

# HIV PREVENTION RESEARCH & DEVELOPMENT INVESTMENTS 2021

Shifting investment  
priorities fund  
innovation in a  
challenging global  
health landscape

JULY 2023



RESOURCE TRACKING  
FOR HIV PREVENTION  
RESEARCH & DEVELOPMENT



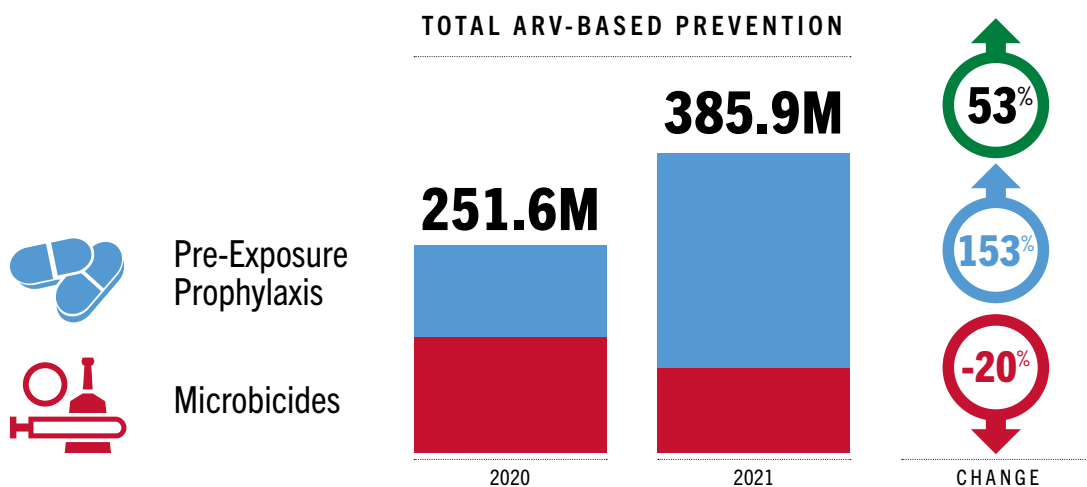


In its 17th annual report, the Resource Tracking for HIV Prevention Research & Development Working Group (“Working Group”) documents research and development spending for the calendar year 2021. This report also analyzes funding trends spanning 22 years for the following biomedical HIV prevention options: preventive HIV vaccines, microbicides, pre-exposure prophylaxis (PrEP), treatment as prevention (TasP), voluntary medical male circumcision (VMMC), female condoms and prevention of vertical transmission (PVT).

## Trends in HIV Prevention R&D

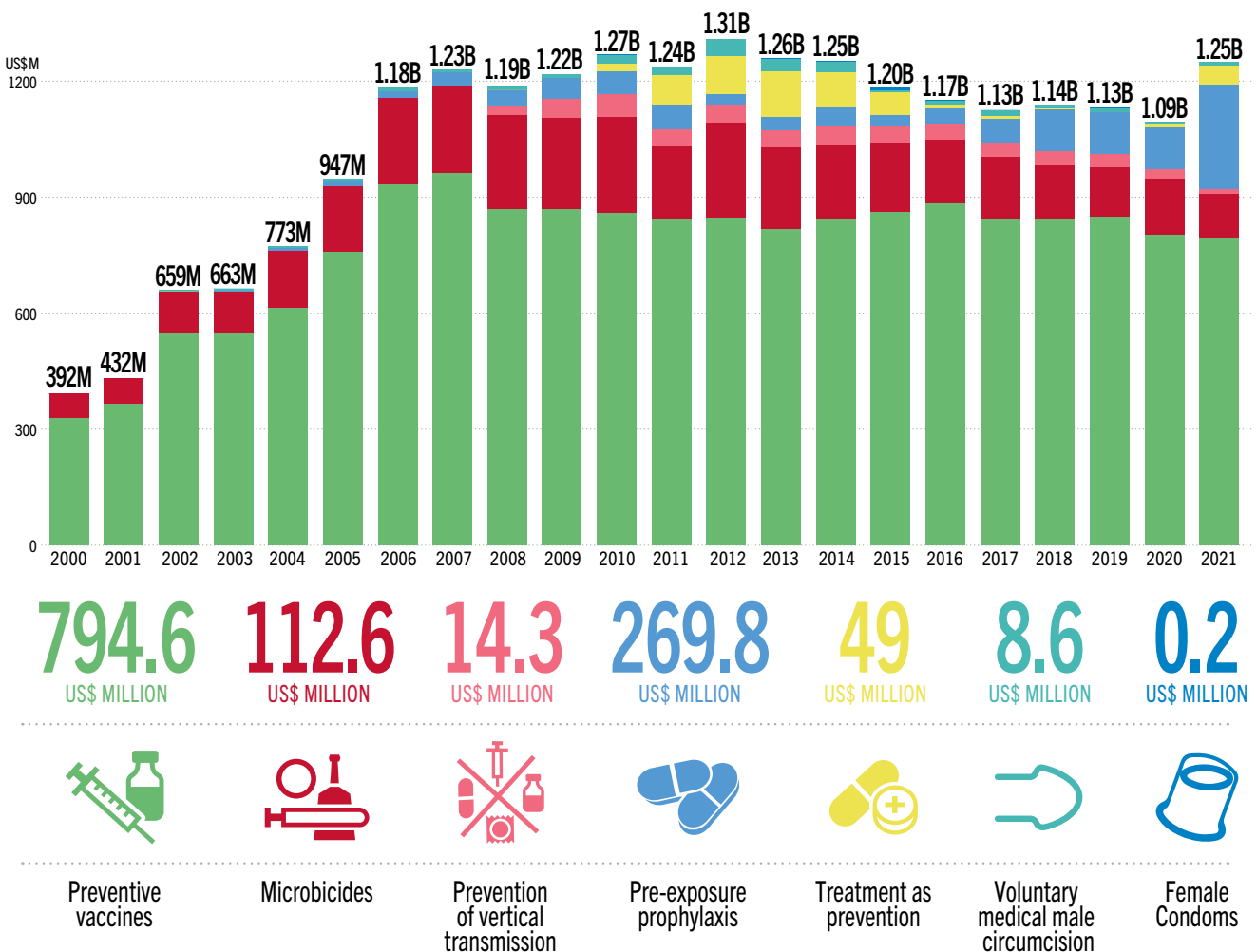
In 2021, total funding for HIV prevention R&D increased 12.5 percent (US\$140 million) from the previous year, rising to US\$1.25 billion. Funding increased for R&D focused on PrEP, VMMC, TasP and female condoms. During the same period, microbicide funding saw a 20 percent decline, and preventive HIV vaccine research declined 4 percent. The decline in microbicide funding reflects, in part, the impact of closure of the Microbicides Trials Network.

