.2%). Preventive vaccine R&D dominated US NIH ($494m, 56%) and Gates Foundation ($104m, 78%) funding, while industry invested near-equal shares in preventive vaccines ($107m, 52%) and drugs ($96m, 47%). Close to a fifth ($280m, 19%) of all investment was expended through industry, although almost three-quarters ($205m) of this was self-funded R&D. The two largest individual recipients were the Fred Hutchinson Cancer Research Center ($167m, 12%), which houses the HIV Vaccine Trials Network and primarily received funding from the US NIH (as well as the Gates Foundation), and the US NIH itself via its own intramural investment ($142m, 9.8%).

Sexually transmitted infections

Global funding for basic research and product development for LMIC-relevant sexually transmitted infections (STIs) – excluding HIV and human papillomavirus (HPV) – in 2018 was $71m. More than a third ($24m, 34%) was invested in gonorrhoea, while near equal shares went to herpes simplex virus 2 (HSV-2) and R&D to address multiple STIs ($12m, 17% each), reflecting the advanced pipelines of these fields. All other individual STIs each received less than $10m in funding: chlamydia ($7.9m, 11%), hepatitis B ($5.7m, 8.0%), human T-lymphotropic virus 1 (HTLV-1, $5.1m, 7.2%), and syphilis ($2.8m, 3.9%). Just $0.7m (1.0%) was spent on R&D for other STIs, most of which ($0.4m, 59%) was directed at R&D for bacterial vaginosis.

Nearly a third of STI investment went to basic research ($21m, 30%), mostly to gonorrhoea ($6.2m, 29%) and HTLV-1 ($5.1m, 24%), reflecting the rise in incidence of AMR gonorrhoea and poorly understood pathogenesis of HTLV-1. This was followed by diagnostics R&D ($19m, 27%), almost half of which ($9.1m, 47%) went to diagnostics for multiple STIs. Near equal investment was made in drugs ($11m, 15%) – two-thirds of which went to AMR gonorrhoea ($7.2m, 67%) – and preventive vaccines (also $11m, 15%). The remainder was invested in therapeutic vaccines ($6.2m, 8.7%), dominated by HSV-2 R&D ($6.2m, 99.5%). Unspecified product R&D was just $2.9m (4.1%). Despite some late-stage candidates, most STI funding was for basic & early-stage research ($43m, 60%), almost double the amount invested in clinical development & post-registration studies ($22m, 31%).

Funding for STI R&D was highly concentrated, with the top two funders – the US NIH and industry – providing 81% ($58m) of all investment. While the US NIH was amongst the top two funders for all surveyed STIs, nearly all industry investment was in multiple-STI diagnostics ($7.2m, 52%) and HSV-2 therapeutic vaccines ($6.6m, 48%). In total, more than a third of all STI funding went to industry ($28m, 39%) to conduct R&D across all included STIs, except HTLV-1 and syphilis. The largest single recipient – the Global Antibiotic Research and Development Partnership (GARDP) – received $3.7m (5.2% of all STI funding) entirely for gonorrhoea-related R&D, from a diverse range of funders.

Multipurpose prevention technologies

Global funding for product development for multipurpose prevention technologies (MPTs) in 2018 was $48m. Of this, $38m (79%) was invested in MPT drugs (including microbicides), with a further $7.8m (16%) for MPT devices & combination products. The rest ($2.3m, 4.8%) was invested in MPT R&D with an unspecified intended product type.

MPTs for the combined prevention of pregnancy and STIs received the vast majority of funding in 2018 ($37m, 78%), all of which was invested in drugs/microbicides. In contrast, funding for products with HIV prevention as an indication was largely invested in devices & combination products ($7.8m, 75% of funding to MPTs with HIV prevention), possibly reflecting the shift in HIV MPT R&D away from gel-based delivery methods and towards ring-based products (particularly those that also provide contraception). There was no reported funding for MPT R&D either for drugs or devices & combinations for prevention of multiple (non-HIV) STIs alone. Overall, most MPT R&D ($40m, 83%) was for clinical development & post-registration studies – mostly funded by industry – with just $5.5m (11%) for basic & early-stage research.

Counting aggregate industry as one, there were just six MPT funders reported in 2018, with heavy concentration in industry investment ($38m, 79%), dominated by specific funding towards MPT drugs for STI and pregnancy prevention. This was a somewhat unexpected finding given industry investment in MPT R&D has historically been low, with funding instead dominated by the US government. The US NIH ($6.2m, 13%) was indeed the second largest funder of MPTs in 2018, followed by USAID ($2.4m, 5.1%), and collectively, the US government was the source of 91% ($9.1m) of all non-industry investment. There were 11 recipients (with aggregate industry counted as one) of MPT R&D funding reported in 2018. The largest recipient after industry – Boston University – received $2.2m (4.6%) for early stage R&D into antibody-based MPTs.

HPV and HPV-related cervical cancer

Global funding for basic research and product development for HPV and HPV-related cervical cancer in 2018 was $52m. R&D for vaccines to prevent HPV infection received the largest share ($31m, 60%), two-thirds ($21m, 66%) of which was invested in dose reduction studies for existing HPV vaccines. This was followed by diagnostics for both HPV infection and cervical lesions ($7.5m, 14%), basic research ($6.9m, 13%), and therapeutic vaccines ($4.2m, 8.2%). The remainder ($2.3m, 4.3%) was not allocated to a specific product. In total, almost two-thirds of all HPV R&D was for clinical development & post-registration studies ($34m, 65%) – mostly to preventive vaccine R&D ($28m, 84%) – with just under a third for basic & early-stage research ($16m, 31%).

Most HPV R&D investment in 2018 came from just two funders – US NIH ($21m, 41%) and the Gates Foundation ($16m, 31%) – who together accounted for just under three-quarters ($37m, 72%) of total funding, with no other individual funder providing more than 5% of overall funding. All funding from the Gates Foundation and more than a third of US NIH funding for HPV was invested in preventive vaccine R&D. There were fifty reported recipients of funding for HPV and HPV-related cervical cancer R&D in 2018, with the top 12 accounting for 73% ($38m) of all investment. Collectively, aggregate industry was the largest recipient of HPV R&D funding, although this in fact represented 15 separate companies. A little over half ($4.6m, 57%) of all funding for industry came from external funders, with the remainder ($3.5m, 43%) being self-funded R&D. In contrast, the second largest recipient – Fundación Inciensa (FUNIN) – received a near similar amount ($6.2m, 12%) for a follow-up study of an HPV-16/18 vaccination trial in Costa Rica (funded by US NIH).

Post-partum haemorrhage

Global funding for product development for post-partum haemorrhage (PPH) in 2018 was $4.4m. The largest share ($3.2m, 72%) was for drugs, with the remainder for devices & combination products ($1.2m, 28%). The majority of PPH drug R&D investment ($2.8m, 87%) was for Phase III clinical trials evaluating room-temperature stable carbetocin as part of the CHAMPION trial. An additional $0.4m (13% of PPH drug R&D) went to PATH for R&D into inhaled, heat-stable oxytocin. Nearly all investment in PPH devices & combinations ($1.2m, 99%) was directed towards industry-led development of novel uterine devices to halt post-partum bleeding. The vast majority of PPH R&D was for clinical development & post-registration studies ($4.0m, 90%), with only a small amount ($0.4m, 10%) for early-stage research.

Only six funders of PPH R&D were reported in 2018. The top two – MSD for Mothers (the maternal health-focused initiative of Merck & Co., Inc., $3.1m, 71%) and the German BMZ ($0.8m, 19%) – accounted for 90% of all PPH R&D funding in 2018. The majority of this went to WHO/HRP for their coordination of the carbetocin Phase III clinical trials ($2.8m, 63%). Much of the remaining funding went to support the industry-led development of tamponade devices, either via the Global Health Investment Fund (GHIF, $0.8m, 19%) or directly to industry ($0.4m, 8.9%).

Pre-eclampsia

Global funding for basic research and product development for pre-eclampsia in 2018 was $12m. The bulk of this was for basic research ($10m, 82%), reflecting basic science-related knowledge gaps for pre-eclampsia, including poorly understood pathophysiology, and a lack of specific biomarkers and appropriate animal models. Almost all remaining funding was for diagnostic R&D ($2.2m, 18%), the vast majority of which ($2.0m, 92%) was for R&D into much needed point-of-care tests to identify early stages and women at risk of pre-eclampsia. Only a small amount of funding (<$0.1m, 0.6%) was reported for drug R&D, however this partly reflects the quite restrictive scope of this report, which was limited to drugs aimed at preventing the development of pre-eclampsia (rather than its management). Almost all funding in 2018 was for basic & early-stage research ($12m, 96%), with no reported funding for clinical development & post-registration studies.

There were twelve reported funders of pre-eclampsia R&D in 2018. The top two were the US NIH ($7.7m, 63%) and the Chinese National Natural Science Foundation (NSFC, $1.8m, 15%). All other funders provided less than $1.0m each. Aggregate industry was the largest recipient of pre-eclampsia R&D funding ($2.2m, 18%), all of which was provided by external funders and directed towards diagnostic R&D. This was followed by $1.8m (15%) from the Chinese NSFC to a number of unspecified recipients, all for basic research. The largest single recipient of funding, however, was the University of California San Francisco (UCSF) ($1.3m, 10%), also for basic research, as was funding for all other top recipients.

Non-issue specific R&D

Funding for R&D that was not specifically targeted at a single sexual and reproductive health area in 2018 was $44m. Most non-issue-specific funding went to R&D into platform technologies with ultimate applicability to SRH issues ($23m, 53%), followed by $20m (44%) in core funding to SRH R&D organisations. The remainder ($1.1m, 2.4%) was for other R&D, capturing projects with multidimensional R&D elements.

Funding for platform technology R&D was fairly evenly split between adjuvants & immunomodulators ($13m, 54%) and delivery technologies ($11m, 46%). Two funders provided the vast majority of funding, collectively accounting for 85% ($20m) of all investment in platform technology R&D: the Gates Foundation ($11m, 49%) and the US NIH ($8.4m, 36%). There were 47 reported recipients of platform technology R&D funding in 2018, with just under a quarter of investment going to aggregate industry ($5.3m, 23%) – the majority of which was for the development of adjuvants & immunomodulators ($3.7m, 70% of aggregate industry's received funding). All platform technology R&D investment to industry came from external funders ($5.3m, 100%).

Four organisations were reported to have provided core funding to SRH R&D organisations in 2018, the top three of which – the UK DFID ($6.9m, 36%), the Indian ICMR ($6.1m, 31%) and the Dutch DGIS ($5.9m, 30%) – accounted for 97% ($19m) of the overall figure. The remainder of core funding came from the Norwegian Ministry of Foreign Affairs ($0.6m, 3.1%). Only three organisations were reported as receiving core funding, with just under half going to WHO/HRP ($9.4m, 48%) – the main instrument within WHO and the UN system responsible for research in SRH and human reproduction. WHO/HRP's 2018 reported core funding was made up of funds from the Dutch DGIS ($5.9m, 62% of WHO/HRP's core funding), the UK DFID ($2.9m, 31%) and the Norwegian Ministry of Foreign Affairs ($0.6m, 6.5%). Funding for the Indian ICMR was intramural ($6.1m, 31%), directed to the National Institute for Research in Reproductive Health (NIRRH) within ICMR. The Bangladeshi ICDDR also received $4.0m – just over a fifth (21%) of all core funding and all from the UK DFID – for work conducted under their maternal and neonatal health portfolio.

Two organisations provided funding to other R&D in 2018: UK DFID ($1.0m, 94%) and Brazilian FINEP (<$0.1m, 6.2%). All of the UK DFID's funding went to PATH for the Devices, Diagnostics, and Drugs to Address Women's Needs Product Development Partnership (D_3AWN PDP) project, for a portfolio of products to prevent or manage pre-eclampsia/eclampsia and PPH. All of the Brazilian FINEP's investment went to the Brazilian Federal University of Para for multi-faceted projects related to HIV, HTLV-1 and chlamydia diagnostics, therapeutics and vaccines.

Discussion

Funding for HIV/AIDS R&D dwarfed funding for all other STIs combined; but STI funding was similarly dominated by priority pathogens

Global investment in basic research and product development for HIV/AIDS in 2018 was $1,442m, orders of magnitude larger than all other STIs. The scale of this difference reflects the unique position held by HIV/AIDS in the global health and R&D landscape, undoubtedly assisted by decades of strong global advocacy and sustained investment, but also reflecting the disease's huge burden of morbidity and mortality, as well as an advanced pipeline of products with a number of candidates in (expensive) late stage clinical trials.

Funding for HPV and HPV-related cervical cancer product R&D ($52m) in 2018 was only slightly less than total investment in all other STIs combined ($71m). This is similarly explained, in part, by the high mortality of HPV-related cervical cancer and strong global interest and investment aimed at achieving cervical cancer elimination.

Funding for non-HIV and -HPV STIs was dominated by priority pathogens and elimination strategies outlined in WHO's Health Sector Strategy on STIs. This includes notable attention towards gonorrhoea, which comprised over a third ($24m, 34%) of all STI R&D investment; as well as preventive and therapeutic vaccines for HSV-2 ($9.2m, 13% of all STI funding) and diagnostics for multiple STIs ($9.1m, 13%). Despite better products to address syphilis also being an identified priority, reported funding for syphilis R&D lags behind ($2.8m, 3.9%).

When combined with issue-specific totals, investment in MPT R&D influences overall funding levels for some – but not all – SRH issues within its definition

R&D funding for HIV/AIDS, STI and contraception is higher than the figures quoted in each of these individual areas once relevant investments in MPT R&D are included. How much higher, however, varies between SRH issues. Total funding for HIV/AIDS R&D including HIV-related MPT R&D is $1,453m, just 0.7% more ($10m) than total HIV/AIDS funding without ($1,442m). The relatively minor impact of this additional funding reflects both the magnitude of the overall HIV/AIDS R&D landscape, and an investment portfolio dominated by vaccine development.

In contrast, total funding for STI R&D when STI-related MPT R&D is included, expands from $71m to $115m, an increase of 61%. Similarly, total contraception R&D rises sharply to $109m from $64m, when contraception-related MPT R&D is included (up 71%). In fact, contraception-related MPT R&D represents 41% of all combined contraception R&D. Besides much smaller overall funding portfolios to HIV/AIDS, the greater impact of MPT funding on overall funding levels for STIs and contraception R&D is predominantly driven by considerable industry-led investments into on-demand MPTs with dual protective action against STIs and pregnancy ($37m, 78% of all MPT funding). This, along with the advanced stage of these candidates in the MPT pipeline, translate to a substantial impact on the overall picture for STI and contraception R&D.

A few funders – US NIH, Gates Foundation and industry – dominate SRH R&D investment, with some interesting industry funder profiles

The top three funders of all SRH issues combined are the US NIH ($994m), industry ($273m) and the Gates Foundation ($185m). The US NIH ranked in the top three funders of R&D for every single SRH issue in this report except PPH. It was also a top funder of platform technology R&D. The weight of investment by the US public sector is unsurprising given the US NIH's vast portfolio of biomedical R&D. The Gates Foundation featured as a top funder across several SRH issues, including contraception, HIV/AIDS, HPV and HPV-related cervical cancer, pre-eclampsia and platform technologies. These investments are similarly driven by focused strategic priorities in contraception; HIV/AIDS; and maternal, newborn and child health. While both invaluable contributors to SRH R&D, the proportion of their investment – together accounting for 68% of all SRH R&D reported here – signals a heavy reliance in the sector on the contributions of just a couple of organisations.

Industry funding to SRH R&D was generally also well represented across issues, with industry – at least when aggregated – featuring as one of the top funders in all SRH issues except pre-eclampsia or platform technology R&D. Given industry's historically limited interest in R&D for many SRH issues – particularly contraception – this ranking is notable. A number of industry organisations and pharmaceutical companies featured in this report – while still classified as multinational companies (MNCs) or small pharmaceutical and biotechnology firms (SMEs) – are however driven by explicitly women-focused, socially-oriented objectives, intentionally accepting probable lower profits for greater social returns. Acknowledging a limited dataset, the trend is nonetheless interesting.

As a baseline effort, there are acknowledged gaps in survey participation and data

Data collection for this project utilised the well-established systems, processes and relationships of Policy Cures Research's broader G-FINDER project, leveraging over 12 years of experience in collecting and analysing global health R&D data. We acknowledge, however, that re-establishing the G-FINDER SRH project after a five-year hiatus has likely left holes in participation and ultimately the data presented here. In addition, G-FINDER has strict protocols for handling data, especially to avoid double counting. This means that there are instances where some organisations' data – though relevant – was necessarily omitted, for example, because of misalignments between funder disbursement and recipient expenditure years.

Nonetheless, the data reported here offer an insightful baseline effort at capturing the global picture of LMIC-appropriate SRH product R&D. As the project establishes itself and moves into a yearly data collection cycle similar to the G-FINDER neglected disease and emerging infectious disease survey, our intention is to grow and nurture participation across sectors. We also intend to offer a more comprehensive evidence-base and analysis, including consecutive, year-on-year funding trends across the global SRH R&D landscape.

Table 1. Sexual and reproductive health issue and product R&D funding 2018 (US$ millions)

Health issue or product	Basic research	Drugs (including microbicides)	Microbicides*	Vaccines (preventive)	Vaccines (therapeutic)	Diagnostics	Devices & combinations	Unspecified	Total
Contraception		30.52					19.45	13.89	**63.87**
On-demand		1.41					2.25	-	**3.67**
Short-acting		18.55					3.98	1.10	**23.64**
Long-acting reversible (LARC)		5.18					12.59	-	**17.76**
Permanent		-					-	3.59	**3.59**
Multiple or unspecified duration		5.38					0.63	9.20	**15.21**
HIV/AIDS	204.51	214.46	132.35	777.67	17.50	68.23		27.72	**1,442.44**
Sexually transmitted infections (STIs)	21.39	10.74		16.73	0.15	19.41		2.92	**71.33**
Syphilis	0.77	1.38		0.60	-			-	**2.76**
Gonorrhoea	6.19	7.22		4.82	-	6.23		-	**24.47**
Chlamydia	3.02			2.22	0.01	2.61		-	**7.86**
Herpes simplex virus 2 (HSV-2)	1.79	1.06		2.99	6.20	0.38		-	**12.42**
Human T-lymphotropic virus 1 (HTLV-1)	5.13	-		-	0.02	-		-	**5.14**
Hepatitis B	1.91	0.57			-	0.76		2.48	**5.73**
Multiple STIs	2.46	0.19		-	-	9.13		0.44	**12.22**
Other STIs	0.12	0.31		-	-	0.30		-	**0.73**
Multipurpose prevention technologies (MPTs)		37.64					7.78	2.29	**47.71**
Human papillomavirus (HPV) & HPV-related cervical cancer	6.89	-		31.08	4.24	7.48		2.25	**51.95**
Post-partum haemorrhage (PPH)	-	3.18					1.22	-	**4.39**
Pre-eclampsia	9.97	0.08				2.17		-	**12.21**
Platform technologies									**23.41**
Adjuvants & immunomodulators									**12.75**
Delivery technologies									**10.66**
Core funding of an SRH R&D organisation									**19.55**
Other R&D									**1.06**
Total R&D funding									**1,737.93**

- No reported funding
Category not included in G-FINDER
* Microbicides for HIV/AIDS were captured as a standalone category

INTRODUCTION

Sexual and reproductive health: a spectrum of needs and issues

Sexual and reproductive health (SRH) is a broad concept that covers the sexual and reproductive processes, functions and systems of people at all stages of life. It encompasses a spectrum of needs and issues that span the period from adolescence (including menarche), through the reproductive years (including pre-pregnancy, pregnancy and birth), and into mature or post-reproductive life.

Attaining good sexual and reproductive health requires that people have access to a comprehensive range of information, products and services. Under its broadest definition, this includes the prevention and treatment of sexually transmitted infections (STIs), including HIV/AIDS, and other genitourinary diseases; affordable and acceptable methods of contraception; effective services for healthy pregnancy and birth; prevention and management of reproductive cancers; safe abortion and post-abortion care; safe and hygienic management of menstruation; and management of sub-fertility, infertility and other fertility issues. It also extends to concepts of care and services related to sexuality and sexual and/or gender identity, sexual dysfunction, and gender-based and intimate partner violence.[1] The rights of people to access these services underpins all global frameworks related to SRH programming.[2]

Despite being enshrined in numerous international and national agreements, including twice within the 2030 Agenda for Sustainable Development,[3] progress has been slow globally in meeting the SRH needs of people, particularly those in low- and middle-income countries (LMICs).[1] In many instances, this is due to weak health systems, political and cultural opposition, or limited access to information. In others however, research and development (R&D) gaps remain a problem. The purpose of this report is to capture investments in **SRH R&D for products or technologies that are relevant to, fill gaps and are appropriate for people in LMIC contexts,** where the need is greatest.

Background to the G-FINDER project

This report is part of Policy Cures Research's flagship project G-FINDER. The G-FINDER project tracks annual investment into R&D for new products and technologies that are designed to address persistent global health challenges disproportionately affecting people in LMICs. Through comprehensive data and analysis, G-FINDER provides policy-makers, donors, researchers and industry with the information they need to make optimal R&D policy and funding decisions, helping to improve accountability, transparency and performance within the global health R&D landscape.

