IAS 2023

Conference report

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Acronyms and abbreviations

1HP	One-month isoniazid and rifapentine regimen
3HP	Three-month isoniazid and rifapentine regimen
aHR	Adjusted hazard ratio
AIDS 2014	20th International AIDS Conference
AIDS 2022	24th International AIDS Conference
ART	Antiretroviral therapy
Bcl-2	B-cell lymphoma-2
BMI	Body mass index
bNAbs	Broadly neutralizing antibodies
CAB-LA	Cabotegravir long-acting
CAR	Chimeric antigen receptor
cART	Combination antiretroviral therapy
CDC	US Centers for Disease Control and Prevention
COVID-19	Coronavirus disease 2019
CRISPR	Clustered Regularly Interspaced Short Palindromic Repeats
DTG	Dolutegravir
FTC	Emtricitabine
GVHD	Graft-versus-host disease
HBV	Hepatitis B virus
HPTN	HIV Prevention Trials Network
IAS	International AIDS Society
IAS 2023	12th IAS Conference on HIV Science
JAK	Janus kinase
LDL	Low-density lipoprotein
LGBTI	Lesbian, gay, bisexual, trans and intersex
MACE	Major cardiovascular event
McL-1	Myeloid cell leukaemia-1
mRNA	Messenger RNA
NGO	Non-governmental organization
NK	Natural killer
NRTI	Nucleoside reverse transcriptase inhibitor
OAT	Opioid agonist treatment
PEPFAR	US President's Emergency Plan for AIDS Relief
PrEP	Pre-exposure prophylaxis
SARS-CoV-2	Sudden acute respiratory syndrome coronavirus 2
STI	Sexually transmitted infection
TAF	Tenofovir alafenamide fumarate
TDF	Tenofovir disoproxil fumarate
TLD	Tenofovir disoproxil fumarate, lamivudine and dolutegravir
Trans	May refer to trans, transsexual or any other non-binary identification of sex or gender
UNAIDS	Joint United Nations Programme on HIV/AIDS
U=U	Undetectable equals untransmittable
VMMC	Voluntary medical male circumcision
WHO	World Health Organization

Terminology

Key populations refers to gay men and other men who have sex with men, people who inject drugs, people in prisons and other closed settings, sex workers and their clients, and trans people.

Vulnerable populations refers to people living with HIV and groups outside of key populations who may be at increased vulnerability to acquiring HIV, for example, adolescents, Indigenous peoples, migrants, refugees, internally displaced persons, people with disabilities, people in prisons and other closed settings, people of advanced age, women and girls.

IAS 2023 at a glance

IAS 2023 attracted **5,335** participants from **139** countries.

75% of participants attended IAS 2023 in person.

Just **over one in four participants** (27%) came from central, eastern, southern and western Africa and **48%** came from low- and middle-income countries.

IAS 2023 awarded **327** in-person and virtual scholarships to participants from **63 countries**. Half of all scholarships were awarded to people in central, eastern, southern and western Africa.

Just **over half** (51%) of participants at IAS 2023 were aged **45** years or younger.

Overall, **85%** of delegates agreed that the conference objectives were met.

IAS 2023 generated over **300** original news stories.

Introduction

IAS 2023, the 12th International AIDS Society Conference on HIV Science, took place in Brisbane, Australia, and virtually, on 23-26 July 2023, with over 5,000 participants.

Delegates heard that Inner Sydney had reduced new HIV acquisitions by 88%, meaning that it may be the first locality in the world to reach the UN target to end AIDS as a public health threat by 2030. REPRIEVE, a study with global implications for cardiovascular disease prevention in people with HIV, showed that daily statin treatment reduced the risk of major cardiovascular events in people with HIV at low-to-moderate risk of cardiovascular events. And the conference heard details of the "Geneva Patient", the first person to achieve HIV remission after receiving a bone marrow transplant containing HIV-susceptible stem cells.

The conference featured 30 oral abstract sessions organized into five tracks. The 32 invited-speaker sessions were made up of eight plenaries and 24 symposia. Three pre-meetings and 56 satellite sessions complemented the invited-speaker and abstract-driven programme.

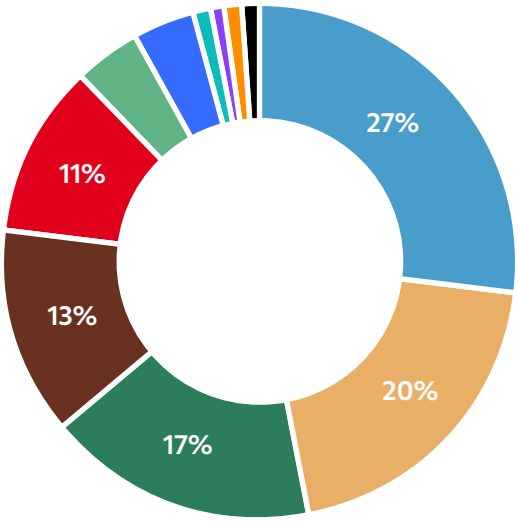
A total of 3,857 abstracts were submitted to IAS 2023, including 395 late-breaker abstracts. Ultimately, 1,571 abstracts were selected for presentation in sessions and the poster exhibition, an acceptance rate of 38%.

Who was there?

IAS 2023 had 5,335 participants. Six percent of participants were scholarship recipients. A quarter (25%) of participants had virtual registrations, allowing them to view live sessions, ask questions and network with other delegates online.