In addition, a number of donors have expanded the definition of “PrEP R&D” to incorporate all antiretroviral (ARV)-based prevention options, including investments that might have previously been coded as microbicides. The combined 2021 investments for microbicides and PrEP increased 53% in aggregate.



Preventive HIV vaccines, as the focus of 63.5 percent of total prevention research investment in 2021, continued to make up the lion’s share of overall HIV prevention funding. Yet preventive HIV vaccines in 2021 comprised a lower percentage of total prevention funding than in any prior year. The increase in total prevention funding in 2021 was fueled instead by increases in PrEP and TasP funding. The relative proportion of PrEP funding, at 21 percent of overall HIV prevention funding in 2021, has risen consistently since 2012 when the first PrEP indication TDF/FTC was approved by the US Food and Drug Administration.

**FIGURE 1**  
**Global HIV Prevention R&D Investment by Technology Category**  
 2000-2021 (US\$ millions)



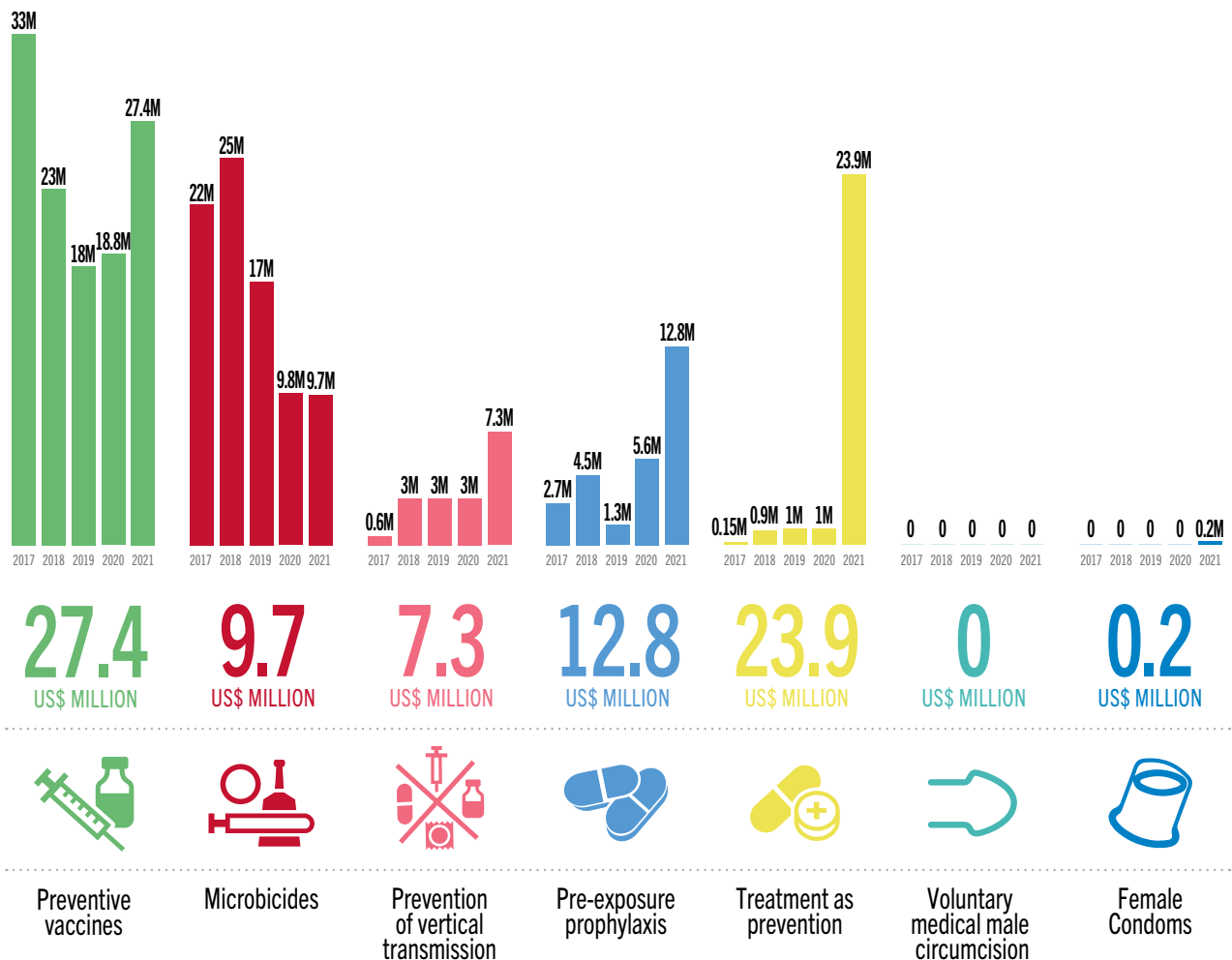
## US and European Public Sector Funding

Both public sector investment and philanthropic investment as a percentage of total investment remained the same in 2021, at 81 percent and at 12 percent, respectively. North America, principally the United States Government, made up the bulk of public sector funding in 2021 at US\$1.08 billion (86 percent), while the European region came in second at US\$161 million (13 percent). Other regions contributed US\$13 million which constituted one percent of the cumulative public sector funding.

US public sector investment as a whole increased from US\$857 million to US\$922 million in 2021. In particular, US public investment in PrEP and TasP substantially increased in 2021 over 2020. European public sector funding increased to US\$81.3 million. Europe saw increases in all areas of prevention research except, like the US, in microbicides.