The G-FINDER project has collected and reported data on R&D funding for neglected diseases annually since 2007, and for emerging infectious diseases since 2014. But this is just the second time in its history that the G-FINDER project has collected data on global funding for reproductive health R&D. The previous one-off report was published in 2014, looking at global funding in FY2013. This report marks the five year review of that previous effort, describing the landscape of SRH R&D investment in FY2018. While building on the foundations of the previous report, the five-year interval meant that a re-examination of the review's scope was warranted.

In line with the purpose of the G-FINDER project, **this report is not intended to capture investment in the entire global spectrum of SRH R&D.** It is focused specifically on the SRH needs of people in LMIC contexts that are not being met because of a lack of appropriate products or technologies, or the absence of fundamental scientific knowledge. The report scope and the process through which it was defined are outlined below.

G-FINDER – the gold standard in tracking global health R&D investment

G-FINDER is recognised as the gold standard in tracking and reporting global funding for neglected disease R&D. The World Health Organization (WHO) Expert Panel's Global Strategy and Plan of Action on Public Health, Innovation and Intellectual Property (GSPOA) includes a recommendation that Member States commit to providing information to G-FINDER, and G-FINDER has been included– as both a primary source and an indicator – in agenda items presented at the WHO Executive Board meeting and World Health Assembly. G-FINDER is the primary source of neglected disease R&D funding data for both the WHO Global Observatory on Health R&D and Donor Tracker, and helps support the work of many other groups in the broader global health community.

SRH survey scope

Defining LMIC-relevant SRH R&D: from 'LMIC-targeted' to 'LMIC-appropriate'

For some SRH R&D investments, it is clear that the product or technology is both intended and suitable only for high-income country (HIC) markets. For example, innovations in diagnostics for human papillomavirus (HPV) that simplify testing, improve sensitivity and expand oncogenic strain recognition but require deep cold storage and high-tech laboratories to operate would only be feasible in high-resource HIC settings, where established HPV genetic testing facilities and associated public health programs exist. R&D investments like these are excluded from this report since they are driven by, targeted at and currently useful only to people in HICs.

On the other hand, some SRH R&D investments are specifically aimed at LMIC needs. These target people living in LMICs who suffer disproportionately from unintended pregnancies, death and disability during pregnancy and childbirth, STIs, and other SRH issues. This includes research funding aimed at developing new or adapted products that are heat stable or 'low-tech', for example inhaled rather than intravenous oxytocin for the treatment of post-partum haemorrhage (PPH); or at establishing or improving the safety and efficacy of products in LMIC populations. These investments clearly target the needs of people in LMICs and are therefore included in this report.

However, while people in HICs and LMICs can and do have different SRH needs, there are also SRH needs that span low-, middle- and high-income settings. For example, women in HICs have similar desires to women in LMICs for a broad choice of contraceptives, including those that are affordable, safe, easy-to-use and have minimal side effects. In cases like these with obvious dual markets, it is not easy to disentangle R&D that may *benefit* populations in LMICs from R&D that is *explicitly designed* for populations in LMICs. Indeed, some SRH products developed initially with HIC markets in mind or in the context of a HIC market may also be applicable to people in LMICs. In these cases, it can also be difficult to determine if an investment is targeted to the needs of LMIC populations, or how LMIC-targeted it may be.

To help navigate these complexities and define our survey scope, we sought expert advice from across the SRH sector through a multi-stage process. This started with an initial, broad stakeholder consultation which sought input from a range of the world's leading SRH organisations. Participants included major donors and investors, non-government organisations (NGOs), peak bodies and coalitions, and research and innovation organisations (see Annexe 3). An Expert Advisory Group (EAG) comprising 23 global experts in SRH (see Annexe 2) was then convened to refine our scope definition through several rounds of consultation.

Both groups were asked whether the report should look broadly and include data on investment in 'shared areas', or should try to distinguish – and exclude – any HIC targeted investment, regardless of applicability. The outcome was a decision in favour of the former – to present the broadest picture of SRH R&D possible while still retaining a focus on LMIC needs. In practice, this translated into a re-orientation of focus: away from 'LMIC-targeted' R&D and towards 'LMIC-appropriate' R&D.

To determine if an R&D investment was therefore in scope or not, this report required all investments – regardless of intended market – to answer yes to an overarching filter:

- Is this product appropriate to and suitable for LMIC contexts?

Examples of 'LMIC-appropriate' products include (but are not limited to) those that are heat stable, easy-to-use, or do not require a skilled professional to administer them. Although cost is acknowledged as a barrier to access for many health products, it was not used as a criterion to determine LMIC-appropriate R&D.

Identifying SRH R&D gaps in LMIC contexts

The purpose of this report is to help understand and analyse the global landscape of investment in SRH R&D for the development of products that will address the unmet needs of people and populations in LMICs. The process of identifying these needs and the diseases, health areas and products that were included in the scope of the report involved an in-depth consultation with our EAG. Members were asked to review a range of SRH issues, and filter them based on two criteria:

- Is the SRH issue a significant health issue affecting people in LMICs?
- Is there a need for new products? (i.e. there is no existing product, or improved or additional products are needed to meet the needs of people in LMICs)

This process resulted in the list of SRH issues, products and technologies presented in Table 2. When deciding which investments to ultimately include in the report, only those products that were able to satisfy the overarching (final) filter of 'LMIC-appropriateness' described above were included.

Although basic research and all relevant product types – drugs (including microbicides), preventive vaccines, therapeutic vaccines, diagnostics, and devices & combinations – were considered for inclusion in relation to every SRH issue, not all were included in the scope for all issues, and some were included only with restrictions. For example, syphilis diagnostics were excluded, because cheap, easy-to-use, point-of-care diagnostics already exist and are appropriate for use in low- and middle-income settings. On the other hand, syphilis drugs were included, but only those that target latent, tertiary, maternal or congenital syphilis, since drugs to treat early stage syphilis are effective and readily available.

Platform technologies (adjuvants & immunomodulators, and delivery technologies for drugs or vaccines) were also included in the scope. Platform technologies can potentially be applied to a range of health issues, diseases and products, but have not yet been attached to a specific product for a specific issue or disease. Core funding disbursed to SRH R&D organisations was also included.

A comprehensive explanation of all inclusions, exclusions and restrictions is outlined in the detailed G-FINDER SRH R&D scope document, which is available online at **www.policycuresresearch.org/g-finder**.

Table 2. G-FINDER sexual and reproductive health issues, products, and technologies

Health issue		Basic research	Drugs (including microbicides)	Microbicides*	Vaccines (preventive)	Vaccines (therapeutic)	Diagnostics	Devices & combinations
Contraception	On-demand	-	✓	-	-	-	-	✓
	Short-acting	-	✓	-	-	-	-	✓
	Long-acting reversible (LARC)	-	✓	-	-	-	-	✓
	Permanent	-	✓	-	-	-	-	✓
	Multiple or unspecified duration	-	✓	-	-	-	-	✓
HIV/AIDS		Restricted	Restricted	✓	✓	Restricted	✓	-
Sexually transmitted infections (STIs)	Syphilis	Restricted	Restricted	-	✓	✓	-	-
	Gonorrhoea	Restricted	Restricted	-	✓	✓	✓	-
	Chlamydia	Restricted	-	-	✓	✓	✓	-
	Herpes simplex virus 2 (HSV-2)	Restricted	✓	-	✓	✓	✓	-
	Human T-lymphotropic virus 1 (HTLV-1)	✓	✓	-	✓	✓	✓	-
	Hepatitis B	Restricted	Restricted	-	-	Restricted	✓	-
	Multiple STIs	Restricted	Restricted	-	✓	✓	✓	-
	Other STIs	Restricted	✓	-	✓	✓	✓	-
Multipurpose prevention technologies (MPTs)		-	✓	-	-	-	-	✓
Human papillomavirus (HPV) & HPV-related cervical cancer		Restricted	Restricted	-	Restricted	Restricted	✓	-
Post-partum haemorrhage (PPH)		-	✓	-	-	-	-	Restricted
Pre-eclampsia		Restricted	Restricted	-	-	-	✓	-

Non-issue-specific funding			
Platform technologies		**Core funding of an SRH R&D organisation**	**Other R&D**
Adjuvants and immunomodulators	Delivery technologies		
✓	✓	✓	✓

✓ denotes a category where a health issue or product is included in the survey
Restricted denotes a category where only some investments are eligible as defined in the G-FINDER SRH R&D scope document
* Microbicides for HIV/AIDS were captured as a standalone category

Handling of cross-over issues

In addition to being STIs, HIV/AIDS and hepatitis B are defined by G-FINDER as neglected diseases, and as such feature in both this report and the G-FINDER neglected disease report. As the two reports have slightly different scopes, there are some differences in the handling and interpretation of data between them, as outlined below:

- **Biologics vs therapeutic vaccines.** The G-FINDER neglected disease survey has expanded the 'vaccines (therapeutic)' product category to capture other biologics, which were previously variously included under therapeutic vaccines, drugs and preventive vaccines depending on the disease scope. As this report had not yet adopted that same expansion, HIV/AIDS and hepatitis B biologic grants were manually re-allocated to the appropriate product category headings in the SRH dataset.

- **Allocation of microbicides.** In the neglected disease survey, only microbicides for HIV/AIDS were captured and presented as a standalone category. Within the SRH survey, microbicides were captured under the 'drugs' product category, and for all relevant health areas, specifically STIs (including HPV and HPV-related cervical cancer) and multipurpose prevention technologies (MPTs). The standalone category for HIV/AIDS microbicides has been preserved in the SRH report, however HIV/AIDS microbicide grants that addressed HIV/AIDS in conjunction with another STI or alongside a contraceptive were manually reallocated to MPTs in the SRH dataset.
- **Grants addressing multiple STIs.** HIV/AIDS and hepatitis B grants in the neglected disease survey that addressed more than one STI were manually reallocated as follows: to MPT 'drugs' if preventive drugs such as microbicides (as described above); to multiple STI 'drugs' if therapeutic drugs; and to multiple STIs 'basic research' if basic research. Because HIV/AIDS and hepatitis B basic research categories have different restrictions in the neglected disease survey than the multiple STI basic research category in the SRH survey does, out of scope grants were also reviewed and reallocated as necessary.

Some investments included in both surveys targeted both neglected diseases and SRH issues. These included platform technologies, where the product could feasibly be used for both SRH or neglected diseases, such as general drug or vaccine delivery platforms.

- **Platform technologies.** For the SRH dataset, platform technology investments that were both geared towards SRH issues *and* more broadly applicable to both surveys were included.

There are also some investments within the SRH survey that are applicable to more than one SRH issue. This specifically concerns MPTs, where separate avenues of research could also logically be considered as separate investments in contraception, STI and HIV/AIDS R&D.

- **MPT investments.** Where R&D for different indications – for example protection from pregnancy and HIV – is being pursued separately, the entirety of R&D investments in products where an MPT is the intended outcome was included in the MPT analysis only. In this report, these figures appear in the MPT chapter only, unless specifically noted.

Please refer to the G-FINDER SRH and G-FINDER neglected disease 2019 survey R&D scope documents for scope detail, available at **www.policycuresresearch.org/g-finder**.

Types of research

G-FINDER tracks investment in R&D covering the spectrum from basic research to post-registration studies of new products. The main categories of research included are listed below, grouped under the two overarching categories that we refer to in the body of the report:

- 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 and devices & combinations

A detailed explanation of what types of R&D activities were included in each of these categories, as well as specific inclusions and exclusions related to the G-FINDER scope, is provided in the online G-FINDER SRH R&D scope document.

As stated, the purpose of this report – as part of the G-FINDER project – is to track and analyse global investment in R&D of new products and technologies to address SRH issues disproportionately affecting people in LMICs. **The report does not, and is not intended to, capture investment in the entire spectrum of SRH research.** Many research activities that are extremely important for global health are excluded because they are not related to the development of new tools; this includes health systems and operations/implementation research (for example, research into health systems or policy issues, or research into the programmatic delivery of non-product interventions, or existing health technologies), and sociological, behavioural and epidemiological research not related to the development of new health technologies.

General therapies such as painkillers or nutritional supplements were also excluded, as these investments cannot be ring-fenced to SRH. Investment that is not research-related was similarly excluded. Although we recognise the vital importance of activities such as health program delivery, advocacy, routine disease surveillance programs, community education and general capacity building in addressing SRH issues, investment in these activities falls outside the scope of this report.

Comparability of reports

As described, to define the scope for the G-FINDER SRH survey conducted in 2019, an extensive expert consultation was undertaken to identify the list of issues and products included in Table 2, and to agree on the overarching 'LMIC-appropriateness' criterion. This scope differs from the previous 2014 G-FINDER reproductive health report, where fewer SRH issues with differing product categories were included, and where *only* 'LMIC-targeted' investments were considered in scope. These differences mean that funding levels between the two reports can't meaningfully be compared, and thus data from the 2014 report is not included here.

More information on the 2014 report can be found online at **www.policycuresresearch.org/analysis**.

SRH survey timeframe and participation

Timeframe

The G-FINDER SRH survey was open initially for a six-week period from May to June 2019 alongside the neglected disease and emerging infectious disease survey (through which HIV/AIDS and hepatitis B data was collected). This was followed by a period of intensive follow-up and support for key participants, resulting in the extension of the survey period to November 2019 to ensure maximum participation. A total of 1,297 entries excluding HIV/AIDS and hepatitis B grants, and 3,641 entries including HIV/AIDS and hepatitis B grants were recorded in the SRH database for financial year 2018.

For the full survey methodology, see Annexe 1.

Participants

G-FINDER is primarily focused on funding, and therefore the emphasis is on surveying funding organisations. A total of 129 organisations participated in the G-FINDER survey in 2019, reporting on behalf of 135 organisations. Sixty-eight of the 129 direct participants were funders. A range of funding intermediaries, product development partnerships (PDPs), and researchers and developers who received funding also participated. Data from funding recipients was used to collect data on investments from funders who did not participate in the survey; to better understand how and where R&D investments were made; to track funding flows through the system; to prevent double counting; and to verify reported data.

Participants originated from 27 countries. Organisations included:

- Public, private and philanthropic funders from 18 HICs
- The European Commission (EC)
- Public funders from 6 middle-income countries (MICs) (Brazil, China, Colombia, India, South Africa and Thailand)
- Private sector funders from 9 countries, including 1 MIC (India)
- Academic organisations from 1 MIC (Thailand)

For a list of participants in the survey, see Annexe 4.

SUPPLEMENTARY MATERIALS

A detailed methodology is available at:
https://www.policycuresresearch.org/analysis

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

CONTRACEPTION

People everywhere have the right to access safe, effective contraception that fits their lifestyle, needs and preferences. Despite significant improvements in availability of modern methods, the greatest gaps remain in LMICs, where an estimated 218 million women of reproductive age still have an unmet need for modern contraception, contributing to 111 million unintended pregnancies each year. Fully meeting this need would avert 76 million unintended pregnancies, 46 million induced abortions – approximately half of which are unsafe[4] – and 70,000 maternal deaths annually.[5]

There are many reasons people in LMICs may not use contraception, only some of which relate to product gaps. Lack of awareness of modern methods; opposition to use; and an inability to source or afford contraception can all contribute.[6] In other cases, an R&D gap is the problem. Real or perceived side-effects, health risks, or inconvenience of available methods are the most common reasons cited by women for not using contraception, despite wanting to space or limit pregnancy.[6]

Currently available modern contraceptive methods are limited to options that have changed little over decades, are largely hormonal, and only a few of which are user-controlled. Short-acting methods (monthly pills, vaginal rings, and three-monthly DMPA injectables) offer effective short-term protection from pregnancy, and for pills and rings, are user-controlled. However, all are hormonal, require regular repeat actions to be effective, and some (rings) require cold-storage. In contrast, long-acting reversible methods of contraception (LARCs) offer long-term protection from pregnancy – up to five years for subcutaneous hormonal implants and levonorgestrel-releasing intra-uterine systems (LNG-IUS), and 10 years for copper intra-uterine devices (IUDs) – with minimal user interaction. However, they require skilled health workers to insert and remove, and can have untenable side-effects, particularly heavy menstrual bleeding associated with copper IUDs – currently the only highly effective reversible non-hormonal contraceptive available besides barrier methods. Permanent contraception requires skilled, surgical intervention, while on-demand methods are limited to condoms, diaphragms, or emergency contraception. For men, there are just two modern contraceptive options: condoms and vasectomy.

Several new contraceptives have recently become available or are in late-stage development, including Medicines360's Liletta hormonal IUS (Avibela in LMICs), now with a six-year indication and in ongoing Phase III trials for use up to 10 years;[7] Sayana Press, the three month, low-dose DMPA-SC self-injectable, now in implementation studies to support introduction;[8] and Annovera, the first heat-stable vaginal ring with efficacy up to a year, approved by the US FDA in 2018.[9] Although a smaller area of research, R&D for non-surgical permanent contraception for women exists, with some products in clinical trials, such as Femasys' FemBloc Permanent Contraceptive System, a temporary biopolymer that causes scarring and permanent closure of fallopian tubes.[10]

Male contraceptive R&D focuses on novel hormonal combinations to block sperm production and non-hormonal approaches to interrupt sperm production, transport, motility, or fertilisation. Some promising candidates include Contraline's vas-occlusion product Adam, a polymer hydrogel injected into the vas deferens, with clinical trials anticipated for 2020,[11] and the US NIH/NICHD and Population Council's Nestorone and Testosterone (NES/T) gel, a daily transdermal gel in Phase II clinical trials.[12]

$63.9
MILLION
TOTAL SPEND ON LMIC-APPLICABLE **CONTRACEPTION** R&D IN 2018

BASIC RESEARCH	OUT OF SCOPE
DRUGS	IN SCOPE
VACCINES (PREVENTIVE)	OUT OF SCOPE
VACCINES (THERAPEUTIC)	OUT OF SCOPE
DIAGNOSTICS	OUT OF SCOPE
DEVICES & COMBINATIONS	IN SCOPE

Exclusively covers research aimed at developing new health technologies – see the Introduction for details

Global funding for contraception product development in 2018 was $64m.

More than a third ($24m, 37%) of all contraception R&D funding was directed at developing short-acting contraception. This was followed by investments in long-acting reversible contraception (LARCs, $18m, 28%) and contraception with multiple or unspecified durations ($15m, 24%). Remaining funding went to on-demand methods ($3.7m, 5.7%), and to permanent methods ($3.6m, 5.6%).

Table 3. Contraception R&D funding by product type 2018 (US$ millions)

Duration of action	Drugs	Devices & combinations	Unspecified	Total	% of total
On-demand	1.4	2.3	-	3.7	5.7
Short-acting	19	4.0	1.1	24	37
Long-acting reversible (LARC)	5.2	13	-	18	28
Permanent	-	-	3.6	3.6	5.6
Multiple or unspecified duration	5.4	0.6	9.2	15	24
Total	31	19	14	64	100

- No reported funding

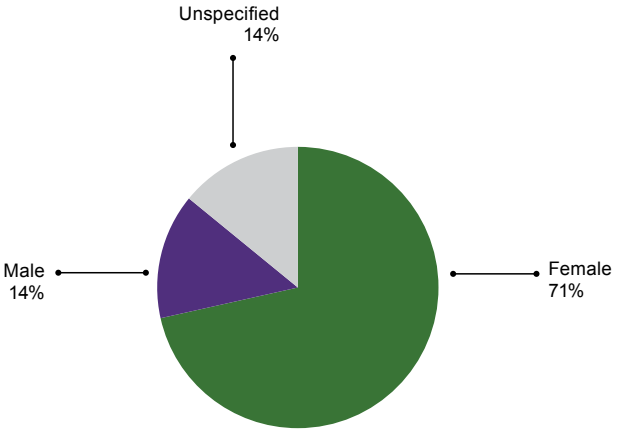
Just under half of all funding for contraception R&D in 2018 went to the development of contraceptive drugs ($31m, 48%), with devices & combination products receiving $19m (30%). A further $14m (22%) went to unspecified contraceptive product R&D.

Drug R&D was concentrated in developing new short-acting contraceptives ($19m, 61%), reflecting an evolving pipeline of research into novel short-term contraceptive drugs that are effective for longer, more convenient and easily user-controlled, and less or non-hormonal. The two largest single investments in short-acting contraception drug R&D – both funded by the Gates Foundation – were for the industry-led development of a once-monthly oral contraceptive pill ($4.2m, 23% of short-term contraception drug R&D), and a 6-month injectable ($2.6m, 14%) that would offer a longer duration of protection than the current 3-monthly DMPA injectable. Only 4.6% ($1.4m) of contraception drug R&D was invested in on-demand methods. However, when the contraceptive R&D components of novel on-demand MPT drugs with dual protection from pregnancy and STIs are included, this figure jumps to $27m (see discussion).

In contrast, device & combination product R&D was largely invested in LARCs ($13m, 65% of devices & combinations funding), reflecting the technical need for delivery devices that have stable, sustained release of contraceptive drugs for long-term pregnancy prevention. Almost two-thirds ($7.5m, 60%) of this spending came from industry, largely invested in hormone-releasing IUDs with extended durations of action. There was also a sizeable investment by Population Council in their one-year contraceptive vaginal ring Annovera ($2.5m, 20% of LARC devices & combination funding) supporting the submission of a new drug application to the FDA. More modest investments were reported in contraceptive device & combination product R&D for short-acting contraception ($4.0m, 20%), with over a third of this ($1.3m, 34%) from USAID to FHI-360 for part of the Envision FP project investigating the efficacy of microneedle array delivery of nestorone, etonogestrel or levonorgestrel. Smaller investments also went to device & combination product R&D for on-demand contraception ($2.3m, 12%), all of which went to efforts towards improved or new barrier methods, with user-experience in mind.

Over a quarter of unspecified product R&D went to permanent contraception ($3.6m, 26%), representing the entirety of reported permanent contraceptive R&D: a single grant from the Gates Foundation to the Permanent Contraception Research Center at Oregon Health and Science University for research into novel non-surgical permanent contraceptive options.

Figure 1. Contraception R&D funding by product end-user 2018



Nearly three-quarters ($46m, 71%) of all reported funding for contraception R&D in 2018 was directed to the development of products intended for female end-users[1], reflecting a research agenda historically and still largely dominated by products for women and girls. Remaining funding was balanced between products intended for male end-users ($9.2m, 14%) – a growing field of study into novel contraceptive options beyond currently available condoms and vasectomy – and products without a clear or specified intended user ($9.0m, 14%). More than three-quarters of all funding for male contraceptive R&D was provided by the US NIH ($7.1m, 77%) – far outstripping all other funders – almost half ($3.4m) of which went to the University of Minnesota for R&D into novel targets for male contraception.

R&D funding for female-targeted contraception was divided equally between short-acting methods ($18m, 40%) and LARCs ($18m, 39%), with more modest investments in permanent contraception ($3.6m, 7.9%) and on demand contraception ($1.0m, 2.2%). In contrast, funding for male-targeted contraception was primarily for short-acting ($5.2m, 57%) or on-demand methods ($2.4m, 26%), with only $0.1m (1.6%) invested in LARCs and zero reported investment in permanent contraception R&D. These overall patterns, while incomplete, largely reflect the generalised differences in needs and preferences between female and male end-users that inform the current contraception market.

Clinical development & post-registration studies received the largest share ($27m, 42%) of contraception R&D funding, with a further $17m (26%) going to early-stage research. Another $20m (31%) did not have a specified product or R&D stage. The majority ($17m, 63%) of total clinical development & post-registration studies funding went to LARCs, representing 96% of all LARC R&D and reflecting the advanced state of the LARC pipeline. In contrast, more than half ($12m, 52%) of short-term and three-quarters ($2.8m, 77%) of on-demand product R&D was in early-stage research. While over half of all contraception R&D funding intended for female end-users was for clinical development & post-registration studies ($25m, 54%), three-quarters of funding for products for male end-users was for early-stage research ($6.9m, 75%), reflecting the nascent stage of male contraception development.

[1] We recognise that sex and gender identity are complex issues, and respect the rights of people to align and describe themselves in terms beyond binary notions of male and female. We refer to 'male' and 'female' contraception in this report for brevity only, with no disrespect intended.

Table 4. Top funders of contraception R&D 2018

Funder	US$ (millions)	% of total
Gates Foundation	24	37
US NIH	21	33
Aggregate industry	8.6	14
USAID	5.2	8.1
Population Council	3.3	5.2
Male Contraceptive Initiative (MCI)	0.5	0.8
South African MRC	0.4	0.6
Parsemus Foundation	0.3	0.5
Tara Health Foundation	0.2	0.3
Research Council of Norway	0.2	0.2
Reproductive Health Investors Alliance	0.1	0.2
Chinese NSFC	<0.1	0.2
Subtotal of top 12	64	99.8
Total	64	100

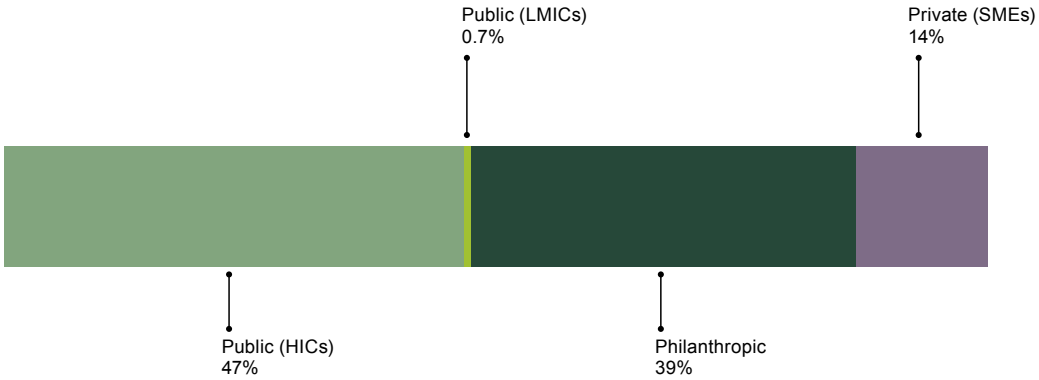
Table 5. Top recipients of contraception R&D funding 2018

Recipient	US$ (millions)	% of total
Aggregate industry	26	40
FHI 360	8.6	13
Oregon Health and Science University	4.2	6.6
University of Minnesota	3.4	5.4
Population Council	3.3	5.2
Boston University	2.4	3.8
WomanCare Global (WCG)	1.7	2.6
SRI International	1.4	2.2
Baylor College of Medicine	1.2	1.9
Northwestern University	1.1	1.7
CONRAD	1.0	1.5
Cardiff University	0.6	0.9
Subtotal of top 12	54	85
Total	64	100

Recipient organisation did not participate in the survey for this year. Any funds received listed are based on data reported by funders so may be incomplete.

There were 14 reported funders of contraception R&D in 2018, with investment highly concentrated in the top two: Gates Foundation ($24m, 37%) and the US NIH ($21m, 33%). Industry represented the third largest funder of contraception R&D overall ($8.6m, 14%). However, if industry investment in the contraceptive R&D components of novel on-demand MPTs are also considered, this figure reaches $34m. This is significant given the general lack of interest in contraception R&D by industry, in part due to perceived low return on investment, regulatory hurdles and a litigious past. Interestingly, the shift in this data is driven largely by socially-oriented pharmaceutical companies, offering insight into an evolving landscape of industry-led contraceptive R&D (see discussion). Apart from sizeable investments from USAID ($5.2m, 8.1%) and Population Council ($3.3m, 5.2%), all other funders invested <$1.0m each.

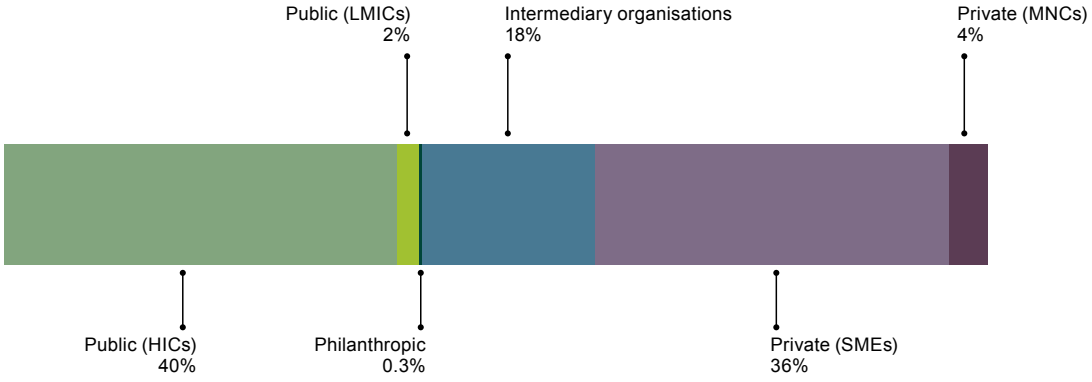
Figure 2. Contraception R&D funding by funder sector 2018



Almost half of all reported funding for contraception R&D in 2018 came from the public sector ($30m, 47%). The philanthropic sector contributed $25m (39%), and industry $8.6m (14%), solely from SMEs. Almost all public sector funding came from HICs ($30m, 98%), with LMIC governments providing the remaining $0.5m (1.6%). Public sector investment was also very concentrated, with funding reported by only four countries – the US ($30m, 98%), South Africa ($0.4m, 1.2%), Norway ($0.2m, 0.5%), and China ($0.1m, 0.3%) – plus the EU ($<0.1m, 0.2%).

There were 70 reported recipients of funding for contraception R&D in 2018, including 20 pharmaceutical or biotechnology companies. These 20 companies alone accounting for 40% ($26m). FHI 360 was the largest single recipient of funding ($8.6m, 13%). Funding to FHI 360 in 2018 included the Gates Foundation-funded Contraceptive Technology Innovation (CTI) Initiative, and the USAID-funded Envision FP project, both multi-partner research projects managed by FHI-360 (with a range of additional partners) for the development of new contraceptive technologies. Oregon Health and Science University was the third largest recipient – and largest academic institute recipient – of contraception R&D funding, with the vast majority of their funding ($3.6m, 91%) received as a single grant from the Gates Foundation for R&D into novel, non-surgical permanent methods of contraception – the only investment in permanent methods of contraception reported in 2018.

Figure 3. Contraception R&D funding by recipient sector



Public ($27m, 42%) and private ($26m, 40%) sector organisations received near-equal funding for contraception R&D in 2018. A further $11m (18%) went to three intermediary organisations: FHI 360 ($8.6m, 76%), WomanCare Global ($1.7m, 15%) and CONRAD ($1.0m, 8.6%). The majority of public sector recipients were in HICs ($25m, 95%), with only $1.4m (5.4%) going to LMIC public sector recipients. The majority ($23m, 90%) of funding to industry was to SMEs, and the remainder to MNCs ($2.6m, 10%). Of total SME investment, just over one-third ($8.6m, 37%) was self-funded research, with the other two-thirds ($14m, 63%) from public sector governments and philanthropic funders. No self-funded MNC R&D for contraception was reported in 2018, with all $2.6m coming from external funders.

HIV/AIDS

HIV continues to be a major public health issue, with almost 40 million people living with the virus as of 2018, the majority in LMICs.[13] The virus attacks and destroys CD4 cells in the human immune system; without treatment, infected individuals become increasingly susceptible to other diseases, and eventually develop acquired immune deficiency syndrome (AIDS). People with AIDS often die from opportunistic infections like tuberculosis or cryptococcal meningitis, or cancers like Kaposi's sarcoma.

There is currently no vaccine against HIV, and the rapid mutation of the virus poses a significant challenge to development. To date no vaccine candidate has proved able to match even the 31% efficacy achieved in the 2009 RV144 Thai Phase III clinical trials.[14] There are currently two large HIV vaccine efficacy trials underway: HVTN 706, a global Phase III HIV vaccine efficacy trial of mosaic immunogens;[15] and HVTN 705, a Phase IIb trial of Janssen's prime-boost-based regimen.[16] A third vaccine trial – HVTN 702, a Phase IIb/III trial investigating a modified version of the RV144 vaccine regimen – was halted in early 2020 due to non-efficacy.[17] Several other candidates are currently in Phase I and II trials, including NIAID's broadly neutralising anti-HIV antibody (bNAb) candidate, VRC01, which is in Phase IIb.[18]

Therapeutic vaccines – including bNAb-based approaches, which are designed to control HIV infection by boosting the body's natural immunity – are also being investigated for immunotherapy, including VRC01LS/10-1074, a dual long-acting bNAb currently in Phase II.[19] Plasmid and viral vectored DNA vaccines are also among the therapeutic vaccine candidates currently in Phase I and II clinical trials.[20–22]

Despite advances in HIV therapeutics, R&D gaps for HIV drugs persist in LMICs, including paediatric formulations or long-acting injectable drugs for pre-exposure prophylaxis (PrEP), with promising progress underway. The Drugs for Neglected Diseases initiative (DND*i*) is developing Quadrimune – a '4-in-1' LPV/r-based taste-masked and heat-stable fixed-dose formulation designed specifically for children, which is currently under review by the FDA, with a Phase I/II trial ongoing in Uganda to generate evidence for worldwide scale-up.[23,24] One long-acting injectable PrEP candidate, cabotegravir, is also in Phase IIb/III and III trials, and has demonstrated high efficacy when administered every eight weeks, with the blinded part of the study subsequently stopped as a result of this success.[25] Following a Phase III trial, the long-acting injectable treatment regimen cabotegravir/rilpivirine was also granted approval by Health Canada in early 2020.[26] In addition, microbicides – preventive tools designed to block transmission of HIV through the vaginal or rectal mucosa – have shown promise. The International Partnership for Microbicides (IPM)'s monthly dapivirine ring has completed Phase III trials, and in July 2020 received a positive scientific opinion from the European Medicines Agency for use in women over 18 in LMICs.[27]

Current methods for early diagnosis are often not adapted to, or suitable for, developing countries, especially early infant diagnosis. There is progress towards robust, rapid point-of-care diagnostics, culminating in the recent WHO prequalification of several promising candidates. These include early infant diagnostic tests (Alere's q HIV-1/2 Detect and Cepheid's Xpert HIV-1 Qual Assay), an assay for viral load monitoring (Hologic's Aptima HIV-1 Quant Assay) and the first true point-of-care molecular test for resource limited settings (Abbott's m-PIMA HIV-1/2 VL).[28–30]

$1.4
BILLION
TOTAL SPEND ON LMIC-APPLICABLE **HIV/AIDS** R&D IN 2018

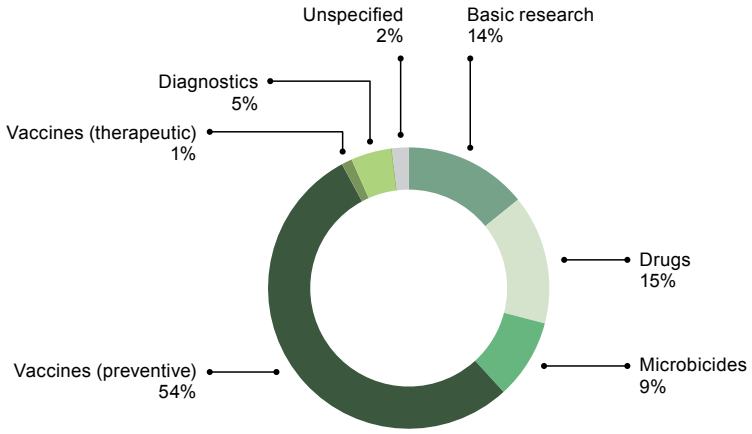
BASIC RESEARCH	RESTRICTED
DRUGS	RESTRICTED
MICROBICIDES	IN SCOPE
VACCINES (PREVENTIVE)	IN SCOPE
VACCINES (THERAPEUTIC)	RESTRICTED
DIAGNOSTICS	IN SCOPE
DEVICES & COMBINATIONS	OUT OF SCOPE

Exclusively covers research aimed at developing new health technologies – see the Introduction for details

Global funding for basic research and product development for HIV/AIDS in 2018 was $1,442m.

More than half of all reported HIV/AIDS R&D funding in 2018 was for preventive vaccines ($778m, 54%). The next largest investments were in drugs ($214m, 15%) and basic research ($205m, 14%), followed by microbicides ($132m, 9.2%), diagnostics ($68m, 4.7%), unspecified R&D ($28m, 1.9%), and therapeutic vaccines ($17m, 1.2%).

Figure 4. HIV/AIDS R&D funding by product type 2018^



^ HIV/AIDS R&D data was captured through the G-FINDER annual survey of neglected diseases. Due to slight differences in scope, some grants have been re-allocated. See introduction for details.

Nearly two-thirds of preventive vaccine investment came from the US NIH ($494m, 64%), which supports a diverse and growing range of activities across the HIV/AIDS research spectrum, from intramural discovery and pre-clinical R&D to late-stage clinical trials conducted by the HIV Vaccine Trials Network (HVTN). After the US NIH, the next largest contributions came from industry ($107m, 14% of preventive vaccine R&D funding) and the Gates Foundation ($104m, 13%), with the latter also providing funding to HVTN, as well as to the International AIDS Vaccine Initiative (IAVI). Collectively, the US NIH, industry and the Gates Foundation provided 91% ($705m) of all funding for preventive vaccine R&D in 2018.

Despite heavy restrictions for LMIC-relevance, drug R&D and basic research were still respectively the second and third largest overall investments in HIV/AIDS R&D. The largest share of drug R&D investment ($96m, 45%) came from industry, largely for the development of long-acting injectables, including the beginning of a Phase III clinical trial of a long-acting injectable treatment regimen, cabotegravir/rilpivirine. A further 39% ($83m) came from the US NIH, with $40m of this funding for the HIV Prevention Trials Network's long-acting pre-exposure prophylaxis (PrEP) clinical trials, most notably the start of a Phase III clinical trial of the long-acting injectable cabotegravir in sub-Saharan Africa. Another $23m went to the International Maternal Paediatric Adolescent AIDS Clinical Trials (IMPAACT) network, for further research into new drug formulations for HIV-infected pregnant women and children. The US NIH was also the largest funder of microbicide R&D, followed by USAID; collectively these two organisations provided 81% ($107m) of all funding for microbicide R&D in 2018.

Investment in diagnostic R&D was still significant despite accounting for less than 5% of overall funding for HIV/AIDS R&D and was also the only area for which the US NIH was not the largest funder. This was instead Unitaid ($41m, 59% of diagnostic funding), whose funding went to the Elizabeth Glaser Paediatrics AIDS Foundation, CHAI and UNICEF for the pilot implementation of early infant diagnostics. And while only 1.2% ($17m) of HIV/AIDS R&D funding went to therapeutic vaccines, this was still far and away the largest investment in therapeutic vaccine R&D of any STIs.

More than half of all HIV/AIDS R&D funding in 2018 went to clinical development & post-registration studies ($729m, 51%), with basic & early-stage research receiving $614m (43%). The remaining $99m (6.9%) was not allocated to a specific product or R&D stage. The weight of investment in clinical development reflects the advanced state of the HIV/AIDS R&D pipeline, characterised by several ongoing late-stage clinical trials for vaccines, drugs, and microbicides, as well as operational research for diagnostics. Clinical development & post-registration studies dominated funding across all product categories: preventive vaccines ($405m, 52%); drugs ($188m, 88%); microbicides ($73m, 55%); diagnostics ($48m, 71%); and therapeutic vaccines ($15m, 86%).

Table 6. Top funders of HIV/AIDS R&D 2018

Funder	US$ (millions)	% of total
US NIH	885	61
Aggregate industry	206	14
Gates Foundation	133	9.2
Unitaid	52	3.6
USAID	52	3.6
US DOD	21	1.4
EC	14	1.0
UK DFID	13	0.9
German BMBF	11	0.7
French ANRS	7.6	0.5
Inserm	6.4	0.4
Dutch DGIS	6.1	0.4
Subtotal of top 12	1,408	98
Total	1,442	100

Table 7. Top recipients of HIV/AIDS R&D funding 2018

Recipient	US$ (millions)	% of total
Aggregate industry	280	19
Fred Hutchinson Cancer Research Center	167	12
US NIH	142	9.8
IAVI	80	5.5
FHI 360	54	3.7
Duke University	52	3.6
US DOD	40	2.7
IPM	31	2.2
Scripps Research Institute	27	1.9
Magee-Womens Research Institute	27	1.9
Johns Hopkins University	22	1.5
Elizabeth Glaser Pediatric AIDS Foundation	19	1.3
Subtotal of top 12	940	65
Total	1,442	100

Recipient organisation did not participate in the survey for this year. Any funds received listed are based on data reported by funders so may be incomplete.

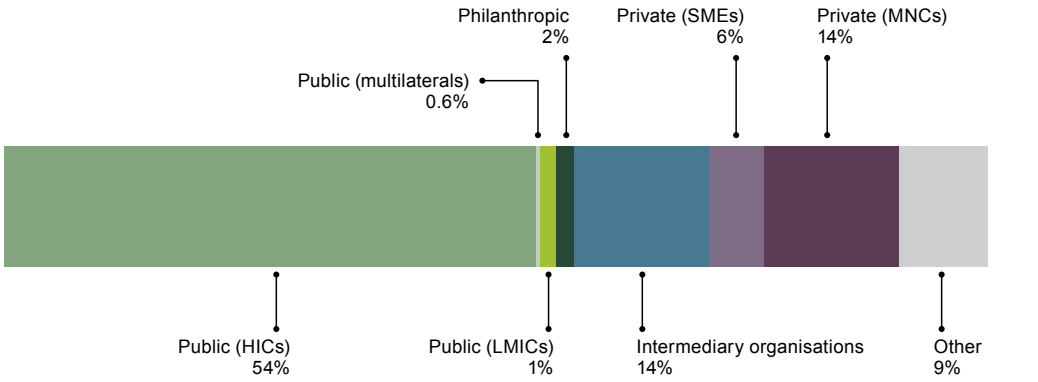
The top 12 funders of HIV/AIDS R&D in 2018 accounted for almost all global investment, with funding from the top three entities alone – the US NIH ($885m, 61%); industry ($206m, 14%), and Gates Foundation ($133m, 9.2%) – providing 85% of all funding. There was variation in product investment by the top funders. Disbursements from US NIH ($494m, 56%) and Gates Foundation ($104m, 78%) were dominated by preventive vaccine R&D, while industry invested near-equal shares in preventive vaccines ($107m, 52%) and drugs ($96m, 47%). A little over three-quarters ($41m, 77%) of all Unitaid funding was for early infant diagnostics.