**FIGURE 2**

### European Public Sector Investments in HIV Prevention R&D by Technology 2017-2021 (US\$ millions)

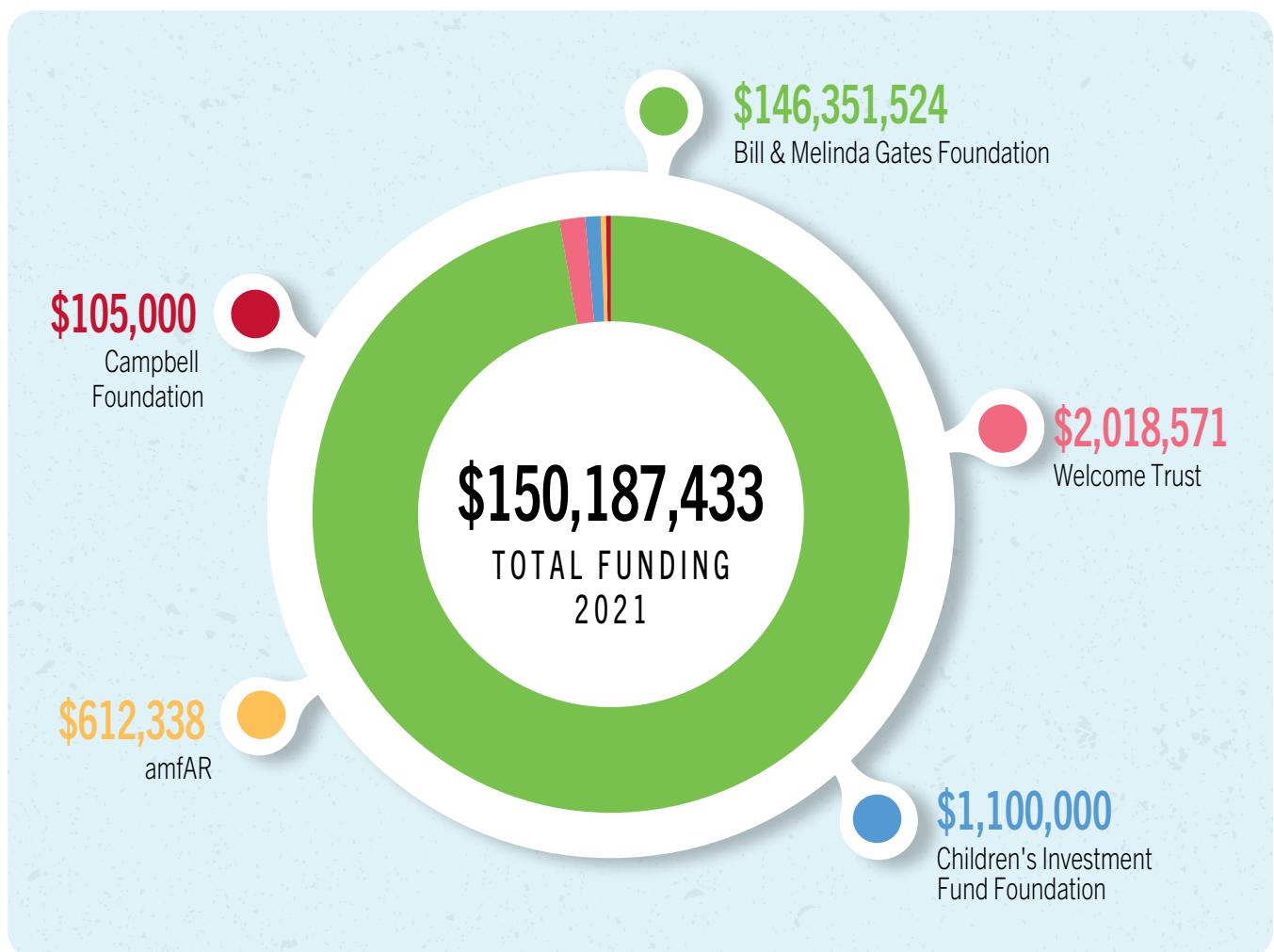


## Philanthropic Funding

Global philanthropic funding levels increased 16 percent in 2021 to US\$150 million, up from US\$127 in 2020. The Bill and Melinda Gates Foundation (BMGF) remains the largest philanthropic funder equaling 97% of philanthropic funding and 12 percent of total prevention R&D funding.

**FIGURE 3**

### Investment in HIV Prevention R&D by Top Philanthropic Funders 2021 (US\$ millions)



## Global investment in preventive HIV vaccines R&D

In 2021, global investment in preventive HIV vaccines R&D decreased US\$30 million from the previous year, for a total of US\$795 million. The public sector made up 84 percent of overall investment, at US\$671 million, with the philanthropic and commercial sectors contributing an estimated 8 percent and 7 percent, respectively. At US\$637 million, the US public sector remained the largest donor of preventive HIV vaccine research globally despite decreased investment by two percent from 2020 levels. Overall European investment in preventive HIV vaccine R&D increased by 47 percent and amounted to US\$27.5 million. Philanthropic contributions decreased from US\$93.5 million to US\$66 million in 2021 due to year-to-year reduction in BMGF funding. BMGF remains the largest philanthropic funder of HIV vaccine research, accounting for 99% of philanthropic funding.

**FIGURE 4a**  
**HIV Vaccine Funding Trends Over Time**  
 2000-2021 (US\$ millions)

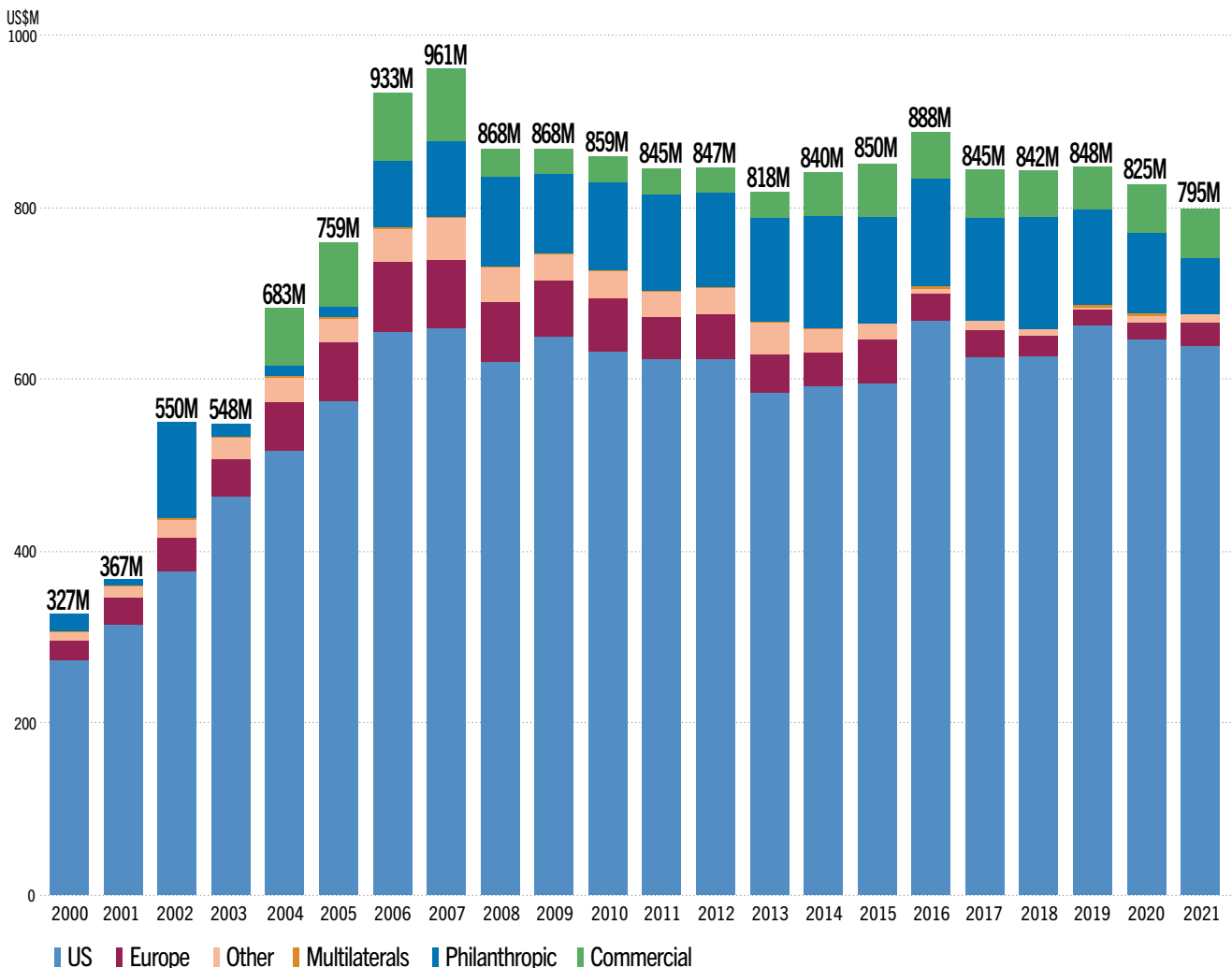
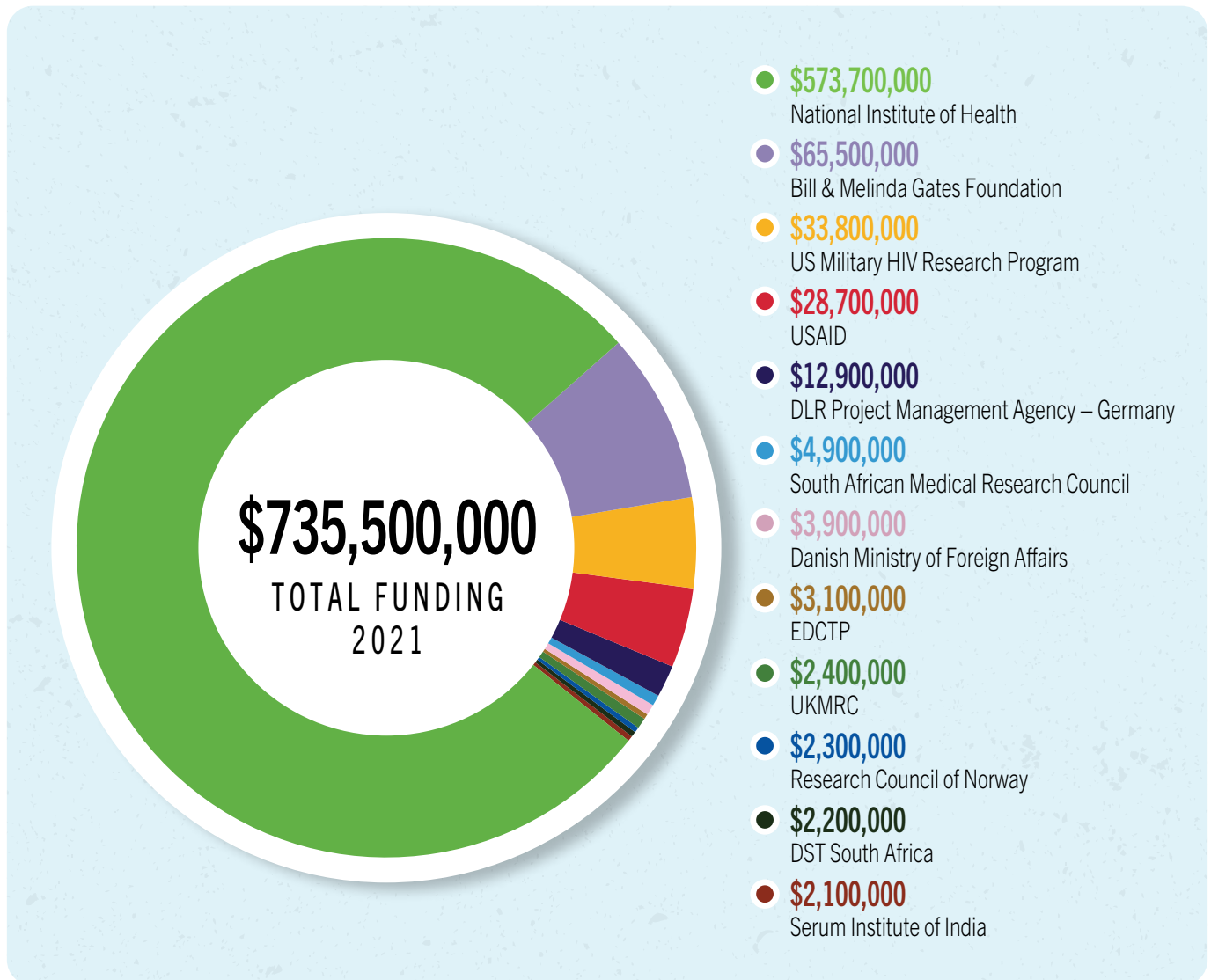


FIGURE 4b

## Top HIV Vaccine Funders

2021 (US\$ millions)





## Developments in the field of preventive HIV vaccine research

As of June 2023, only one HIV vaccine efficacy trial is underway, known as PrEPVacc. The PrEPVacc trial is simultaneously testing experimental HIV vaccines and oral PrEP, but the trial is not intended to result in licensure of a product.