Just over three-quarters of all funding came from the public sector ($1,099m, 76%), whose funding dwarfed that of both industry ($206m, 14%) and the philanthropic sector ($137m, 9.5%). The vast majority of public funding came from HICs ($1,038m, 94%), and specifically from the US government ($961m, 93% of all public funding). Of LMIC public funding, three-quarters ($5.5m, 76%) came from South Africa.

Figure 5. HIV/AIDS R&D funding by funder sector 2018

The top 12 recipients of HIV/AIDS R&D funding in 2018 received $940m (65%). Collectively, aggregate industry was the largest recipient, receiving close to a fifth ($280m, 19%) of all investment, although three-quarters ($205m) of this was self-funded R&D. The two largest individual recipients were the Fred Hutchinson Cancer Research Center ($167m, 12%), which houses the HVTN, and primarily received funding from the US NIH (as well as the Gates Foundation), and the US NIH itself via its own intramural investment ($142m, 9.8%).

Figure 6. HIV/AIDS R&D funding by recipient sector 2018



More than half of all investment was to public sector recipients ($808m, 56%). The vast majority were based in HICs ($778m, 96%), followed by $21m (2.6%) in LMICs, and $8.9m (1.1%) to UNICEF, the only multilateral to receive HIV/AIDS funding. Close to one-fifth ($280m, 19%) of funding was spent through industry, with $200m (71%) through MNCs and $80m (29%) through SMEs. Whereas the near-entirety of MNC R&D was self-funded ($199m, 99%), SMEs predominantly received disbursements from external funders ($73m, 92%), most notably the US NIH ($56m, 77%) and Gates Foundation ($13m, 17%). $196m (14%) of funding went to intermediary organisations, with the lion's share going to IAVI ($80m, 41%), followed by FHI 360 ($54m, 27%) and IPM ($31m, 16%). The Elizabeth Glaser Pediatric AIDS Foundation was the largest philanthropic recipient of HIV/AIDS funding in 2018.

SEXUALLY TRANSMITTED INFECTIONS

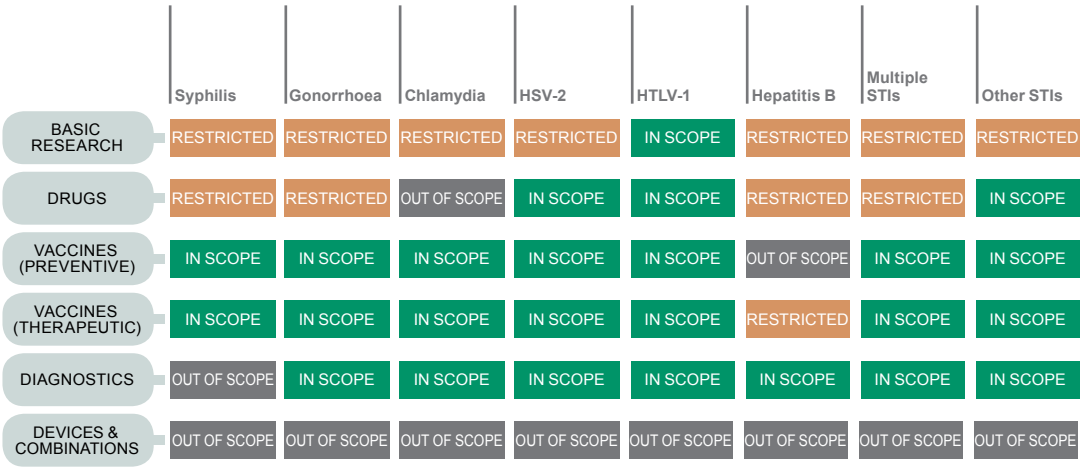
$71.3
MILLION
TOTAL SPEND ON LMIC-APPLICABLE **STI** R&D IN 2018

Sexually transmitted infections (STIs) are a major global health issue. Although primary infection can be asymptomatic or cause manageable symptoms, it can also produce acute illness, and result in serious conditions including increased HIV acquisition and transmission; pelvic inflammatory disease, ectopic pregnancy and infertility; and congenital deformities, stillbirth, neonatal illness and death.[31] In 2016, there were 376 million new cases of the four most common curable STIs: 156 million cases of trichomoniasis, 127 million of chlamydia, 87 million of gonorrhoea, and 6.3 million of syphilis – equating to transmission of more than 1 million STIs per day. Up to 10 million people worldwide are also infected with HTLV-1,[32] arguably the most potent oncovirus,[33] while more than 400 million people live with incurable HSV-2.[34] The burden of STI infections is greatest in LMICs.[35,36]

A significant challenge in STI control is accurate and timely diagnosis. For most STIs, current diagnostic testing involves laboratory-based platforms that are resource-intensive, skilled labour-dependent, and expensive, making them unsuitable for LMICs. Lengthy time for results can also lead to lost patient follow-up.[37] Point-of-care (POC) diagnostics have several benefits over traditional laboratory-based tests, including the ability for administration by lower cadre health workers, and facilitation of same-session testing, diagnosis, counselling, and treatment. Multiple syphilis POC tests meeting WHO assured criteria are available,[38] with one capable of distinguishing active and past infection.[39,40] For other STIs however, there is a need for low-cost, rapid, reliable, easy-to-use, POC diagnostics, particularly tests able to diagnose multiple STIs. The GeneXpert platform, for example, is capable of screening for and diagnosing trichomoniasis, chlamydia and gonorrhoea simultaneously, but it is costly, requires electricity and specific training, and has a run-time of 60-90 minutes.[41,42]

Rising antimicrobial resistance presents a serious challenge to effective drug treatment of many STIs, particularly gonorrhoea, a high-priority pathogen identified by WHO.[43,44] Two advanced candidates are in the pipeline for drug-resistant gonorrhoea: zoliflodacin[45] – being co-developed by the Global Antibiotic Research and Development Partnership (GARDP) – and gepotidacin,[46] both of which have shown good efficacy in Phase II trials, with Phase III trials ongoing; other candidates are in preclinical development, such as Debiopharm's candidate Debio 1453.[47] Diagnostics capable of identifying drug resistance without time- and labour-intensive traditional culture methods are also needed. Additionally, no novel syphilis drugs are in development, despite the need for drugs to treat latent, tertiary, maternal or congenital syphilis, and a growing threat of global benzathine penicillin shortage.[48]

Preventive and therapeutic vaccines for STIs are also sorely needed, with promising progress made since the development of the Global STI Vaccine Roadmap.[49] This is especially true for HSV-2, where – despite limited success with prophylactic candidates – there are multiple therapeutic candidates (many with prophylactic potential) in development, such as the live-attenuated candidate HSV529 in Phase I.[50] Efforts to map all proteins produced by gonorrhoea, chlamydia and syphilis have also opened up opportunities for identification of new vaccine candidates.[42] Preclinical work has progressed, including research into the cross-protective potential of meningococcal group B vaccines for gonorrhoea.[51]



Exclusively covers research aimed at developing new health technologies – see the Introduction for details

Global funding for basic research and product development for LMIC-relevant sexually transmitted infections (STIs) – other than HIV and human papillomavirus (HPV) – was $71m in 2018.

Just over a third ($24m, 34%) of all STI R&D funding went to gonorrhoea, followed by equal shares for herpes simplex virus 2 (HSV-2) and R&D to address multiple STIs ($12m, 17% each). All other individual STIs each received less than $10m in funding: chlamydia ($7.9m, 11%), hepatitis B ($5.7m, 8.0%), human T-lymphotropic virus 1 (HTLV-1) ($5.1m, 7.2%), and syphilis ($2.8m, 3.9%). Of the $0.7m (1.0%) of funding reported for other STIs, more than half ($0.4m, 59%) was directed at R&D for bacterial vaginosis.

Table 8. Sexually transmitted infection R&D funding by product type 2018 (US$ millions)^

Disease	Basic research	Drugs#	Vaccines (preventive)	Vaccines (therapeutic)	Diagnostics	Unspecified	Total	% of total
Gonorrhoea	6.2	7.2	4.8	-	6.2	-	24	34
HSV-2	1.8	1.1	3.0	6.2	0.4	-	12	17
Chlamydia	3.0		2.2	<0.1	2.6	-	7.9	11
Hepatitis B*	1.9	0.6	-	-	0.8	2.5	5.7	8.0
HTLV-1	5.1	-	-	<0.1	-	-	5.1	7.2
Syphilis	0.8	1.4	0.6	-		-	2.8	3.9
Multiple STIs	2.5	0.2#	-	-	9.1	0.4	12	17
Other STIs	0.1	0.3	-	-	0.3	-	0.7	1.0
Total	21	11	11	6.2	19	2.9	71	100

^ Please note that there were restrictions on basic research and drug investments for some sexually transmitted infections. Due to this, total funding between these product categories cannot be reasonably compared.

* Hepatitis B data was collected through the G-FINDER annual survey of neglected diseases. Due to slight differences in scope, some grants have been reallocated. See introduction for details.

Only therapeutic drugs for the treatment of more than one STI are included in this product category for multiple STIs. Preventative drugs (including microbicides) that address two or more STIs are classified under 'MPTs'.

\- No reported funding

Category not included in G-FINDER

The two major focus areas of STI R&D funding were basic research ($21m, 30%) and diagnostics R&D ($19m, 27%), which together accounted for well over half (57%) of all STI R&D funding in 2018. This was followed by near equal investment in drugs – a category with multiple additional restrictions and exclusion criteria – and preventive vaccines ($11m, 15% each). The remainder was invested in therapeutic vaccines ($6.2m, 8.7%) – dominated by HSV-2 R&D – followed by unspecified product R&D ($2.9m, 4.1%).

The largest share of basic research funding went to gonorrhoea ($6.2m, 29%), followed closely by HTLV-1 ($5.1m, 24%), reflecting in turn the rapidly changing dynamics of AMR gonorrhoea and the poorly understood natural history and pathogenesis of HTLV-1. Just under half ($9.1m, 47%) of all diagnostic R&D funding was for multiple STIs, in line with priorities within the WHO Global Health Sector Strategy on STIs, and reflecting a shift from single pathogen tests to multi-STI panels. STI drug R&D funding was similarly concentrated, with two-thirds ($7.2m, 67%) of funding in this area going to AMR gonorrhoea drug R&D – also a WHO priority issue – with more than half of this going to the Global Antibiotic Research and Development Partnership (GARDP) to support Phase III trials of zoliflodacin to treat resistant strains of gonorrhoea as part of the organisation's '5 by 25' initiative. While the majority of preventive vaccine funding was for gonorrhoea ($4.8m, 45%), almost all therapeutic vaccine R&D investment went to HSV-2 ($6.2m, 99.5%), reflecting interest in and advanced clinical development of HSV-2 therapeutic vaccine candidates.

STI funding in 2018 was concentrated on basic & early-stage research ($43m, 60%), which received almost double the amount invested in clinical development & post-registration studies ($22m, 31%). A further $6.1m (8.5%) was not allocated to a specific product or R&D stage. Two notable outliers to this trend were HSV-2, where the majority ($7.2m, 58%) of funding was for clinical development & post-registration studies – although this was primarily due to an industry-led Phase I trial of a therapeutic vaccine candidate and limited funding for basic research, rather than a healthy late-stage pipeline – and multiple STIs, where nearly two thirds ($7.9m, 65%) of funding was for clinical development & post-registration studies, primarily for clinical evaluations of industry-led improved molecular diagnostics ($7.2m, 90%).

Table 9. Top funders of sexually transmitted infection R&D 2018

Funder	US$ (millions)	% of total
US NIH	44	62
Aggregate industry	14	19
Inserm	1.8	2.5
UK DHSC	1.5	2.2
German BMBF	1.5	2.1
German BMG	1.4	2.0
UK MRC	1.1	1.6
Indian ICMR	0.7	0.9
Wellcome Trust	0.7	0.9
Canadian CIHR	0.6	0.8
Colombian Colciencias	0.5	0.8
Innovate UK	0.5	0.7
Subtotal of top 12	68	96
Total	71	100

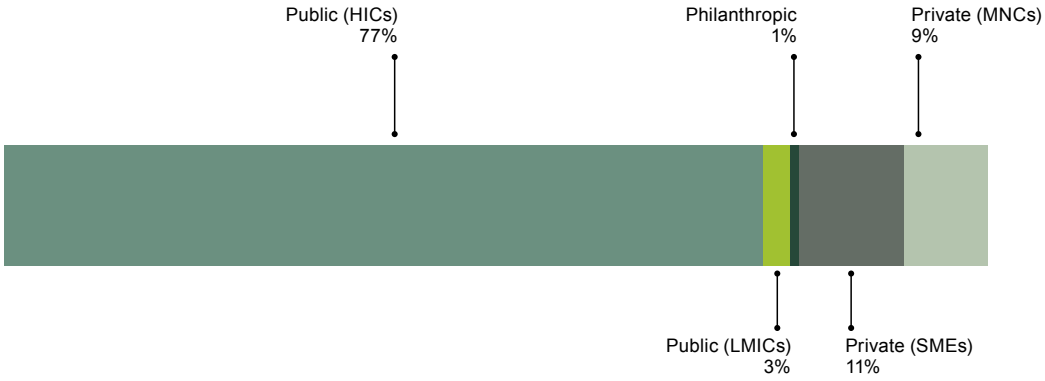
Table 10. Top recipients of sexually transmitted infection R&D funding 2018

Recipient	US$ (millions)	% of total
Aggregate industry	28	39
GARDP	3.7	5.2
US NIH	2.7	3.8
University of Massachusetts Medical School	2.6	3.6
University of Alabama at Birmingham	2.4	3.4
Ohio State University	1.8	2.5
Inserm	1.8	2.5
Yeshiva University	1.7	2.4
University of North Carolina	1.6	2.2
Johns Hopkins University	1.4	1.9
Yale University	1.2	1.7
Imperial College London	1.0	1.4
Subtotal of top 12	50	70
Total	71	100

Recipient organisation did not participate in the survey for this year. Any funds received listed are based on data reported by funders so may be incomplete.

Funding for STI R&D was highly concentrated, with the top two funders – the US NIH and industry – providing 81% ($58m) of all investment. While the US NIH was amongst the top two funders for all surveyed STIs, industry spending was primarily only for diagnostics for multiple STIs ($7.2m, 52% of industry investment) and therapeutic vaccines for HSV-2 ($6.6m, 48% of industry investment), with a small amount invested in hepatitis B diagnostics (<$0.1m, 0.1%). There was also variation in the concentration of funding across diseases. The top two funders of hepatitis B R&D – Inserm ($1.8m, 31%) and the US NIH ($1.3m, 22%) – collectively provided only a little more than half ($3.0m, 53%) of total funding to that STI, whereas syphilis R&D was almost entirely dependent on US NIH investment ($2.7m, 99%).

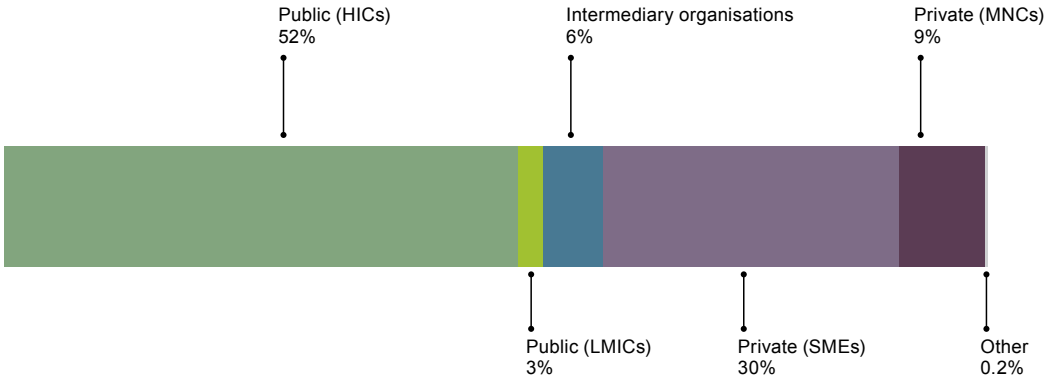
Figure 7. Sexually transmitted infection R&D funding by funder sector 2018



Public sector funding accounted for 80% ($57m) of all investment in STI R&D, with HIC public sector funding alone accounting for over three-quarters ($55m, 77%), most of which came from the US NIH ($44m, 80% of HIC public funding). LMIC public funders provided a further $1.8m (2.6% of all STI funding), the vast majority of which came from India via the ICMR ($0.7m, 37% of LMIC public funding) and Colombian Colciencias ($0.5m, 30%). Total industry investment was $14m (19% of total STI R&D funding), with 55% ($7.6m) from SMEs and 45% ($6.2m) from MNCs. The small remainder ($0.7m, 1.0%) was provided by the philanthropic sector, nearly all of which (95%) was from the Wellcome Trust. R&D for syphilis, chlamydia, gonorrhoea, hepatitis B and other STIs was overwhelmingly funded by the public sector (each over 99%). Although the majority of funding for HTLV-1 was from public sector sources (89%), it was also the only STI to receive a sizeable proportion from the philanthropic sector, albeit in a small quantum ($0.6m, 11%). The public sector was the minority contributor for HSV-2 and multiple STI R&D, with industry providing 53% and 59% respectively.

In total, more than a third of all STI funding went to industry ($28m, 39%) to conduct R&D spanning all included STIs, with the exception of HTLV-1 and syphilis. The largest individual recipient– GARDP – received $3.7m (5.2% of all STI funding) for gonorrhoea R&D, from a range of public sector funders, including the German BMG and BMBF; UK DHSC and DFID; the Dutch Ministry of Health, Welfare and Sport and the South African MRC; as well as a contribution from the Leo Model Foundation.

Figure 8. Sexually transmitted infection R&D funding by recipient sector 2018



More than half of all recipients were in the public sector of HICs ($37m, 52%), with smaller amounts of funding to LMICs ($1.8m, 2.5%) bringing the public sector total to $39m (55%). A total of $28m (39% of overall funding) went to industry – approximately half of which was self-funded and half from external sources – with more than three-quarters of this through SMEs ($21m, 78%) and the remainder through MNCs ($6.2m, 22%). Intermediary organisations ($4.4m, 6.2%) and other unspecified recipients ($0.1m, 0.2%) received the remaining funding, with all intermediary funding directed at gonorrhoea R&D, almost all of which went to GARDP ($3.7m, 84%).

MULTIPURPOSE PREVENTION TECHNOLOGIES

Multipurpose prevention technologies (MPTs) are a class of biomedical intervention that simultaneously provide protection – in varied combinations – against pregnancy, STIs or HIV in a single product.[52] MPTs can be preventive drugs (including microbicides) or devices in combination with a pharmaceutical element, offering protection for the following indications:

- Contraception + HIV prevention
- Contraception + STI prevention
- Contraception + STI + HIV prevention
- HIV + STI prevention
- Prevention from two or more non-HIV STIs (multiple STIs)

In LMICs, where the brunt of STIs, HIV and unintended pregnancies is felt, the prospective benefits of effective MPTs would be huge. The vast majority of all women with an unmet need for contraception are found in LMICs,[5] while over two-thirds of all people living with HIV are found in sub-Saharan Africa alone.[53] Over 90% of all STIs globally also occur outside of high-income countries.[35,36]

MPTs that are appropriate for use in low-resource settings would allow sexually active people, particularly women and girls, the ability to protect themselves against multiple SRH issues with the convenience of one product, increasing efficiencies for users, as well as donors, procurers, and healthcare providers. Currently the only MPT available is the condom, and while highly effective, a diverse range of MPTs will be critical if the different needs of people in different circumstances and life stages are to be met, particularly women in LMICs.

An array of potential MPT products are possible, including intravaginal rings, vaginal or rectal gels or films, fast dissolving inserts, and barrier devices combined with drugs (hormonal or non-hormonal), with a number of these in pre-clinical and clinical development for various combined indications. These include IPM's Phase I trial of the combined dapivirine and levonorgestrel vaginal ring, Orion Biotechnology OB-001 vaginal gel, PATH's dissolving MPT Microarray Patch, and RTI's biodegradable subcutaneous implant (SCHIELD), all offering dual protection from HIV and pregnancy.[54] Evofem's Multipurpose Vaginal pH Regulator candidate – an on-demand, non-hormonal vaginal gel previously known as Amphora – is in late-stage clinical development for protection from STIs (urogenital chlamydia and gonorrhoea) as EVO100,[55] with the contraceptive indication recently approved by the US FDA under the brand name Phexxi;[56] while Population Council's vaginal and rectal gel PC-1005 (MIV-150 and zinc acetate in a carrageenan gel) is in Phase I for protection against HIV, HPV and HSV-2.[57]

MPTs with combined action against all SRH indications within the MPT definition – HIV, STIs and pregnancy – include products such as CONRAD's Phase II tenofovir and levonorgestrel vaginal ring for simultaneous protection from pregnancy, HIV and HSV-2,[58] as well as Yaso Therapeutics vaginal gel Yaso-GEL, in advanced pre-clinical development offering protection from chlamydia, gonorrhoea, HIV, HPV, HSV-2 and pregnancy.[52]

$47.7
MILLION
TOTAL SPEND ON LMIC-APPLICABLE **MPT** R&D IN 2018

BASIC RESEARCH	OUT OF SCOPE
DRUGS	IN SCOPE
VACCINES (PREVENTIVE)	OUT OF SCOPE
VACCINES (THERAPEUTIC)	OUT OF SCOPE
DIAGNOSTICS	OUT OF SCOPE
DEVICES & COMBINATIONS	IN SCOPE

Exclusively covers research aimed at developing new health technologies – see the Introduction for details

Global funding for product development for multipurpose prevention technologies (MPTs) in 2018 was $48m.