Following disappointing results of the Uhambo/HVTN 702 trial in 2020 and the Imbokodo/HVTN 705 trial in 2021, the Mosaico/HVTN 706 ended in early 2023, after findings showed this vaccine candidate did not significantly reduce the risk of HIV infection. Results from the Antibody Mediated Prevention (AMP) trials also presented in 2021, showed that the VRC01 antibody did not significantly reduce the overall risk of HIV acquisition in participants who received the antibody compared to those who received the placebo. However, VRC01 did safely and effectively reduce the risk of acquiring HIV from strains of the virus that are classified as “highly-sensitive” to VRC01. The trials suggest a single bNAb, such as VRC01, does not offer sufficient protection against a broad range of HIV, and a combination of bNAbs is likely needed to achieve broad protection. Several phase 1 trials have subsequently started to explore mRNA-based technology to test new HIV vaccine candidates that might elicit similar antibody responses, and there are additional studies looking at the direct administration of combinations of neutralizing antibodies.

## Funding allocations for preventive HIV vaccine R&D

Funding for HIV vaccine R&D was allocated to the following areas in 2021: basic research (18.9 percent), preclinical (43.6 percent), clinical (36.8 percent) and advocacy and policy (< 1 percent). 2021 allocations are similar compared to those of 2020. The lack of efficacy in these recent late-phase efficacy trials has prompted researchers to look for trial designs that can quickly ask and answer key questions, inform decisions about which vaccine candidates to advance into larger trials and, hopefully, increase the probability of demonstrating efficacy. Researchers, funders and vaccine developers are now focusing on experimental medicine vaccine trials (EMVTs; also sometimes referred to as Discovery Medicine trials) to build on current knowledge and help to advance the field. This significant shift upstream in research will likely influence the funding allocations in future years.

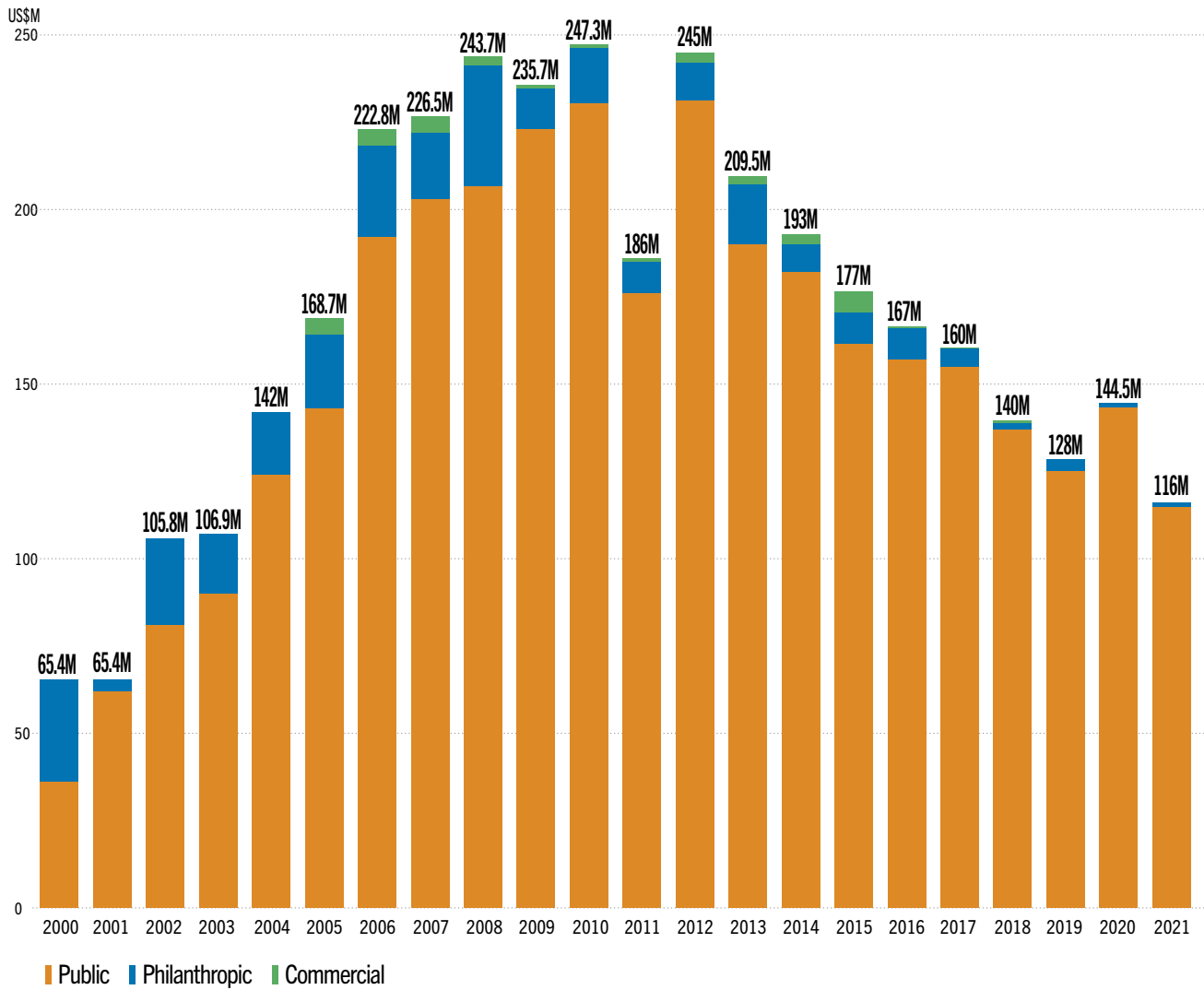
## Global investment in microbicide R&D

Investment in microbicide R&D totaled US\$112.7 million in 2021, a 20 percent decrease from 2020 funding levels. This is the seventh consecutive year of declining microbicide funding and the lowest investment levels reported since 2003. The majority of funding originated from the public sector (99 percent), while philanthropic funding trailed (1 percent).

It is important to note that the apparent decline in microbicide investments may reflect the fact that several donors now consolidate their microbicide and other ARV-based prevention investments now shifting these to the PrEP category, which has seen a significant increase over 2020. The Working Group categorizes all topical HIV prevention as microbicides, but accepts funder categorizations of systemic approaches between PrEP and microbicides where appropriate.

**FIGURE 5a**

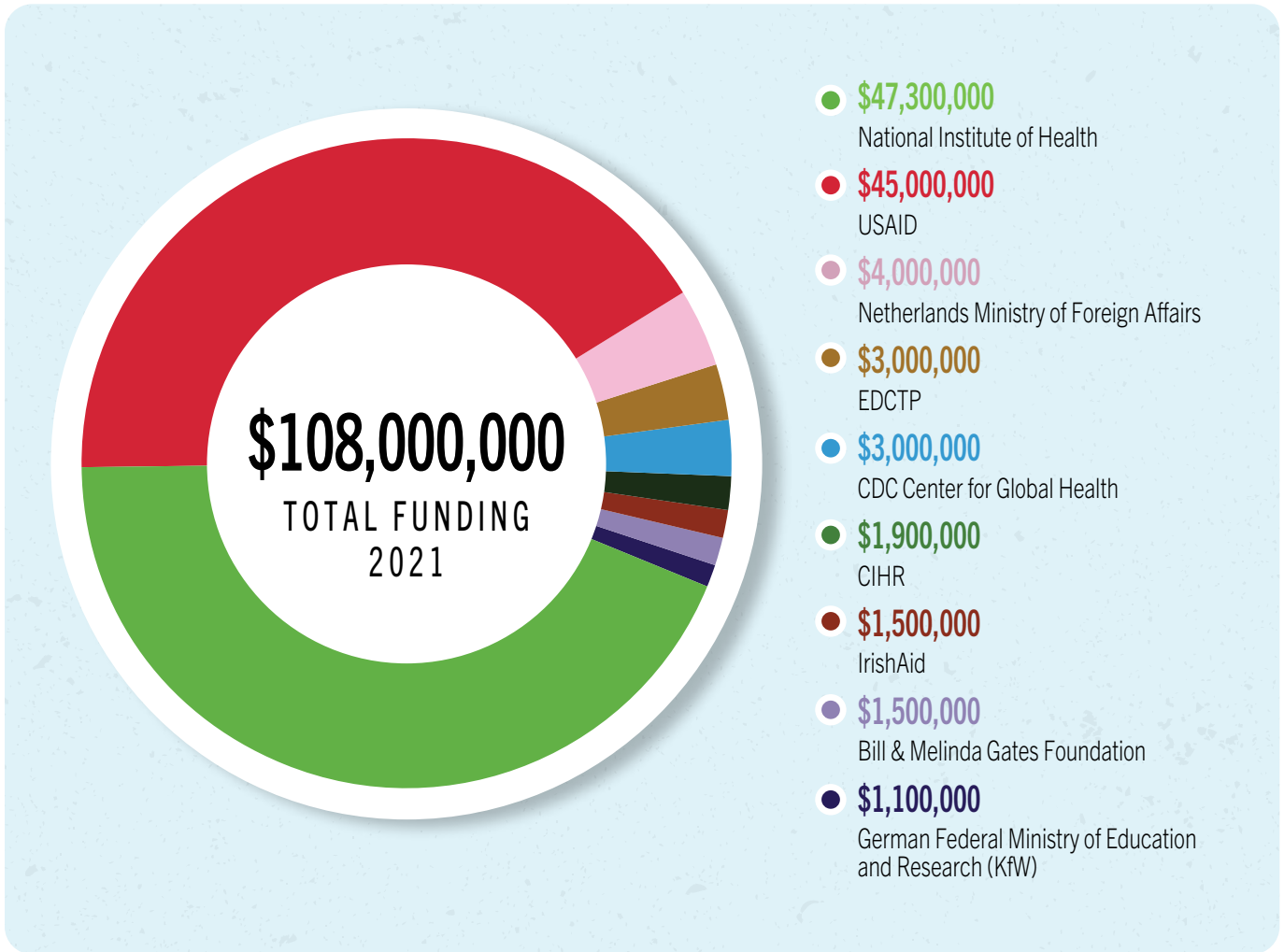
## Global Microbicide Funding Trends Over Time 2000-2021 (US\$ millions)



**FIGURE 5b**

### Top Microbicide Funders

2021 (US\$ millions)



## Developments in the field of microbicide research

A range of microbicide strategies are under investigation, including gels, douches and rings. Developed by the International Partnership for Microbicides (IPM), now part of the Population Council, the dapivirine vaginal ring (DVR) is the first topical HIV prevention method to be submitted for regulatory approval. The World Health Organization (WHO) recommended the ring in January 2021, and several countries have approved or are reviewing the status of the ring. In 2021, the Microbicides Trials Network responsible for the DVR clinical trials ended its status as an independent NIH clinical trials network.

Also in late 2021, the US Agency for International Development launched the Microbicide R&D to Advance HIV Prevention Technologies through Responsive Innovation and excellence Consortium (MATRIX), a \$125 million five-year cooperative agreement to support research into microbicide and other HIV prevention and dual prevention options. These investments will be recorded by the Working Group from 2022 onwards.

## Funding allocations for microbicide R&D

Allocations for microbicide R&D in 2021 were as follows: basic research (4.5 percent), basic mechanisms of mucosal transmission (1.5 percent), preclinical research (22.6 percent), formulations and modes of delivery (11.6 percent), clinical trials (40.8 percent), behavioral and social science research (2.7 percent), research infrastructure (8.3 percent) and advocacy and policy (6.2 percent). These 2021 allocations as compared to 2020 exhibit a shift toward clinical work away from basic, preclinical and social/behavioral research.

## Global investment in R&D related to PrEP

In 2021, global investment in PrEP R&D amounted to US\$269.8 million. This is a more than two-fold increase from 2020 and the highest funding level the Working Group has recorded for PrEP R&D. The impetus behind this surge is the increase in investment from the public sector, rising from US\$63 million to US\$188 million, and an increase in philanthropic investment from US\$20 million to US\$56 million. In addition, this increase reflects the shift by some donors to include both microbicides and other next-generation prevention options under the PrEP category.