Across product types, $38m (79%) was invested in MPT drugs including microbicides, with a further $7.8m (16%) funding MPT devices & combination products. The rest ($2.3m, 4.8%) was invested in MPT R&D with an unspecified intended product.

Table 11. Multipurpose prevention technology funding by product type 2018 (US$ millions)

Indication	Drugs (including microbicides)*	Devices & combinations	Unspecified	Total	% of total
Contraception + STIs	37	-	-	37	78
Contraception + HIV + STIs	-	4.6	-	4.6	9.6
Contraception + HIV	0.3	2.7	0.3	3.3	6.9
HIV + STIs	-	0.5	1.1	1.6	3.4
HIV + unspecified	-	-	0.9	0.9	1.8
Multiple STIs	-	-	-	-	-
Total	38	7.8	2.3	48	100

- No reported funding
* Only preventive drugs (including microbicides) are considered in this category. Therapeutic drugs for the treatment of more than one STI are included in the STI chapter under 'multiple STIs'.

R&D for MPTs for the combined prevention of pregnancy and non-HIV STIs made up the vast majority of funding ($37m, 78%), all of which was invested in drugs/microbicides. In contrast, MPT R&D funding for products with HIV prevention as an indication was largely invested in devices & combination products ($7.8m, 75% of funding to MPTs with HIV prevention), possibly reflecting the shift in HIV MPT R&D away from gel-based delivery methods and towards ring-based products, and particularly those that also provide contraception. There was no reported funding for MPT R&D into the prevention of multiple (non-HIV) STIs alone (either for drugs, or for devices & combinations).

In 2018, $40m (83%) of MPT R&D was for clinical development & post-registration studies, while $5.5m (11%) was invested in basic & early-stage research; remaining funding ($2.6m, 5.5%) was not allocated to a specified product or R&D stage. Funding for MPT clinical development & post-registration studies was dominated by large industry investments into late-stage clinical trials of MPT drugs with dual contraceptive and STI protective qualities ($37m, 93%). In contrast, funding for basic & early stage research was overwhelmingly for devices & combination products ($4.9m, 89%). Clinical development funding for MPT devices & combinations was reported for only a few candidates, including a USAID-funded, IPM-coordinated dapivirine-contraceptive vaginal ring to provide dual protection against HIV and pregnancy ($1.3m), and the US CDC Phase IIa trial of a tenofivir and levonorgestrel releasing IVR ($0.5m).

Table 12. Funders of multipurpose prevention technology R&D 2018

Funder	US$ (millions)	% of total
Aggregate industry	38	79
US NIH	6.2	13
USAID	2.4	5.1
French ANRS	0.9	1.8
US CDC	0.5	1.0
Wellcome Trust	<0.1	<0.1
Total	48	100

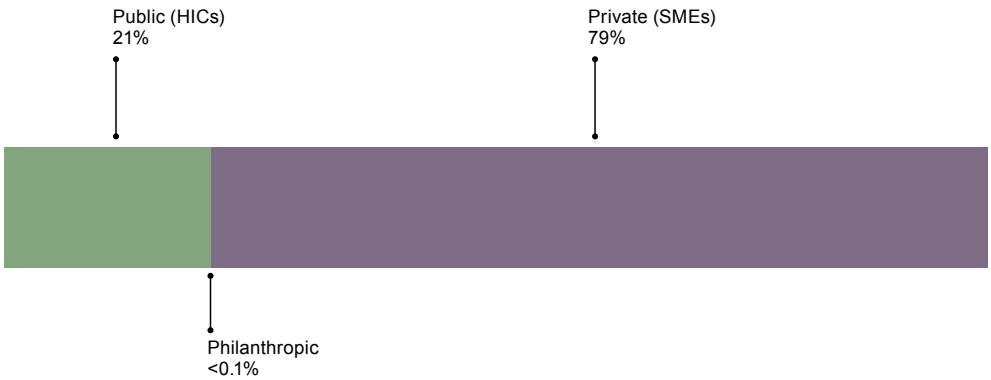
Table 13. Recipients of multipurpose prevention technology R&D funding 2018

Recipient	US$ (millions)	% of total
Aggregate industry	40	84
Boston University	2.2	4.6
IPM	1.3	2.7
RTI International	1.2	2.5
University of Massachusetts Medical School	0.5	1.1
US CDC	0.5	1.0
University of North Carolina	0.5	1.0
Dartmouth College	0.3	0.7
US NIH	0.3	0.5
Queen's University Belfast	<0.1	<0.1
Unspecified Recipients	0.9	1.8
Total	48	100

Recipient organisation did not participate in the survey for this year. Any funds received listed are based on data reported by funders so may be incomplete.

Only six funders including aggregated industry funding reported investment in MPT R&D in 2018, with an overwhelming majority ($38m, 79%) coming from industry, focused on the development of drugs for the prevention of pregnancy and STIs. This is notable both for the socially-driven and women-focused agenda of the companies involved, and the fact that industry investment in MPT R&D has historically been very low, with funding instead dominated by the US government for the last decade. Indeed, the US NIH ($6.2m, 13%) was the second largest funder of MPTs in 2018, followed by USAID ($2.4m, 5.1%), and collectively the US government was the source of 91% ($9.1m) of all non-industry investment. The US NIH was the only funder other than industry to invest in MPT drugs ($0.3m, 4.6% of US NIH funding), with all other funders reporting funding only for R&D into devices & combinations, or for unspecified product types.

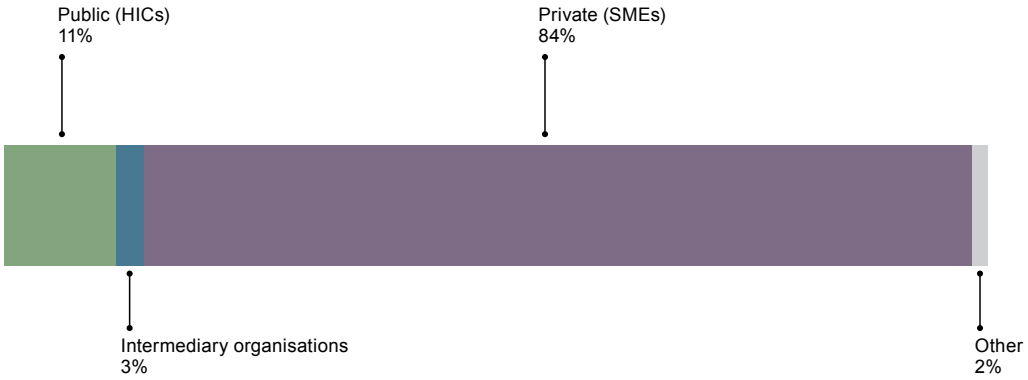
Figure 9. Multipurpose prevention technology R&D funding by funder sector 2018



Private sector investment accounted for 79% ($38m) of all MPT R&D funding in 2018, all of which came from SMEs. Just over a fifth ($10m, 21%) of all funding came from the public sector, entirely from HICs, and nearly all of which was from the USA. The only non-US public funding reported came from the French ANRS ($0.9m, 8.7%). Marginal investment was reported from the philanthropic sector through a small contribution from the Wellcome Trust (<$0.1m, <0.1%).

Including aggregate industry there were eleven reported recipients of MPT R&D funding in 2018. The largest individual recipient – after aggregate industry – was Boston University, which received $2.2m (4.6% of funding) from the US NIH for early-stage research into antibody-based MPTs, including in gel and intra-vaginal ring formats.

Figure 10. Multipurpose prevention technology R&D funding by recipient sector 2018



The vast majority ($40m, 84%) of all funding for MPT R&D in 2018 went to the private sector, all to SMEs. Of this, $38m was self-funded industry investment, while an additional $2.5m came from the HIC public sector. Public sector institutions received $5.4m (11% of total funding), the majority of which ($4.7m, 87%) went to universities and academic institutions. Smaller amounts went to the intermediary organisation IPM ($1.3m, 2.7%) – dedicated to the microbicide research agenda – and unspecified recipients of unknown sector ($0.9m, 1.8%)

HPV AND HPV-RELATED CERVICAL CANCER

Human papillomavirus (HPV) is the most common sexually transmitted infection, affecting more than one in ten women and one in five men worldwide. In sub-Saharan Africa, almost a quarter of women and more than three-quarters of men are infected.[59] While most infections are asymptomatic and resolve spontaneously, infection with key HPV strains can result in pre-cancer and cancer. HPV infection is the causal agent in almost all cases of cervical cancer,[60] which is the fourth most frequent cancer worldwide and a leading cause of cancer death in women. There were 570,000 new cases and 311,000 deaths from cervical cancer in 2018,[61] with more than 85% of deaths occurring in LMICs.[62] In the presence of HIV, HPV infection is also more likely to lead to earlier development of cervical cancer, taking as little as 5 years for invasive cervical cancer to develop.[62]

In 2020 the WHO Executive Board recommended adoption of the first global strategy for elimination of cervical cancer as a public health problem.[63] It recognises that primary prevention through HPV vaccination is highly effective, and that elimination is feasible with the three currently available (WHO prequalified) virus-like particle-based HPV vaccines – Gardasil, Cervarix and Gardasil 9 – with studies suggesting that effective implementation of HPV vaccine programs could prevent up to 90% of HPV-positive cancers of the cervix.[64] To date, GAVI has played a leading role in facilitating low-cost access to these vaccines in 30 countries.[65] However, these vaccines follow a 2-dose or 3-dose schedule, and do not protect against all high-risk HPV strains. They also do not eliminate pre-existing HPV infection, nor does any virus-specific drug treatment for HPV infection exist.[60]

Current HPV vaccine research includes dose reduction and longer interval studies for existing HPV vaccines, as well as development of novel preventive vaccines with broader strain specificity. Therapeutic vaccines are also in development: the modified vaccinia virus Ankara (MVA)-based vaccine candidate TG4001 has reported histological clearance and promising efficacy while being well tolerated in Phase II trials,[66] and is now being trialled in combination with a monoclonal antibody (avelumab) in Phase Ib/II;[67] the EC's IMMUNISA program, which is advancing Phase II CervISA-2 clinical trials of the synthetic long-peptide HPV therapeutic candidate ISA101b;[68] and Inovio's DNA-based vaccine candidate VGX-3100, progressing to Phase III.[69]

While screening programs have shown huge benefit in HICs, current screening technologies reach only 5% of women in LMICs.[61] Testing is costly and generally requires highly skilled technicians and laboratory infrastructure. Even current POC HPV DNA tests designed with LMIC needs in mind remain prohibitively expensive.[61] Visual inspection with acetic acid for screening or diagnosis of cervical epithelial changes – the method used in most LMICs – is simple to use, but has poor specificity and high observer variability.[70] A number of technologies are in development that aim to be simpler, more reliable and safe for POC use in LMICs, such as the POCKeT colposcope, TruScreen, and High-Resolution Micro-endoscopy.[61] Automated Visual Examination (AVE) – which uses smartphone-based algorithms to improve visualisation approaches – and a one-hour HPV DNA test to speed-up high-specificity screening are being developed by Global Good.[71]

$51.9
MILLION
TOTAL SPEND ON LMIC-APPLICABLE **HPV AND HPV-RELATED CERVICAL CANCER** R&D IN 2018

BASIC RESEARCH	RESTRICTED
DRUGS	RESTRICTED
VACCINES (PREVENTIVE)	RESTRICTED
VACCINES (THERAPEUTIC)	RESTRICTED
DIAGNOSTICS	IN SCOPE
DEVICES & COMBINATIONS	OUT OF SCOPE

Exclusively covers research aimed at developing new health technologies – see the Introduction for details

Global funding for basic research and product development for human papillomavirus (HPV) and HPV-related cervical cancer in 2018 was $52m.

R&D for vaccines to prevent HPV infection received the largest share of funding in 2018 ($31m, 60%), followed by diagnostics for both HPV infection and cervical lesions ($7.5m, 14%), basic research ($6.9m, 13%), and therapeutic vaccines ($4.2m, 8.2%). The remainder ($2.3m, 4.3%) was not allocated to a specific product. No funding was reported for R&D into drugs to clear HPV infection, reflecting the fact that therapeutic options for HPV are instead focused on cryotherapy for pre-cancerous lesions or therapeutic vaccines, and that HPV-related drug R&D is generally focused on anti-neoplastic drugs (which are outside the scope of this report).

Figure 11. HPV and HPV-related cervical cancer R&D funding by product type 2018

Unsurprisingly given the availability and efficacy of existing HPV preventive vaccines, two-thirds ($21m, 66%) of all funding for HPV preventive vaccine R&D was in support of dose reduction studies for existing HPV vaccines. The emphasis on these investments reflects the current LMIC-focused HPV vaccine research agenda, where reduced dosage schedules on existing products would offer a cheaper and logistically less challenging approach to HPV vaccination in resource-limited settings. Over half of all preventive vaccine R&D funding for HPV in 2018 came from the Gates Foundation ($16m, 52%), the majority of which was directed towards dose reduction studies ($12m, 72%).

Diagnostic R&D was dominated by funding from the US NIH ($3.8m, 51%) and Gates Ventures ($2.5m, 33%), with all of Gates Ventures funding going to Global Good for the development of a rapid test to screen oncogenic strains of HPV, which has since moved to clinical evaluation, and an automated visual examination tool to improve visual inspection diagnostic accuracy. Smaller investments were made in therapeutic vaccine R&D – driven by the US NIH ($2.8m, 65%) and the EC ($1.4m, 33%) – and likely reflective of global prioritisation towards HPV prevention as a cervical cancer elimination strategy. Nevertheless, these investments represent some advanced research into therapeutics, for example the EC's IMMUNISA program, which is advancing Phase II CervISA-2 clinical trials of the HPV therapeutic vaccine candidate ISA101b.

Almost two-thirds of all HPV and HPV-related cervical cancer R&D was for clinical development & post-registration studies ($34m, 65%), with just under a third for basic & early-stage research ($16m, 31%). Investments for R&D not allocated to a specific stage totalled ($2.4m, 4.5%). The vast majority of clinical development & post-registration studies funding ($28m, 84%) went to preventive vaccine R&D, and was dominated by investments from the Gates Foundation and the US NIH, who together accounted for 75% ($21m). Basic & early stage research funding was more spread, and included investments across basic research ($6.9m, 43%), diagnostics ($5.5m, 35%) – driven by a single investment from Gates Ventures to Global Good's cervical cancer screening portfolio ($2.5m, 45%) – preventive vaccines ($2.8m, 18%), and a small portion to therapeutic vaccines ($0.6m, 4%).

Table 14. Top funders of HPV and HPV-related cervical cancer R&D 2018

Funder	US$ (millions)	% of total
US NIH	21	41
Gates Foundation	16	31
Aggregate industry	3.5	6.8
Gates Ventures	2.5	4.8
EC	1.9	3.7
Indian BIRAC	1.5	3.0
German DFG	1.4	2.7
Australian NHMRC	1.1	2.1
UK MRC	1.0	1.9
Tara Health Foundation	0.5	1.0
French ANRS	0.5	0.9
Wellcome Trust	0.3	0.6
Subtotal of top 12	51	99
Total	52	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.

Table 15. Top recipients of HPV and HPV-related cervical cancer R&D funding 2018

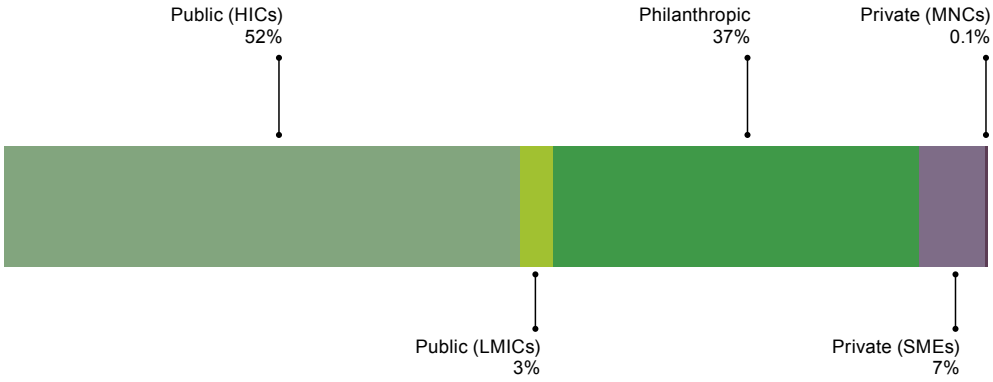
Recipient	US$ (millions)	% of total
Aggregate industry	8.0	15
Fundación Inciensa (FUNIN)	6.2	12
US NIH	3.9	7.6
Johns Hopkins University	3.2	6.2
Global Good	2.5	4.8
LSHTM	2.3	4.5
University of Washington Foundation	2.2	4.1
IVI	1.9	3.7
Rice University	1.8	3.5
Indian BIRAC	1.6	3.1
Wits Health Consortium	1.6	3.1
Fighting Infectious Diseases in Emerging Countries (FIDEC)	1.5	3.0
Subtotal of top 12	37	71
Total	52	100

Recipient organisation did not participate in the survey for this year. Any funds received listed are based on data reported by funders so may be incomplete.

Twenty-one organisations reported providing funding for HPV and HPV-related cervical cancer R&D in 2018. However, most investment came from just two funders – the US NIH ($21m, 41%) and the Gates Foundation ($16m, 31%) – who together accounted for just under three-quarters ($37m, 72%) of total funding, with no other individual funder providing more than 5% of overall funding. All funding from the Gates Foundation and more than a third of that from the US NIH was invested in preventive vaccine R&D.

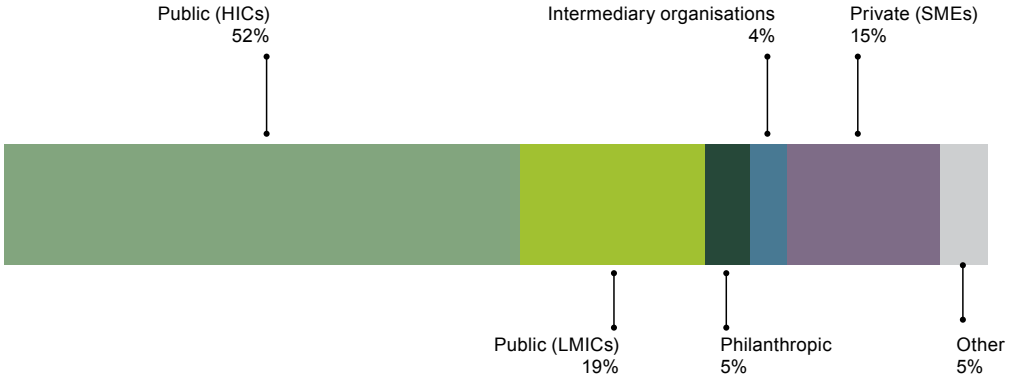
The public sector provided more than half of all funding ($29m, 56%), with HICs reporting 94% ($27m) of all public funding. Over three-quarters of HIC public sector funding came from the US NIH ($21m, 78%), with more modest investments from institutes in Europe, South America and Australasia. LMICs accounted for 3.5% ($1.8m) of total HPV and HPV-related cervical cancer R&D, largely dominated by investment from Indian BIRAC ($1.5m, 85% of LMIC public funding). The second largest share of funding came from the philanthropic sector ($19m, 37%), with 96% of this coming from the Gates Foundation ($16m) and Gates Ventures ($2.5m). This was followed by industry investments from both SMEs ($3.5m, 6.6%) and to a smaller extent MNCs (<$0.1m, 0.1%).

Figure 12. HPV and HPV-related cervical cancer R&D funding by funder sector 2018



There were fifty reported recipients of funding for HPV and HPV-related cervical cancer R&D in 2018, with the top 12 accounting for 73% ($38m) of all investment. Collectively, aggregate industry was the largest recipient of HPV R&D funding, although this in fact represented 15 separate companies; a little over half ($4.6m, 57%) of all funding for industry came from external funders, with the remainder ($3.5m, 43%) being self-funded R&D. The largest individual recipient was Fundación Inciensa (FUNIN), which received a single large grant from the US NIH for a follow-up study of an HPV-16/18 vaccination trial in Costa Rica.

Figure 13. HPV and HPV-related cervical cancer R&D funding by recipient sector 2018



Most funding for HPV and HPV-related cervical cancer R&D in 2018 went to the public sector ($37m, 71%), the majority of which went to academic and other research institutions ($31m, 83%). HICs received the largest share ($27m, 74% of public funding) and the remainder went to LMICs ($9.8m, 26% of public funding). All funding for industry – a mix of external and self-funding as noted above – went to SMEs. The remainder was split between philanthropic ($2.3m, 4.5%), one intermediary organisation – IVI – ($1.9m, 3.7%), and other organisations ($2.6m, 5.0%).