The Working Group saw an increasing share of policy/advocacy and social/behavioral research in the PrEP space as more products became more widely available, especially focused on African American youth in the Southern United States, and a global focus on men who have sex with men and adolescent girls and young women around PrEP use and access.

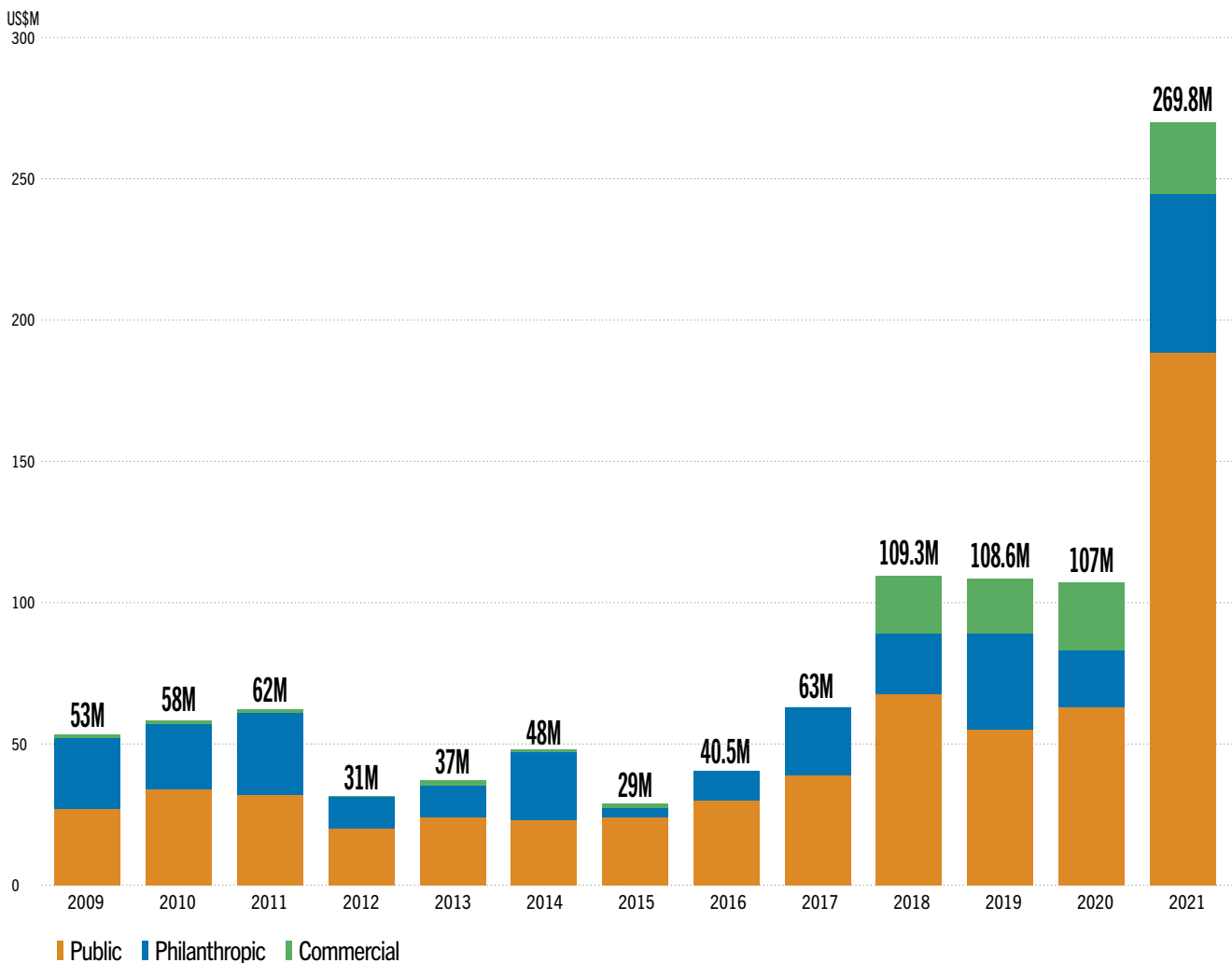
## Developments in the field of PrEP research

In 2019, F/TAF (brand name Descovy) became the second oral PrEP product to be approved after TDF/FTC (brand name Truvada), but only for men who have sex with men (MSM) and transgender women. An efficacy study of F/TAF among cisgender women is ongoing. Studies reported in 2020 show injectable cabotegravir is safe and effective. In December 2021 the FDA approved injectable cabotegravir as a prevention option,

and since then Australia, Botswana, Brazil, Malawi, South Africa and Zimbabwe have followed, while other countries continue their reviews. These approvals represent a significant increase in the number and time to approval for injectable PrEP, especially in low- and middle-income countries when compared to the prior slow pace of oral TDF/FTC approvals.

Also in late 2021, the US Agency for International Development launched the Maximizing Options to Advance Informed Choice for HIV Prevention (MOSAIC), a \$85 million five-year cooperative agreement to develop and expedite women’s access to new HIV prevention products. These investments, which are funded as part of USAID’s long-standing microbicide investments, will largely be recorded by the Working Group from 2022 onwards.

**FIGURE 2**  
**Global Pre-Exposure Prophylaxis (PrEP) Funding**  
 2009-2021 (US\$ millions)



## Funding allocations for PrEP R&D

In 2021, PrEP R&D was allocated across the following six categories: basic (3 percent), preclinical (3.5 percent), clinical (32.7 percent), implementation science (37.8 percent), behavioral and social science (13.1 percent), research infrastructure (8.6 percent) and advocacy and policy (< 1 percent). These 2021 allocations as compared to 2020 exhibit a shift toward clinical, preclinical, research infrastructure and behavioral/social science work away from implementation science which comprised over 50% of research in 2020. This is likely to change in 2022 with a significant number of implementation studies being designed and implemented following the approvals and recommendations of both the dapivirine vaginal ring and injectable cabotegravir.

## Global investment in R&D related to TasP

Funding for TasP increased five-fold totaling US\$49 million up from US\$9 million in 2020. This increase is fueled by a number of new funders as well as increased investment by Canadian Institute for Health Research (CIHR), the BMGF and the European Commission. Public sector and philanthropic funding increased each to US\$31.5 million and US\$17.4 million respectively. This increase in TasP investment is also due to efforts of integrating PrEP provision with HIV self-testing and early ART initiation and links to expanded undetectable equals untransmittable (U=U) research.

## Global investment in female condom R&D

Investment in female condom research increased from no reported funding in 2020 to US\$0.2 million with a new investment by the UK Medical Research Council.

## Investment in voluntary medical male circumcision

The 30 percent increase in VMMC observed in 2021 reversed the decline seen in 2020. Overall funding was US\$8.6 million. This increase is attributed to a US\$7.8 million investment from BMGF.

## Investments in research related to prevention of vertical transmission (PVT)

Funding for PVT decreased from US\$25 million in 2020 to US\$14.3 million in 2021, the lowest level recorded by the Working Group. Most PVT research (US\$13.1 million) was funded by the public sector, with the US NIH, the European & Developing Countries Clinical Trials Partnership (EDCTP) and CIHR the largest donors. European funding equaled US\$7.5 million or 52.7 percent of total PVT funding.

## **Dominant funders and their field-wide influence**

As in past years, prevention research in 2021 continued to be concentrated in a small number of large investors. The US public sector, primarily the NIH and USAID, contributed 73 percent of all global funding (US\$922 million out of US\$1.25 billion). BMGF remained the principal philanthropic donor, accounting for 97 percent—US\$147 million out of US\$152 million—of all philanthropic investment. Investments by the two leading donors—the US public sector and BMGF - combined accounted for US\$1.06 billion, or 85 cents of every dollar spent. Diversifying the funding base is vital not only for the long-term sustainability of the field, but also to ensure that the research priorities are informed by a diversity of perspectives. This year saw an increase in European funding from 17 funders which could bode well for diversifying prevention research funding in the future. The increase in European funding was propelled by increased investments, or returning funders, from public sector funders in Denmark, Germany, Ireland, the Netherlands, Norway and the United Kingdom. European philanthropic investments also increased for Wellcome Trust and the Children's Investment Fund Foundation. Hopefully this trend will continue in subsequent years in the face of new European budgetary challenges posed by the COVID-19 pandemic, and the war in the Ukraine.

## **Shift toward PrEP, TasP and PVT**

The most striking change in funding in 2021 was the shift from microbicides and PVT, toward PrEP, TasP and VMMC. Preventive HIV vaccines funding also decreased but continued to make up the bulk of overall HIV prevention funding at 64 percent. Investment by funders is heavily concentrated in preventive HIV vaccines representing 71.5 percent of total NIH's investment in prevention research and 45 percent of investment by the BMGF. At the same time, PrEP overtook microbicides by a large margin in 2021 for the first time. Yet, when PrEP and microbicide research investments are combined (as several donors now do), there was a 52% increase in this broad ARV-based prevention category. The shift toward TasP may reflect the acceleration of U=U strategies, as well as emerging new PrEP options. While it is too early to infer a trend, at least in the short-term, funders seem to be focusing increasingly in areas of prevention research where effective options or strategies already exist that are open to improvement or evolution.

## **Decrease in the number of philanthropic funders engaged**

Despite philanthropic funding levels increasing from US\$127 million to US\$151 in 2021, the decline in the number of philanthropic donors continued. The number of philanthropies responding with grants in HIV prevention research decreased from 9 to 6 in 2021. It is unclear whether this decline is due to a true shift in priorities, or year to year changes in funding cycles or other reporting vagaries. The Working Group will continue to track this metric. Philanthropic investment in HIV cure research in 2021 was also limited to six philanthropies, but covering a smaller research portfolio. Independent philanthropic donors are essential to a vibrant funding base and could help improve the funding imbalance that currently afflicts the investment landscape.

## **COVID-19 related impact to HIV Prevention R&D in 2021**

Fifty six percent of funders spanning nineteen countries surveyed by the Working Group provided insights on how the COVID-19 pandemic had impacted their HIV prevention projects in 2021. Respondents reported varied impact to their investment portfolio with some increasing and others decreasing investments, but almost all reported that COVID had not caused them to make new long-term shifts in their HIV prevention investment. More than half of funders, however, reported that they experienced pragmatic challenges resulting from the COVID-19 pandemic. These challenges include: 1) delays in clinical trials due to COVID-19 restrictions in the trial environment, 2) shortages of bio-material resources redirected to support pandemic efforts; and 3) disruptions caused by administrative study protocol changes, ethics approvals, and timeline extensions.



## Collection and Analysis Methodology

The Working Group has employed a standardized methodology since 2004 to generate comprehensive statistics on investment in HIV prevention research and development, including disaggregated trends. These methods were employed to generate the estimates of funding for R&D presented in this report. A detailed explanation of the methodology can be found on the Working Group website ([www.hivresourcetracking.org](http://www.hivresourcetracking.org)). Categories used to describe different R&D activities were derived from those developed by the US NIH and are shown on the website. A set of questions on COVID-19 were specially added in response to ongoing impacts of the pandemic in 2020 and 2021.

## About the Resource Tracking for HIV Prevention R&D Working Group

Established in 2004, the Resource Tracking for HIV Prevention Research & Development Working Group (“Working Group”) comprises AVAC, IAVI and UNAIDS, with AVAC serving as the secretariat.

The Working Group has employed a standardized and comprehensive methodology to generate HIV prevention research and development (R&D) estimates, and to track investment trends for biomedical HIV prevention options, including HIV vaccines, microbicides, pre-exposure prophylaxis (PrEP), treatment as prevention (TasP), voluntary medical male circumcision (VMMC), female condoms, prevention of vertical transmission (PVT) and multipurpose prevention technologies. The Working Group also separately tracks expenditures in HIV cure research and in the development of vaccines and diagnostics for a wide range of sexually transmitted infections.

By generating investment estimates that can be compared from year to year and across prevention options, funding sources and strategies, the Working Group helps assess the impact of relevant public policies and marshals data for use in advocacy.

This year’s report was prepared by Shiva Mozaffarian, Navita Jain and Grace Yoon (AVAC), with support from Jenni Maple (IAVI), Jaime Atienza Azcona and Deepak Mattur (UNAIDS), and Kevin Fisher and Mitchell Warren (AVAC).

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