POST-PARTUM HAEMORRHAGE

Post-partum haemorrhage (PPH) is defined as blood loss of 500mL or more within the first 24 hours after birth. It is the leading direct cause of maternal mortality globally, with almost a fifth of maternal deaths attributable to PPH.[72] Each year there are an estimated 14 million cases of PPH,[73] and approximately 120,000 deaths,[74] with almost all of this burden falling on women living in LMICs.

Intravenous (IV) or intramuscular (IM) injection of oxytocin remains the accepted gold standard for both the prevention and treatment of PPH.[75] The use of oxytocin is limited in LMICs however by its need for cold-chain transport and refrigeration, often unavailable in low-resource settings. Current formulations of oxytocin also require a skilled health worker to administer them. Globally, however, only 78% of births are assisted by a skilled birth attendant – down to as few as 59% in sub-Saharan Africa[76,77] – which places an additional limitation on access.

Alternative uterotonic drugs to oxytocin for the prevention and treatment of PPH exist or are in development but are not without challenges. Oral misoprostol, for example, is an established alternative for both the prevention and treatment of PPH, and is inexpensive, easy to administer, and heat stable.[75] It is however less effective than oxytocin and its availability can be restricted due to its abortifacient properties. Promising alternatives to oxytocin include heat-stable carbetocin – an oxytocin analogue tested in one of largest global PPH prevention trials (the CHAMPION (Carbetocin Haemorrhage Prevention) trial) – which has been shown to maintain stability at high temperatures and relative humidity for up to 36 months,[78] and appears comparable to oxytocin for the prevention of PPH, with a more favourable side-effect profile than other medication options.[79] It is currently recommended by WHO as a second-line option for the prevention and treatment of PPH, and is listed on WHO's Model List of Essential Medicines.[80] Tranexamic acid – an antifibrinolytic drug – can also reduce incidence of death due to post-partum bleeding by nearly one third when administered IV within three hours of birth with no adverse effects or complication, as demonstrated in the WOMAN Trial.[81] It is currently recommended by WHO for use when uterotonics fail to control bleeding.[82]

Most alternatives still however require skilled personnel for administration. A dry powder, heat stable, inhaled oxytocin formulation, which would eliminate the need for refrigeration and increase ease of administration such that mothers could potentially even self-administer the product, has completed Phase I trials.[83] Other innovative approaches include PATH's research into sublingual oxytocin in heat-stable, fast dissolving tablets.[84]

In cases where drugs are ineffective or unavailable, treatment is escalated, first using mechanical interventions, such as uterine balloon tamponades, then surgery and hysterectomy. In LMICs however, many devices are prohibitively expensive and surgical services often unavailable, leading to uncontrolled bleeding and often death.[85] Low-tech products are in development, such as PATH and Sinapi Biomedical's Ellavi uterine balloon tamponade device designed specifically for low-resource settings, which received regulatory approval in Ghana and Kenya in July 2020,[84,86] and Alydia Health's Jada System vacuum-induced uterine tamponade, which is currently being trialled in the US-based PEARLE study.[87]

$4.4 MILLION

TOTAL SPEND ON LMIC-APPLICABLE **PPH** R&D IN 2018

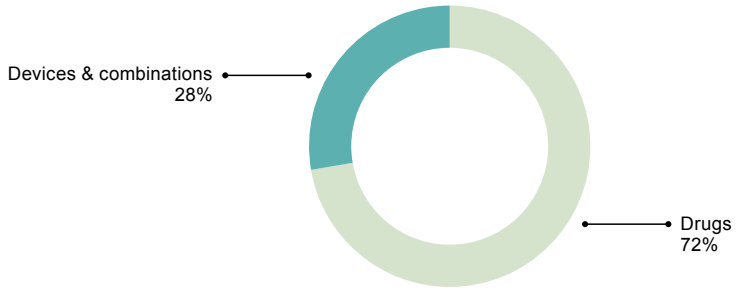
BASIC RESEARCH	OUT OF SCOPE
DRUGS	IN SCOPE
VACCINES (PREVENTIVE)	OUT OF SCOPE
VACCINES (THERAPEUTIC)	OUT OF SCOPE
DIAGNOSTICS	OUT OF SCOPE
DEVICES & COMBINATIONS	RESTRICTED

Exclusively covers research aimed at developing new health technologies – see the Introduction for details

Global funding for product development for post-partum haemorrhage (PPH) in 2018 was $4.4m.

Almost three quarters ($3.2m, 72%) of all PPH R&D funding in 2018 was for drugs, with the remainder of funding for devices & combination products ($1.2m, 28%).

Figure 14. Post-partum haemorrhage R&D funding by product type 2018



The majority ($2.8m, 87%) of reported PPH drug R&D investment in 2018 was for the MSD for Mothers-funded, WHO-coordinated Phase III clinical trials evaluating room-temperature stable carbetocin as part of the CHAMPION trial. The product has since been added to the WHO Model List of Essential Medicines (2019). Remaining funding was primarily for PATH's R&D into inhaled, heat-stable oxytocin. A small investment was also made in novel heat-stable preparations of oxytocin for delivery through microarray patch technology. Nearly all investment in PPH devices & combinations ($1.2m, 99%), was directed towards industry-led development of novel uterine devices to halt post-partum bleeding. Not included in this figure is an additional $1.0m for PATH's Devices, Diagnostics, and Drugs to Address Women's Needs Product Development Partnership (D_3AWN PDP) funded by the UK DFID – which includes investment in the Ellavi uterine balloon tamponade and sublingual oxytocin in heat-stable, fast dissolving tablets (as well as pre-eclampsia/eclampsia R&D) – which is captured instead in the non-issue-specific funding chapter, under 'Other R&D'.

Nearly all PPH R&D funding in 2018 was for clinical development & post-registration studies ($4.0m, 90%), driven by large investments in advanced pipeline products, specifically the Phase III carbetocin studies and tamponade development studies noted above. Only a small amount ($0.4m, 10%) went to early-stage research.

Table 16. Funders of post-partum haemorrhage R&D 2018

Funder	US$ (millions)	% of total
MSD for Mothers	3.1	71
German BMZ	0.8	19
Aggregate industry	0.3	6.1
Gates Foundation	0.1	3.2
Indian BIRAC	<0.1	0.3
Wellcome Trust	<0.1	<0.1
Total	4.4	100

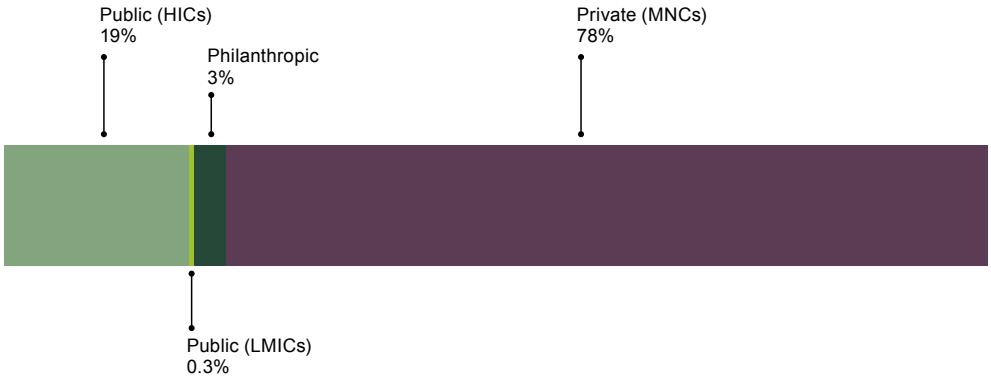
Table 17. Recipients of post-partum haemorrhage R&D 2018

Recipient	US$ (millions)	% of total
WHO/HRP	2.8	63
GHIF	0.8	19
PATH	0.4	9.4
Aggregate industry	0.4	8.9
Queen's University Belfast	<0.1	<0.1
Total	4.4	100

Recipient organisation did not participate in the survey for this year. Any funds received listed are based on data reported by funders so may be incomplete.

Excluding UK DFID, whose funding to PATH's D$_3$AWN PDP included support for PPH R&D, but which is captured separately as noted above, there were only six reported funders of PPH R&D in 2018, with the top two funders alone – MSD for Mothers (the maternal health-focused initiative of MSD) and the German BMZ – accounting for 90% ($4.0m) of funding. The vast majority ($2.8m, 88%) of MSD for Mothers' funding went to WHO/HRP for carbetocin Phase III clinical trials, while German BMZ funding went to the Global Health Investment Fund (GHIF) to support industry-led development of a vacuum-induced uterine tamponade device. Other funders of PPH R&D provided less than $0.5m each, and included investments from industry, Gates Foundation and the Wellcome Trust for research on PPH drugs, and Indian BIRAC for R&D into devices.

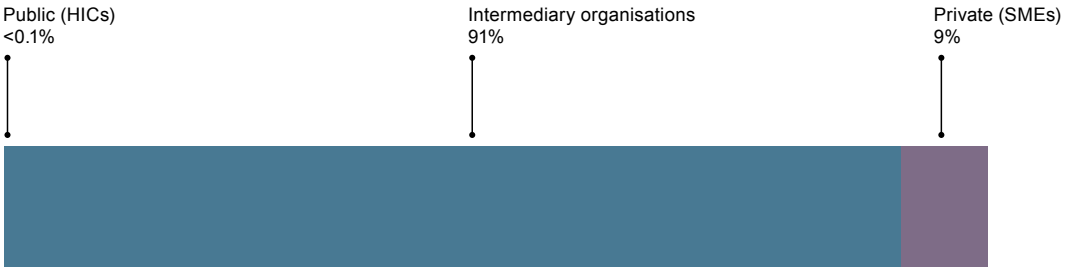
Figure 15. Post-partum haemorrhage R&D funding by funder sector 2018



More than three-quarters ($3.4m, 78%) of all funding for PPH R&D in 2018 came from the private sector – entirely from MNCs – overwhelmingly driven by MSD for Mothers' portfolio of investments in PPH R&D. Most of the remainder came from the public sector ($0.8m, 19%), with minimal funding from the philanthropic sector ($0.1m, 3.3%). Funding from a single HIC government (Germany) accounted for 98% ($0.8m) of all public funding, and all reported LMIC public funding came from India.

Just under two-thirds of all PPH R&D funding in 2018 went to WHO/HRP for their coordination of the carbetocin Phase III clinical trials ($2.8m, 63%). Funding was utilised both by WHO/HRP itself and disbursed as onward funding to a range of additional partners to support the implementation of the project, which was rolled out in 10 countries and included over 30,000 women. Much of the remaining funding went to support the industry-led development of tamponade devices, either via GHIF ($0.8m, 19%) or directly to industry ($0.4m, 8.9%). Funding to PATH ($0.4m, 9.4%) was for inhaled oxytocin development.

Figure 16. Post-partum haemorrhage R&D funding by recipient sector 2018



Intermediary organisations received the largest share ($4.0, 91%) of PPH R&D investments in 2018, with WHO/HRP the largest recipient ($2.8m, 69%), followed by GHIF ($0.8m, 21%), and PATH ($0.4m, 10%). SMEs received 8.9% ($0.4m) of all PPH R&D investment, which came via investments from MNCs ($0.4m, 96% of investment received by SMEs) and public sector in LMICs (<$0.1m, 3.8%). The public sector in HICs received the smallest share of funding (<$0.1m, 0.1%), which went to academic and other research institutions (Queen's University Belfast).

PRE-ECLAMPSIA

Pre-eclampsia is a hypertensive disorder of pregnancy characterised by the onset of sustained high blood pressure and evidence of organ damage, most commonly proteinuria (kidney damage). By definition, it occurs after 20 weeks gestation, however the pathophysiological changes underpinning the disorder are known to start at very early stages of pregnancy. Pre-eclampsia presents along a spectrum of symptoms, but can result in severe morbidity, including stroke, cardiac arrest, kidney or liver failure, foetal growth restriction and preterm birth.[88] It is one of the leading causes of maternal and neonatal mortality and morbidity, affecting up to 8% of all pregnancies worldwide.[89] Women in LMICs are seven times more likely to develop pre-eclampsia than women in HICs, with rates as high as 16.7% in parts of Africa.[90]

The underlying causes of pre-eclampsia are only partially understood, and its screening, diagnosis, and management need improvement. Magnesium sulphate is used (and strongly recommended by WHO) for both prevention and treatment of eclampsia (seizures associated with severe pre-eclampsia). However, there are no currently available options to effectively prevent primary development of pre-eclampsia. Nor are there alternatives to manage it at early or late-stage beyond magnesium sulphate, which while effective, can have dosing limitations in LMICs where full (24 hour) regimens may not be feasible. Ultimately, the only definitive treatment is delivery.[89] Current research on alternatives for prevention and management of pre-eclampsia focus largely on evaluation of re-purposed drugs, such as calcium supplementation,[91] low-dose aspirin,[92] as well as esomeprazole, the diabetic drug metformin,[93] antihypertensives,[94] and cholesterol-lowering statins.[95] There is also some promising R&D into novel biologics to target the underlying causes or effects of pre-eclampsia, such as AMAG Pharmaceutical's biologic AMAG-423, in Phase II clinical trials.[96] Despite progress, there is a need for therapeutics to both prevent and manage pre-eclampsia at early onset, severe and eclamptic stages, particularly with LMIC needs in mind.

Diagnosis of pre-eclampsia is also challenging, historically reliant on symptomatic evaluation. The angiogenic factors PlGF and sFlt1[97] have performed well as markers to assist diagnosis of pre-eclampsia in clinical trials, with recent development of a number of PlGf-based tests for prediction of pre-eclampsia,[98] including the DELFIA Xpress PlGF 1-2-3 test (Perkin Elmer), Triage PlGF test (Alere) and Elecsys immunoassay sFlt-1/PlGF ratio (Roche Diagnostics).[98–101] The need for blood sampling, skilled personnel, and laboratory infrastructure however make them difficult for LMIC settings. Protein in urine is also a commonly used indicator to identify increased risk of pre-eclampsia. Current tests however are impractical for LMICs – being either lab-based (and requiring a 24-hour urine test) or inaccurate (protein-only dipsticks). The recent finding that the urine of women with pre-eclampsia contains proteins that are Congo Red Dot Paper Test positive, however, has opened potential for the creation of a simple, non-invasive, specific, POC diagnostic, with research in this area underway.[102] PATH and Lifeassay's collaboration on an innovative protein to creatine ratiometric urine dipstick test also offers a low cost-alternative highly suitable for LMICs.[84]

$12.2
MILLION
TOTAL SPEND ON LMIC-APPLICABLE **PRE-ECLAMPSIA** R&D IN 2018

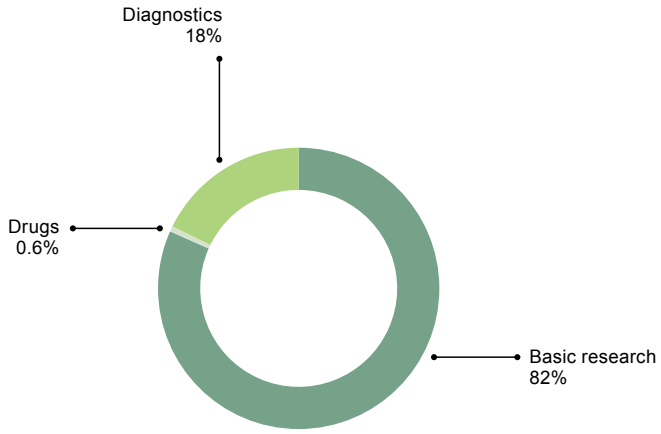
BASIC RESEARCH	RESTRICTED
DRUGS	RESTRICTED
VACCINES (PREVENTIVE)	OUT OF SCOPE
VACCINES (THERAPEUTIC)	OUT OF SCOPE
DIAGNOSTICS	IN SCOPE
DEVICES & COMBINATIONS	OUT OF SCOPE

Exclusively covers research aimed at developing new health technologies – see the Introduction for details

Global funding for basic research and product development for pre-eclampsia in 2018 was $12m.

The bulk of pre-eclampsia R&D funding was for basic research ($10m, 82%), with diagnostic R&D receiving almost all of the remainder ($2.2m, 18%). Only a small amount of funding (<$0.1m, 0.6%) was reported for drug R&D, however this partly reflects the quite restrictive scope of this report, which was limited to drugs to prevent the development of pre-eclampsia (rather than its management).

Figure 17. Pre-eclampsia R&D funding by product type 2018



The strong focus on basic research reflects existing basic science-related knowledge gaps for pre-eclampsia, including poorly understood pathophysiology, and a lack of specific biomarkers and appropriate animal models. The vast majority of diagnostics investment ($2.0m, 92%) was for R&D into much needed point-of-care tests to identify early stages and women at risk of pre-eclampsia, including a protein-to-creatinine rapid urine test funded by South African MRC. Not included in this figure is an additional $1.0m for PATH's Devices, Diagnostics, and Drugs to Address Women's Needs Product Development Partnership (D_3AWN PDP) funded by the UK DFID – which included investment in the Test-It protein-to-creatine urine dipstick (as well as PPH and other pre-eclampsia/eclampsia product R&D) – which is captured instead in the non-issue-specific funding chapter, under 'Other R&D'.

There was no reported pre-eclampsia R&D funding for clinical development & post-registration studies in 2018. Almost all funding was for basic & early-stage research ($12m, 96%), with the remainder not allocated to a specific R&D stage.

Table 18. Funders of pre-eclampsia R&D 2018

Funder	US$ (millions)	% of total
US NIH	7.7	63
Chinese NSFC	1.8	15
Australian NHMRC	0.8	6.7
Canadian CIHR	0.6	5.2
Gates Foundation	0.5	4.1
South African MRC	0.2	1.9
New Zealand HRC	0.2	1.7
EC	0.2	1.5
Indian BIRAC	<0.1	0.4
Preeclampsia Foundation	<0.1	0.3
Brazilian FAPEMIG	<0.1	0.1
Wellcome Trust	<0.1	<0.1
Total	12	100

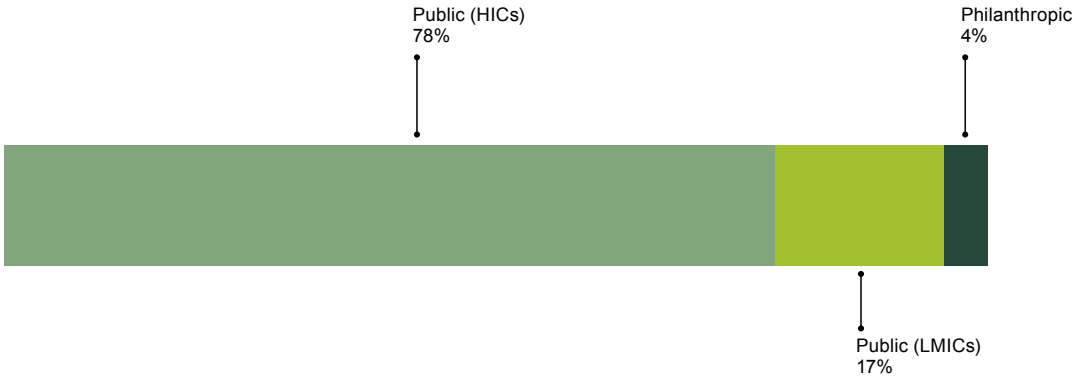
Table 19. Top recipients of pre-eclampsia R&D funding 2018

Recipient	US$ (millions)	% of total
Aggregate industry	2.2	18
Unspecified recipients of NSFC funding	1.8	15
UCSF	1.3	10
University of Mississippi Medical Center	1.1	8.9
US NIH	0.9	7.6
The University of Tennessee Health Science Center	0.5	4.1
Nationwide Children's Hospital US	0.5	4.0
University of Newcastle	0.4	3.5
Rutgers University	0.4	3.3
UCLA	0.4	3.2
University of Melbourne	0.4	3.0
Cleveland Clinic Lerner College of Medicine	0.3	2.8
Subtotal of top 12	10	83
Total	12	100

Recipient organisation did not participate in the survey for this year. Any funds received listed are based on data reported by funders so may be incomplete.

Excluding UK DFID, whose funding to PATH's D$_3$AWN PDP included support for pre-eclampsia R&D, but which is captured separately as noted above, twelve organisations provided funding for pre-eclampsia R&D in 2018. Three-quarters of total investment came from the top two funders – the US NIH ($7.7m, 63%) and the Chinese National Natural Science Foundation (NSFC) ($1.8m, 15%) – with all other funders providing less than $1.0m each. The US NIH provided the majority of funding for both basic research ($6.0m, 60%) and diagnostic R&D ($1.7m, 79%), while the Canadian CIHR was the sole funder of pre-eclampsia drug R&D.

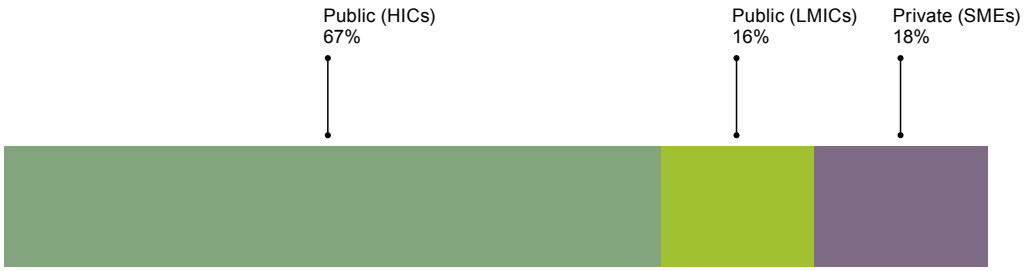
Figure 18. Pre-eclampsia R&D funding by funder sector



The public sector ($12m, 96%) was responsible for almost all pre-eclampsia R&D funding in 2018, of which HICs invested the majority ($9.6m, 82% of all public funding) and LMICs the rest ($2.1m, 18%). All remaining funding ($0.5m, 4.4%) came from the philanthropic sector; there was no investment reported by industry. There were an almost equal number of public sector funders from HICs (5) as there were from LMICs (4), almost all of which were science & technology agencies, reflecting the focus on – and need for – basic research, and the fact that pre-eclampsia remains a public health issue amongst women in both HICs and LMICs, due in part to our poor understanding of the disease's basic pathophysiology.

Aggregate industry was the largest recipient ($2.2m, 18%), all of which was for diagnostic R&D, and all of which was provided by external funders. This was followed by $1.8m (15%) from the Chinese NSFC to a number of unspecified recipients, in this case all for basic research. The largest single recipient of funding, however, was the University of California San Francisco (UCSF) ($1.3m, 10%). Funding to UCSF was also entirely directed towards pre-eclampsia basic research, as was funding for all other top recipients.

Figure 19. Pre-eclampsia R&D funding by recipient sector



More than four-fifths of all pre-eclampsia R&D funding in 2018 went to the public sector ($10m, 82%), with HICs receiving $8.1m (67% of all pre-eclampsia R&D funding) and LMICs $1.9m (16%). The rest went to SMEs in the private sector ($2.2m, 18%), funding for which all came from external funders. Three-quarters of all funding ($9.1m, 76%) went to academic and other research institutions, often universities, and primarily in the USA ($5.5m, 61%).

NON-ISSUE-SPECIFIC

For the purpose of this survey, we included and collected data on three categories of funding that cannot be allocated to a specific SRH issue: platform technologies; core funding of an SRH R&D organisation; and other R&D.

Platform technologies are classified as tools or technologies that can be applied to a range of areas but are not yet focused on a single SRH area or product. Private sector investment in R&D for platform technologies is excluded to ensure that only LMIC-relevant R&D is captured. The platform technology category includes adjuvants & immunomodulators, and delivery technologies.

Adjuvants & immunomodulators are compounds or structures that improve the efficacy of vaccines by improving, modulating or potentiating the human immune response. Aluminium-based adjuvants have long been used, but new, more potent adjuvants are needed.[103]

Delivery technologies are needed to simplify the administration of vaccines and drugs, including nasal or patch-based delivery systems and low-cost formulations for the extended release of therapeutics. An example includes Auritec Pharmaceutical's Versa intravaginal ring platform.[104]

Core funding refers to non-earmarked funding given to organisations that work in multiple SRH areas, where the expenditure per issue is not determined by the funder. For example, funding allocated to an organisation that develops both contraceptives and STI diagnostics by a donor that does not know how much of the funding has been allocated to each R&D area by the recipient is considered core funding.

Other R&D captures any grant that cannot otherwise be allocated, such as multi-dimensional projects looking at a number of SRH issues, products and thematic areas at the same time.

$44.0
MILLION
TOTAL SPEND ON LMIC-APPLICABLE **NON-ISSUE-SPECIFIC** R&D IN 2018

PLATFORM TECHNOLOGIES — IN SCOPE
CORE FUNDING — IN SCOPE
OTHER — IN SCOPE

Exclusively covers research aimed at developing new health technologies – see the Introduction for details

Table 20. Non-issue-specific R&D funding 2018

R&D area	US$ (millions)	% of total
Platform technologies	23	53
Adjuvants & immunomodulators	13	29
Delivery technologies	11	24
Core funding	20	44
Other R&D	1.1	2.4
Total	44	100

Funding for R&D that was not specifically targeted at a single SRH issue in 2018 was $44m.

Most non-issue-specific funding went to R&D into platform technologies with ultimate applicability to SRH issues ($23m, 53%), followed by $20m (44%) in core funding to SRH R&D organisations. The remainder ($1.1m, 2.4%) was for other R&D, capturing projects with multidimensional R&D elements.

PLATFORM TECHNOLOGIES

Global funding for platform technology in 2018 was $23m. This captures funding for SRH specific platform technologies, and those that would be applicable to SRH issues but do not specify that is their intended health area.

Funding for platform technology R&D was fairly evenly split between adjuvants & immunomodulators ($13m, 54%), and delivery technologies ($11m, 46%).

Table 21. Top funders of platform technology R&D 2018

Funder	US$ (millions)	% of total
Gates Foundation	11	49
US NIH	8.4	36
UK DFID	0.8	3.5
Innovate UK	0.8	3.2
EC	0.6	2.4
UK MRC	0.3	1.4
Indian DBT	0.3	1.3
Swiss SNSF	0.2	1.1
SFI	0.2	1.0
Royal Society of New Zealand	0.2	0.8
Flemish EWI	<0.1	0.3
Indian BIRAC	<0.1	0.2
Subtotal of top 12	23	99.9
Total	23	100

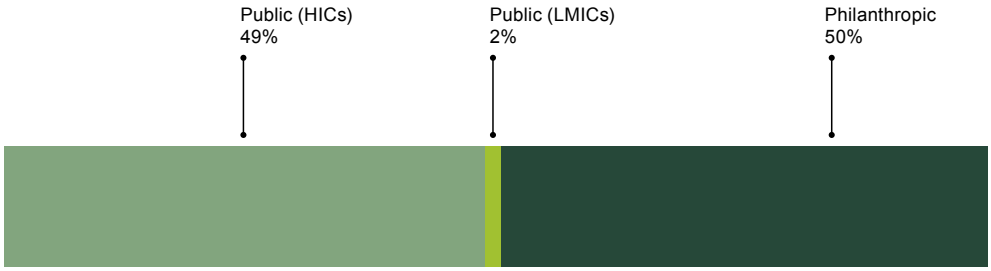
Table 22. Top recipients of platform technology R&D funding 2018

Recipient	US$ (millions)	% of total
Aggregate industry	5.3	23
University College London	3.1	13
PATH	1.9	8.2
Catholic University of Leuven	1.7	7.4
Georgia Institute of Technology	0.8	3.6
Vaccine Formulation Institute	0.8	3.2
University of Washington Foundation	0.7	3.0
University of Montana	0.7	3.0
Boston Medical Center	0.7	2.9
University of Wisconsin	0.6	2.8
Duke University	0.6	2.6
Cornell University	0.6	2.5
Subtotal of top 12	18	75
Total	23	100

Recipient organisation did not participate in the survey for this year. Any funds received listed are based on data reported by funders so may be incomplete.

In total, 14 organisations reported investing in platform technology R&D in 2018. Two funders provided the vast majority of funding, collectively accounting for 85% ($20m) of all investment in platform technology R&D: the Gates Foundation ($11m, 49%) and the US NIH ($8.4m, 36%). The remaining 12 funders each provided under $1.0m. Two thirds ($7.7m, 67%) of the Gates Foundation's funding for platform technologies went to R&D into delivery technologies; in contrast, almost all ($8.0m, 95%) funding from the US NIH was for adjuvants & immunomodulators. Although funding was concentrated amongst the top two funders, both product categories in fact received funding from an array of funders: adjuvants & immunomodulators from seven funders, delivery technologies from eleven funders.

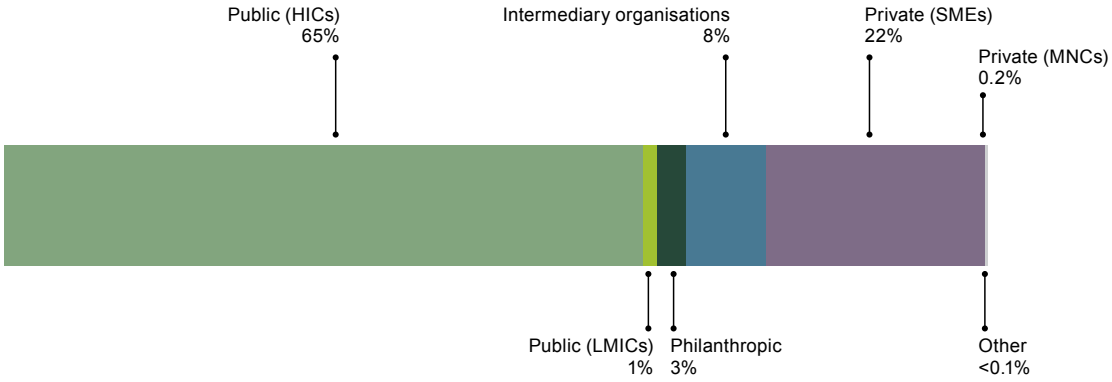
Figure 20. Platform technology R&D funding by funder sector 2018



The public ($12m, 50%) and philanthropic sector ($12m, 50%) each provided half of platform technology R&D funding. The vast majority of funding from the public sector came from HICs ($11m, 97%) – just under three quarters of which came from the US NIH ($8.4m, 74%). Remaining public sector funding came from three organisations in two LMICs ($0.4m, 3.0%): from India via the Indian DBT ($0.3m, 83% of LMIC funding) and Indian BIRAC (<$0.1m, 14%), and from Brazil via the Brazilian FAPEMIG (<$0.1m, 3.1%). Almost all funding from the philanthropic sector came from a single organisation – the Gates Foundation ($11m, 98% of philanthropic funding). The remainder of philanthropic funding came from the Royal Society of New Zealand ($0.2m, 1.5%) and the Wellcome Trust (<$0.1m, <0.1%).

There were 47 reported recipients of platform technology R&D funding in 2018. Just under a quarter of investment went to aggregate industry ($5.3m, 23%), the majority of which was for the development of adjuvants & immunomodulators ($3.7m, 70% of aggregate industry's received funding). All platform technology R&D investment to aggregate industry came from external funders ($5.3m, 100%). The next largest share went to University College London ($3.1m, 13%) for the development of an ultra-low-cost recombinant subunit vaccine manufacturing platform. The third largest recipient – PATH – received funding from the Gates Foundation ($1.1m, 57% of PATH's platform technology funding) for the development of a next-generation compact, prefilled auto-disable device for delivery of injectable contraceptives and vaccines, and from the UK DFID ($0.8m, 43%) for the development of microarray patches to deliver vaccines and drugs.

Figure 21. Platform technology R&D funding by recipient sector 2018



Two-thirds of platform technology R&D funding went to recipients in the public sector ($15m, 66%) with HICs receiving the largest share ($15m, 98% of public funding). LMICs received 1.9% ($0.3m) of all funding that went to the public sector – all of which went to Indian organisations. Private sector recipients received just under a quarter of all funding ($5.3m, 23%), all of which was externally funded ($5.3m, 100%) rather than self-funded research. SMEs received almost all of the funding that went to the private sector ($5.2m, 99%), with the remainder going to MNCs (<$0.1m, 1.1%). Nearly all remaining funding for platform technology R&D went to the intermediary organisation PATH, – and the University of Washington Foundation ($0.7m, 3.0%).

CORE FUNDING

Core funding of SRH R&D organisations conducting R&D in multiple SRH issues in 2018 totalled $20m.

Table 23. Core funders 2018

Funder	US$ (millions)	% of total
UK DFID	6.9	36
Indian ICMR	6.1	31
Dutch DGIS	5.9	30
Norwegian Ministry of Foreign Affairs	0.6	3.1
Total	20	100

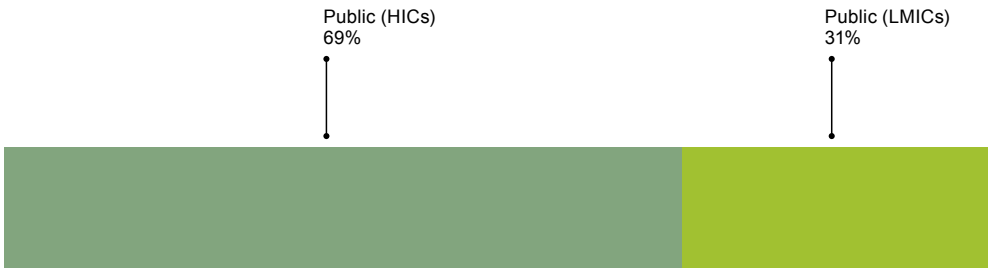
Table 24. Recipients of core funding 2018

Recipient	US$ (millions)	% of total
WHO/HRP	9.4	48
Indian ICMR	6.1	31
ICDDR,B	4.0	21
Total	20	100

Recipient organisation did not participate in the survey for this year. Any funds received listed are based on data reported by funders so may be incomplete.

Four organisations reported providing core funding to SRH R&D organisations, with the top three funders – UK DFID ($6.9m, 36%), Indian ICMR ($6.1m, 31%) and Dutch DGIS ($5.9m, 30%) – accounting for 97% ($19m). The remainder came from the Norwegian Ministry of Foreign Affairs ($0.6m, 3.1%). All organisations except for the UK DFID reported providing core funding to a single organisation. UK DFID split its investment between two organisations: the Bangladeshi ICDDR ($4.0m, 58% of UK DFID's core funding) and WHO/HRP ($2.9m, 42%).

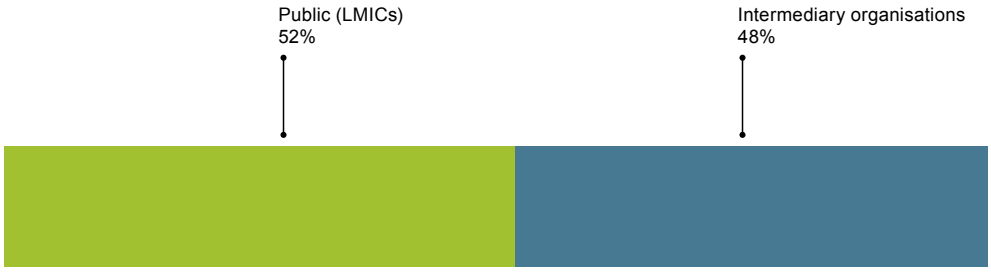
Figure 22. Core funding by funder sector 2018



All core funding to SRH R&D organisations in 2018 came from the public sector. Funding from HICs in Europe and the UK provided the majority ($13m, 69%), with the remainder from a single LMIC (India).

Only three organisations were reported as receiving core funding, with just under half ($9.4m, 48%) going to WHO/HRP – the main instrument within WHO and the UN system responsible for research in SRH and human reproduction. Reported core funding to WHO/HRP in 2018 came from three funders: the Dutch DGIS ($5.9m, 62% of WHO/HRP's core funding), the UK DFID ($2.9m, 31%) and the Norwegian Ministry of Foreign Affairs ($0.6m, 6.5%), although it should be noted that WHO/HRP undertakes a range of activities beyond the scope of this report, and that it receives core funding support from a range of governments and philanthropic organisations, including the governments of Sweden, Switzerland, the USA, and the Gates Foundation. Figures reported here reflect only those reported by funders through this survey. Funding for the Indian ICMR was intramural ($6.1m, 31%), directed to the National Institute for Research in Reproductive Health (NIRRH) within ICMR. The Bangladeshi ICDDR also received $4.0m – just over a fifth (21%) of all core funding and all from the UK DFID – for work conducted under their maternal and neonatal health portfolio.

Figure 23. Core funding by recipient sector 2018



Core funding was essentially evenly split between public sector recipients ($10m, 52%) – all of which went to LMICs (India and Bangladesh) – and intermediary organisations ($9.4m, 48%), in this case WHO/HRP.

OTHER R&D

A total of $1.1m was reported as 'Other R&D' in 2018. Two organisations provided this funding: UK DFID ($1.0m, 94%) and Brazilian FINEP (<$0.1m, 6.2%). All of UK DFID's funding went to PATH for the Devices, Diagnostics, and Drugs to Address Women's Needs Product Development Partnership (D_3AWN PDP) project, for a portfolio of products to prevent or manage pre-eclampsia/eclampsia and PPH. All of Brazilian FINEP's investment went to the Brazilian Federal University of Para for multi-faceted projects related to HIV, HTLV-1 and chlamydia diagnostics, therapeutics and vaccines.

DISCUSSION

This report provides an overview of global investment in research and development (R&D) for new products and technologies designed to address sexual and reproductive health (SRH) challenges that disproportionately affect people in low- and middle-income countries (LMICs). Given the diverse range of issues and diseases included in its scope, the focus of this report is not on the headline funding total, nor on comparing funding between different issues (unless this comparison is instructive). However, the data captured in this report is instead intended to offer an interesting insight into the current landscape of global investment in SRH R&D, and to serve as a baseline for future tracking efforts.

Funding for HIV/AIDS R&D dwarfed funding for all other STIs combined; but STI funding was similarly dominated by priority pathogens

Global investment in basic research and product development for HIV/AIDS in 2018 was $1,442m, orders of magnitude larger than all other STIs. The scale of this difference reflects the unique position held by HIV/AIDS in the global health and R&D landscape. While undoubtedly assisted by decades of strong global advocacy and sustained investment, this position also reflects the disease's high mortality and morbidity (954,492 annual deaths, 54m annual disability adjusted life years lost (DALYs)) compared with other STIs (119,093 annual deaths, 11m annual DALYs);[105] and an advanced pipeline of products with a number of candidates in (expensive) late stage clinical trials.

The fact that investment in HPV and HPV-related cervical cancer product R&D ($52m) in 2018 was only slightly less than total investment in all other STIs combined ($71m) can be explained by similar factors. HPV-related cervical cancer causes 331,000 deaths per year[106] – around three times more than from all other STIs combined. Interest and investment in HPV and HPV-related cervical cancer R&D is also driven by a global agenda focused on cervical cancer elimination with freshly renewed support from WHO, HIC and LMIC governments alike.[107] This recognises the high burden of HPV-related mortality and the value in improving current products, such as post-registration dose reduction studies of existing preventive vaccines, as a strategy towards cervical cancer elimination.

Global investment in STI R&D in 2018 was similarly focused on priority STIs and elimination strategies outlined in WHO's Health Sector Strategy on STIs.[108] This includes attention towards gonorrhoea, which comprised over a third ($24m, 34%) of all STI R&D investment. New drug R&D aimed at addressing antimicrobial resistant gonorrhoea in particular, accounted for 10% ($7.2m) of all STI funding, and was predominantly driven through GARDP. Other priority investment areas included preventive and therapeutic vaccines for HSV-2 ($9.2m, 13% of all STI funding) and diagnostics for multiple STIs ($9.1m, 13%). Despite better products to address syphilis also being an identified global health priority, reported syphilis R&D lags behind ($2.8m, 3.9%).

When combined with issue-specific totals, investment in MPT R&D influences overall funding levels for some – but not all – SRH issues within its definition

MPTs are drugs or devices & combination products that simultaneously prevent a combination of two or more specific SRH issues: infection with HIV/AIDS, infection with STIs, or prevention of pregnancy. By extension, total funding values for HIV/AIDS R&D, STI R&D and contraception R&D could arguably also include investments in MPT R&D, where that SRH issue is included as an indication. The impact of combining these values, however, varies between SRH issues.

Total funding for HIV/AIDS R&D including HIV-related MPT R&D is $1,453m, just 0.7% ($10m) more than total HIV/AIDS funding without ($1,442m). The relatively minor impact of this additional funding reflects both the magnitude of the overall HIV/AIDS R&D landscape compared with STIs and contraception (over 20 and 23 times greater in value respectively), as well as an investment portfolio dominated by vaccine development.

Table 24. MPT R&D funding by indication, relative to overall issue investment 2018 (US$ millions)

Issue	Issue-only investment	MPT investment with issue indicated*	Total investment*	% change	MPT investment as % of total investment
HIV/AIDS	1,442	10	1,453	0.7	0.7
STIs	71	44	115	61	38
Contraception	64	45	109	71	41

* Figures in these columns include duplicative values across rows, and therefore cannot be added together

In contrast, total funding for STI R&D when STI-related MPT R&D is included expands to $115m from $71m, an increase of 61%. Similarly, total contraception R&D rises sharply to $109m from $64m when contraception-related MPT R&D is included (up 71%). Contraception-related MPT R&D in fact represents 41% of all contraception R&D combined. Besides much smaller overall funding portfolios to HIV/AIDS, the greater impact of MPT funding on overall funding levels for STIs and contraception R&D is predominantly driven by considerable industry-led investments into on-demand MPTs with dual protective action against STIs and pregnancy ($37m, 78% of all MPT funding). This, along with the advanced stage of these candidates in the MPT pipeline, translate to a substantial impact on the overall picture for STI and contraception R&D.

A few funders – US NIH, Gates Foundation and industry – dominate SRH R&D investment, with some interesting industry profiles

The top three funders of all SRH issues combined are the US NIH ($994m), industry ($273m) and the Gates Foundation ($185m). While it isn't necessarily meaningful to analyse total funding across the diverse range of issues and R&D portfolios represented in this report, it is certainly notable that these three funders appear consistently (although not always simultaneously) as top funders across each and every issue. This is true whether there are many funders of an issue or just a few.

The US NIH ranked in the top three funders of R&D for every single SRH issue in this report except PPH. It was also a top funder of platform technology R&D. The weight of investment by the US public sector is unsurprising given the US NIH's considerable ongoing contribution to global biomedical R&D, including a vast health portfolio that incorporates sizeable investment in maternal and child health and infectious disease R&D. The Gates Foundation also featured as a top funder across a number of SRH issues, including contraception, HIV/AIDS, HPV and HPV-related cervical cancer, pre-eclampsia and platform technologies. These investments are similarly driven by focused strategic priorities in contraception, HIV/AIDS, and maternal, newborn and child health. The positive interpretation of this data is that both the US NIH and the Gates Foundation are invaluable contributors to SRH R&D. While this is undoubtedly true, the fact that these two organisations together account for 68% of all funding for SRH R&D identified in this report signals a heavy reliance on just a couple of organisations to support SRH R&D.

Industry funding to SRH R&D was also well represented across issues – at least when aggregated – featuring as one of the top funders in all SRH issues except pre-eclampsia and platform technology R&D. Given industry's historically limited interest in R&D for many SRH issues – particularly contraception – this ranking is notable. A number of industry organisations and pharmaceutical companies featured in this report – while still classified as MNCs or SMEs – are driven by explicitly women-focused, socially-oriented objectives, intentionally accepting probable lower profits for social returns. Some are not-for-profit, others, such as MSD for Mothers, are women-focused initiatives of large MNCs. Acknowledging a limited dataset, the trend is nonetheless interesting.

As a baseline effort, there are acknowledged gaps in survey participation and data

Data collection for this project utilised the well-established systems, processes and relationships of Policy Cures Research's broader G-FINDER project, leveraging over 12 years of experience in collecting and analysing global health R&D data. We acknowledge, however, that re-establishing the G-FINDER SRH project after a five-year hiatus has likely left holes in participation and ultimately the data presented here.

G-FINDER also has strict protocols for handling data, especially to avoid double counting. This means that there are instances where some organisations' data – though relevant – was necessarily omitted, for example, because of misalignments between funder disbursement and recipient expenditure years. This has meant some notable organisations working in SRH R&D have relevant work that could not be included.

Nonetheless, the data reported here offer an insightful baseline effort at capturing the global picture of SRH product R&D. As the project establishes itself and moves into a yearly data collection cycle similar to the G-FINDER neglected disease and emerging infectious disease survey, our intention is to grow and nurture participation across sectors. We also intend to offer a more comprehensive evidence-base and analysis, including consecutive, year-on-year funding trends across the global SRH R&D landscape.

ANNEXE 1: METHODOLOGY

DATA COLLECTION

Data for this report was collected as a specific survey through the G-FINDER project survey platform. For the past twelve years, G-FINDER has collected annual data on R&D investments for neglected diseases. Later this was expanded to emerging infectious diseases, and now sexual and reproductive health (SRH). While the G-FINDER neglected diseases/emerging infectious diseases and SRH surveys are separate, they utilise the same data collection tools and processes. This includes operating according to two key principles: capturing and analysing data in a manner that is consistent and comparable across all funders and diseases or health issues; and presenting funding data that is as close as possible to 'real' investment figures.

Tools and approaches

G-FINDER (for neglected diseases) was originally designed as an online survey. An online survey platform was developed to capture grant data and is still used annually by the majority of survey participants. To capture SRH R&D investment data, an SRH online survey was developed and added as an alternative survey option to the G-FINDER online platform. Once logged in, participants were asked to select either the neglected diseases/emerging infectious diseases survey or the SRH survey. All participants were able to complete both surveys, if applicable.

An offline grant-based reporting tool (in Excel) is also available for G-FINDER. This tool was adapted for the SRH survey to capture offline grant data for SRH R&D. Industry (pharmaceutical companies and biotechnology firms) investment in R&D is not grant-based, so a version of the reporting tool was tailored for these participants. Instead of grants, companies enter the number of staff working on SRH R&D programs, salaries, and direct project costs related to these. Companies were required to exclude 'soft' figures such as in-kind contributions and costs of capital.

For the US National Institutes of Health (NIH), grants were collected using the Research Portfolio Online Reporting Tools (RePORTER) and the Research, Condition and Disease Categorization (RCDC) process, with more granular funding data provided directly by the US National Institute of Allergy and Infectious Disease (NIAID). 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)* was retrieved from the Community Research and Development Information Service (CORDIS) public database and Innovative Medicines Initiative's (IMI) online project list. Supplementary data was provided by the EC. Information about the R&D projects funded by Innovate UK was extracted from spreadsheets available on its website. Funding data for the National Natural Science Foundation of China was extracted from its public Chinese-language database.

Processes

Survey participants were identified in a number of ways. This included drawing on G-FINDER's comprehensive, 12-year database of global health R&D organisations; landscaping the environment for organisations active in SRH R&D; and consulting with the project's international Expert Advisory Group (see Annexe 2) and other experts to further identify priority participants.

All participants were asked only to enter SRH R&D disbursements (or receipts), rather than commitments made but not yet disbursed, for the financial year 2018. Data included the grant amount, grant identification number, a brief description of the grant and the name of the funder or recipient of the grant. They were also asked to confirm their organisation details such as role in funding (e.g. funder, fund manager, product developer), financial year, currency used, type of organisation (e.g. private sector firm, academic institution, multilateral organisation), and country where they were located.

* 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, such as the European & Developing Countries Clinical Trials Partnership (EDCTP) and Innovative Medicines Initiative (IMI).

Each grant was entered using a three-step process, where the survey recipient had to choose from a pre-defined list: (1) a specific SRH issue (e.g. contraception, STIs etc), and sub-issue if applicable (e.g. short-acting contraception, gonorrhoea etc); (2) a product type (e.g. drugs, diagnostics etc); and (3) a research type within the product (e.g. discovery and preclinical, clinical development etc) (see the full SRH scope document at **https://www.policycuresresearch.org/r-and-d-needs-for-global-health**). Where survey recipients could not provide data to this level of detail, they were asked to provide the finest level of granularity they could. If survey recipients were not able to allocate the grant to a single SRH issue in step 1, four options were available under the category 'Cannot be allocated to one SRH issue'. These were:

- 'Multi-purpose prevention technologies (MPTs)'
- 'Platform technologies'
- 'Core funding of an SRH R&D organisation' (e.g. funding to an organisation working in multiple SRH areas, where the expenditure per area was not known to the funder)
- 'Other R&D' (e.g. when survey participants were not able to allocate the investments to a single issue, product or research type)

129 organisations (reporting on behalf of 135 organisations) from 27 countries reported SRH R&D data (see Annexe 4 for a list of survey participants). All respondents used the same definitions, categories and inclusion/exclusion criteria. In general, only primary grant data was accepted; the only exception was 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 was subject to verification using the same processes and inclusion/exclusion criteria.

Data was collected over a six-week period from May to June 2019, and during an intensive follow-up with key participants through to November 2019.

DATA VALIDATION

Survey closure was followed by a period of intensive data cleaning, cross-checking, and organising of the complex dataset collected. All grants were verified through a three-step process:

1. Each grant was reviewed and scope checked against our inclusion criteria. Amendments were made to the SRH issue, product or research type categories if incorrectly labelled, as needed. A total of 3,641 grants were manually checked for correct allocation. Where questions remained, organisations were contacted to clarify.
2. Automated reconciliation reports were used to cross-check 'disbursed' funding reported by funders against 'received' funding reported by recipients (intermediaries or product developers). This was followed by manual grant-level review of the report outputs.
3. Discrepancies were resolved by contacting both groups to identify the correct figure. In the few cases where discrepancies still remained, the funder's figures were used.

For grants from the US NIH, funding data was supplemented and cross referenced with information received from the Office of AIDS Research (OAR) and the NIAID. Industry figures were 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 fell outside the expected range, for example, above average FTE costs for clinical staff, were queried with the company and corrected where necessary.

DATA AGGREGATION

With a few exceptions, all pharmaceutical industry funding data was aggregated and anonymised for confidentiality purposes. Rather than being attributed to individual companies, pharmaceutical company investment was instead reported according to the type of company, with a distinction made between multinational pharmaceutical companies (MNCs) and small pharmaceutical and biotechnology firms (SMEs).

HANDLING OF FINANCIAL DATA

The collection principles used by the G-FINDER survey to handle key financial data were also used to handle the data included in this SRH report. These principles included:

- Survey respondents were asked to enter grant-by-grant expenditures incurred during their 2018 financial year (where this differed from the calendar year, respondents were asked to use the year that had the largest overlap with the 2018 calendar year).
- Only funding disbursements or R&D expenditures were included, as opposed to commitments made but not yet disbursed, or 'soft' figures such as in-kind contributions, costs of capital, or funding estimates.
- All figures were reported in 2018 US dollars. Data entered by survey participants in their local currency was converted to US dollars based on the 2018 average annual exchange rate as reported by the International Monetary Fund.

LIMITATIONS TO INTERPRETATION

While the G-FINDER survey methodology has been refined over the past 12 years, there are limitations to the data presented. Potential limitations include:

- **Survey non-completion.** Although strenuous efforts were made to identify all organisations active in SRH R&D, some SRH R&D funding might not have been captured because organisations were not identified and therefore were not invited to participate, or were invited to participate, but did not respond. In particular, private sector investments might be under-reported due to the lack of company participation; only 23 companies reported relevant SRH R&D data in 2018. Limited participation from LMIC-based firms means likely under-reporting in SRH areas where these firms are active.
- **Response rate.** Differing levels of responsiveness between organisations and countries may also have skewed the findings. For instance, being Australian-based, English is the operating language of the G-FINDER group, and this may have translated to higher levels of responsiveness from English speaking organisations, with organisations in non-English speaking settings less enthusiastic in their response (although this is not known to have occurred). Diligent follow up was undertaken during the survey period to encourage participation from a range of organisations. Response and finalisation of the survey however ultimately fell to the organisation, and their interest and prioritisation of the project.
- **Time lags in the funding process.** Time lags exist between disbursement, receipt, and expenditure of funds. 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 here and actual expenditure on R&D programs by product developers and researchers.
- **Inability to disaggregate investments.** Funding allocated to some issues and products may be underestimated due to an inability to discern the precise allocation of funds. This includes funding for organisations working across multiple SRH issues, since core funding grants are not counted within the funding figures for specific SRH issues. This also applies to investments in multiple SRH issues: where funders were unable to disaggregate grants for multiple SRH issues within scope, these investments were included in the 'Other R&D' category. This methodology was followed to prevent double counting.
- **Missing data.** We can only report the data as it is given to us. Although strenuous efforts were made to check the classification, accuracy and completeness of grants, data might have been incorrectly entered or funders may have accidentally omitted some grants. We believe, however, that the checks and balances built into the G-FINDER process – refined over a decade of data collection – mean that such mistakes, if present, will have a minor overall impact.

ANNEXE 2: EXPERT ADVISORY GROUP

EXPERT ADVISORY GROUP MEMBER	ORGANISATION	TITLE
Marleen Temmerman	Aga Khan University	Director, Centre of Excellence in Women and Child Health / Chair, Department of Obstetrics and Gynaecology
O. A. Ladipo	Association of Reproductive and Family Health Nigeria	President / CEO
Joseph Speidel	Bixby Center for Global Reproductive Health, University of California San Francisco	Professor, Department of Obstetrics, Gynecology and Reproductive Sciences
Miles Kemplay	Children's Investment Fund Foundation	Executive Director, Adolescence
Lester Chinery	Concept Foundation / Reproductive Health Supplies Coalition	Director of Programs / Chair, Generic Manufacturers Caucus
Timothy Mastro	FHI 360	Chief Science Officer
Laneta Dorflinger	FHI 360	Director, Contraceptive Technology Innovation
Kate Rademacher	FHI 360	Technical Advisor, Contraceptive Technology Innovation
Malabika Roy	Independent expert (previously Indian Council of Medical Research)	Independent expert (previously Head, Division of Reproductive Child Health, Indian Council of Medical Research)
Smita Mahale	Indian Council for Medical Research	Director, National Institute for Research in Reproductive Health
Bethany Young Holt	Initiative for MPTs	Executive Director
Kathryn Stewart	Initiative for MPTs	Deputy Director
Jeffrey Jacobs	MSD for Mothers	Director, Product Innovation and Market Access
Hanke Nubé	Ministry of Foreign Affairs the Netherlands, Directorate-General for International Cooperation	Senior Health Advisor / Thematic Expert Sexual and Reproductive and Rights
John Townsend	Population Council	Director, Country Strategy
Martha Brady	Program for Appropriate Technology in Health	Program Leader, Reproductive Health
Saumya RamaRao	Population Council / Reproductive Health Supplies Coalition	Senior Associate / Chair, Caucus for New & Underused Reproductive Health Technologies

EXPERT ADVISORY GROUP MEMBER	ORGANISATION	TITLE
Yan Che	Shanghai Institute of Planned Parenthood Research	Professor
Linglig Feng	Shanghai Institute of Planned Parenthood Research	Associate Professor of Pharmaceutics
Jianxing Chen	Shanghai Institute of Planned Parenthood Research	Professor of Medicinal Chemistry / Director of Drug Research
Jonathon Glock	United States National Institute of Health / National Institute of Allergy and Infection Diseases	Multipurpose Prevention Technologies and Diagnostics Program Officer
Helen Rees	Wits Reproductive Health and HIV Institute	Executive Director
Ian Askew	World Health Organization, Special Programme of Research, Development and Research Training in Human Reproduction	Director, Reproductive Health and Research
Melanie Taylor	World Health Organization, Special Programme of Research, Development and Research Training in Human Reproduction	Medical Officer, Sexually Transmitted Infection Programme

ANNEXE 3: STAKEHOLDER CONSULTATION

Prior to our technical consultation with the Expert Advisory Group, in October 2018 we reached out to a range of stakeholders working in the global SRH sector (including major donors and investors, peak bodies in policy and advocacy, research and developers, and NGOs and implementers) to seek their guidance on the potential scope and breadth of the report. We would like to acknowledge the following individuals for their valuable input.

NAME	ORGANISATION	TITLE
Joseph Speidel	Bixby Center for Global Reproductive Health, University of California San Francisco	Professor, Department of Obstetrics, Gynecology and Reproductive Sciences
Eleni Han	Clinton Health Access Initiative	Global Markets Team
Cécile Vernant	Deutsche Stiftung Weltbevoelkerung (DSW)	Head of EU Office
Martyn Smith	Family Planning 2020 (FP2020)	Managing Director, FP2020 Secretariat
Timothy Mastro	FHI 360	Chief Science Officer
Joyce Seto	Global Affairs Canada / Department of Foreign Affairs, Trade and Development	Deputy Director, Health and Nutrition Bureau
Kathryn Stewart	Initiative for MPTs	Deputy Director
Mina Barling	International Planned Parenthood Federation	Director, External Relations
Kathryn Andersen	Ipas	Chief Scientific and Technical Officer
Hanke Nubé	Ministry of Foreign Affairs the Netherlands, Directorate-General for International Cooperation	Senior Health Advisor / Thematic Expert Sexual and Reproductive and Rights
John Townsend	Population Council	Director, Country Strategy
Karl Hoffman	Population Services International	President and CEO
Kevin Peine	United States Agency for International Development	Biomedical R&D Team Lead

ANNEXE 4: SURVEY RESPONDENTS

- Aidsfonds*
- amfAR, The Foundation for AIDS Research*
- Argentinian Ministry of Science, Technology and Productive Innovation (MINCYT)
- Auritec Pharmaceuticals*
- Australian National Health and Medical Research Council (NHMRC)
- Australian Research Council (ARC)
- Baruch S. Blumberg Institute
- Baylor College of Medicine
- Becton, Dickinson and Company (BD)
- Belgian National Fund for Scientific Research (FWO)*
- Bill & Melinda Gates Foundation
- Biotechnology Industry Research Assistance Council (BIRAC)
- Brazilian Innovation Agency (FINEP)
- Brazilian Ministry of Health: Department of Science and Technology (DECIT)
- Brazilian Research Support Foundation of the State of Bahia (FAPESB)
- Brazilian Research Support Foundation of the State of Minas Gerais (FAPEMIG)
- Brazilian Support Foundation for Research in the State of Amazonas (FAPEAM)
- Brazilian Support Foundation for Research in the State of São Paolo (FAPESP)
- 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
- California Institute for Regenerative Medicine (CIRM)*
- Campbell Foundation*
- Canadian Institutes of Health Research (CIHR)#
- CEMAG Care
- Chiang Mai University*
- Children's Investment Fund Foundation (CIFF)*
- Chilean National Fund for Scientific and Technological Development (FONDECYT)
- Colombian Department for Science, Technology and Innovation (Colciencias)
- CONRAD*
- Cuban Center for Genetic Engineering and Biotechnology (CIGB)*
- Danish Ministry of Foreign Affairs and the Danish International Development Agency (DANIDA)#
- Drugs for Neglected Diseases initiative (DND*i*)
- Dutch Ministry of Foreign Affairs - Directorate General of Development Cooperation (DGIS)
- Entasis Therapeutics
- Eppin Pharma
- European & Developing Countries Clinical Trials Partnership (EDCTP)
- European Commission (Directorate-General for Research and Innovation)#
- Evofem Biosciences
- FHI 360
- Flemish Department of Economics, Science and Innovation (EWI)
- Foundation for Innovative New Diagnostics (FIND)
- 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)
- German Federal Ministry for Economic Cooperation and Development (BMZ)
- German Federal Ministry of Education and Research (BMBF)
- German Federal Ministry of Health (BMG)
- German Research Foundation (DFG)
- Gesea Biosciences
- Global Affairs Canada
- Global Antibiotic Research and Development Partnership (GARDP)
- Global Good
- Grand Challenges Canada (GCC)
- GSK Bio
- Gynuity Health Projects
- Health Research Council of New Zealand (HRC)
- Hepatitis B Foundation
- Hervana Bio
- Huesped Foundation*
- Ibero-American Program of Science and Technology for Development (CYTED)
- Indian Council of Medical Research (ICMR)

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

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

- Indian Department of Biotechnology, Ministry of Science and Technology (DBT)
- Indian Department of Health Research, Union Ministry of Health and Family Welfare
- Initiative for MPTs (IMPT) including CAMI Health
- Innovate UK#
- Institut Pasteur
- Institute of Tropical Medicine Antwerp (ITM)
- International AIDS Society
- International AIDS Vaccine Initiative (IAVI)
- International Partnership for Microbicides (IPM)*
- Irish Aid
- Italian National Institute of Health (ISS)*
- Johnson & Johnson
- Liverpool School of Tropical Medicine (LSTM)
- Male Contraceptive Initiative (MCI)
- Mapp Biopharmaceutical
- Médecins Sans Frontières (MSF)
- Medicines360
- Melbourne Children's Campus
- Mexican National Institute of Public Health (INSP)
- Molbio Diagnostics
- MSD / Merck
- MSD for Mothers, an initiative of Merck & Co., Inc
- Mymetics
- National Natural Science Foundation of China (NSFC)#
- Parsemus Foundation
- PATH including the Malaria Vaccine Initiative (MVI)
- Phillip T. and Susan M. Ragon Foundation*
- Population Council
- Preeclampsia Foundation
- Public Health Agency of Canada (PHAC)*
- Reproductive Health Investors Alliance (RHIA Ventures)
- Reproductive Health Supplies Coalition (RHSC)
- Research Council of Norway
- Royal Norwegian Ministry of Foreign Affairs and the Norwegian Agency for Development Cooperation (NORAD)
- Royal Society of New Zealand (RSNZ)
- San Raffaele Scientific Institute (IRCCS)*
- Sanofi
- Science Foundation Ireland (SFI)
- Serum Institute of India
- Sidaction*
- South Africa Medical Research Council (MRC)
- South African Department of Science and Technology (DST)
- Sumagen*
- Swiss National Science Foundation (SNSF)#
- Swiss Tropical & Public Health Institute (Swiss TPH)
- Tara Health Foundation
- Thai Government Pharmaceutical Organisation (GPO)
- Thai Red Cross AIDS Research Center (TRC-ARC)*
- The Female Health Company*
- The Wellcome Trust
- The William and Flora Hewlett Foundation
- UK Department for International Development (DFID)
- UK Department of Health and Social Care (DHSC)#
- UK Medical Research Council (MRC)
- Unitaid
- University of Melbourne
- University of Nebraska Medical Center
- University of Pittsburgh
- US Agency for International Development (USAID)
- US Centers for Disease Control and Prevention (CDC)
- US Department of Defense (DOD) including Defense Advanced Research Projects Agency (DARPA), US Army Medical Research Institute of Infectious Diseases (USAMRIID), the US Naval Medical Research Center (NMRC), Defense Threat Reduction Agency (DTRA) and the Walter Reed Army Institute of Research (WRAIR)#
- US National Institutes of Health (NIH) including the US National Institute of Allergy and Infectious Disease (NIAID) and the US National Institute of Child Health and Human Development (NICHD)#
- ViiV Healthcare
- Women's Global Health Innovations (WGHI)
- Women's Health Research Institute (WHRI)
- World Health Organization: Special Programme of Research, Development and Research Training in Human Reproduction (WHO/HRP)
- Yaso Therapeutics

An additional 138 organisations also participated in the G-FINDER neglected disease and emerging infectious disease surveys that did not report any SRH R&D investment data. Refer to Annexe 2 in the G-FINDER 2019 neglected disease report.

* Denotes organisations where funding data was only received via the Resource Tracking for HIV Prevention Research and Development Working Group
# Denotes organisations where funding data was taken from publicly available sources

ANNEXE 5

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