Country and region

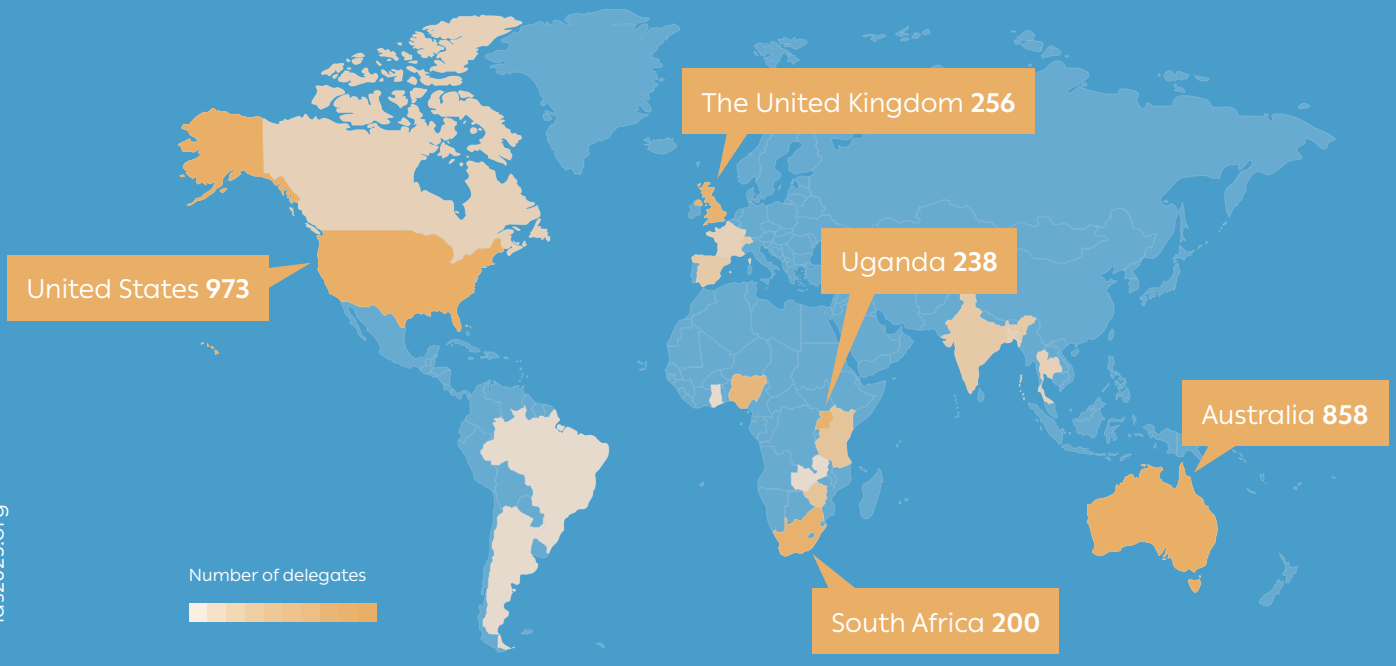
Central, eastern, southern and western Africa was the region with the largest representation at IAS 2023, accounting for 27% of delegates. A total of 20% of delegates were from North America, 17% from Oceania, 13% from western and central Europe, and 11% from South and Southeast Asia.



Delegates by region

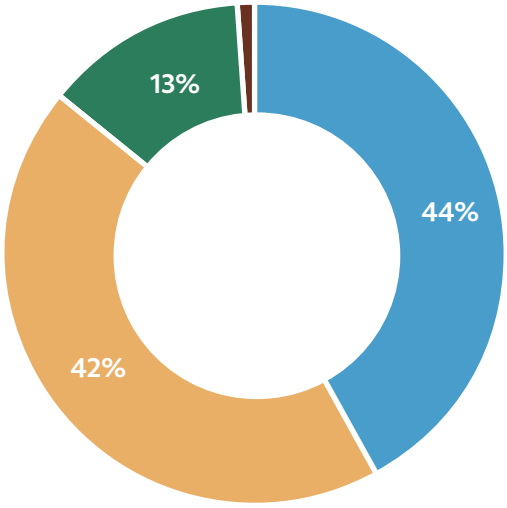
- Central, eastern, southern & western Africa **27%**
- North America **20%**
- Oceania **17%**
- Western & Central Europe **13%**
- South & Southeast Asia **11%**
- Latin America **4%**
- East Asia **4%**
- Eastern Europe & central Asia **1%**
- Caribbean **1%**
- Middle East & North Africa **1%**
- Unspecified **1%**

A total of 139 countries were represented at IAS 2023. The United States (973 participants), Australia (858 participants), the United Kingdom (256 participants), Uganda (238 participants) and South Africa (200 participants) had the largest representation at the conference.



Gender

Overall, 44% of participants were male, 42% were female and 1% were non-binary or gender non-conforming. Two percent of participants said their gender differed from sex assigned at birth, and 13% did not specify their gender.

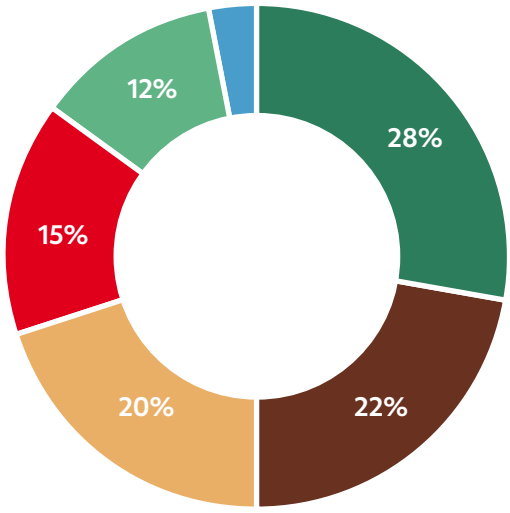


Delegates by gender

- Male **44%**
- Female **42%**
- Not specified **13%**
- Non-binary or gender non-conforming **1%**

Delegates by age range

Just over half (51%) of IAS 2023 participants were under 46 years and 3% were younger than 26 years.

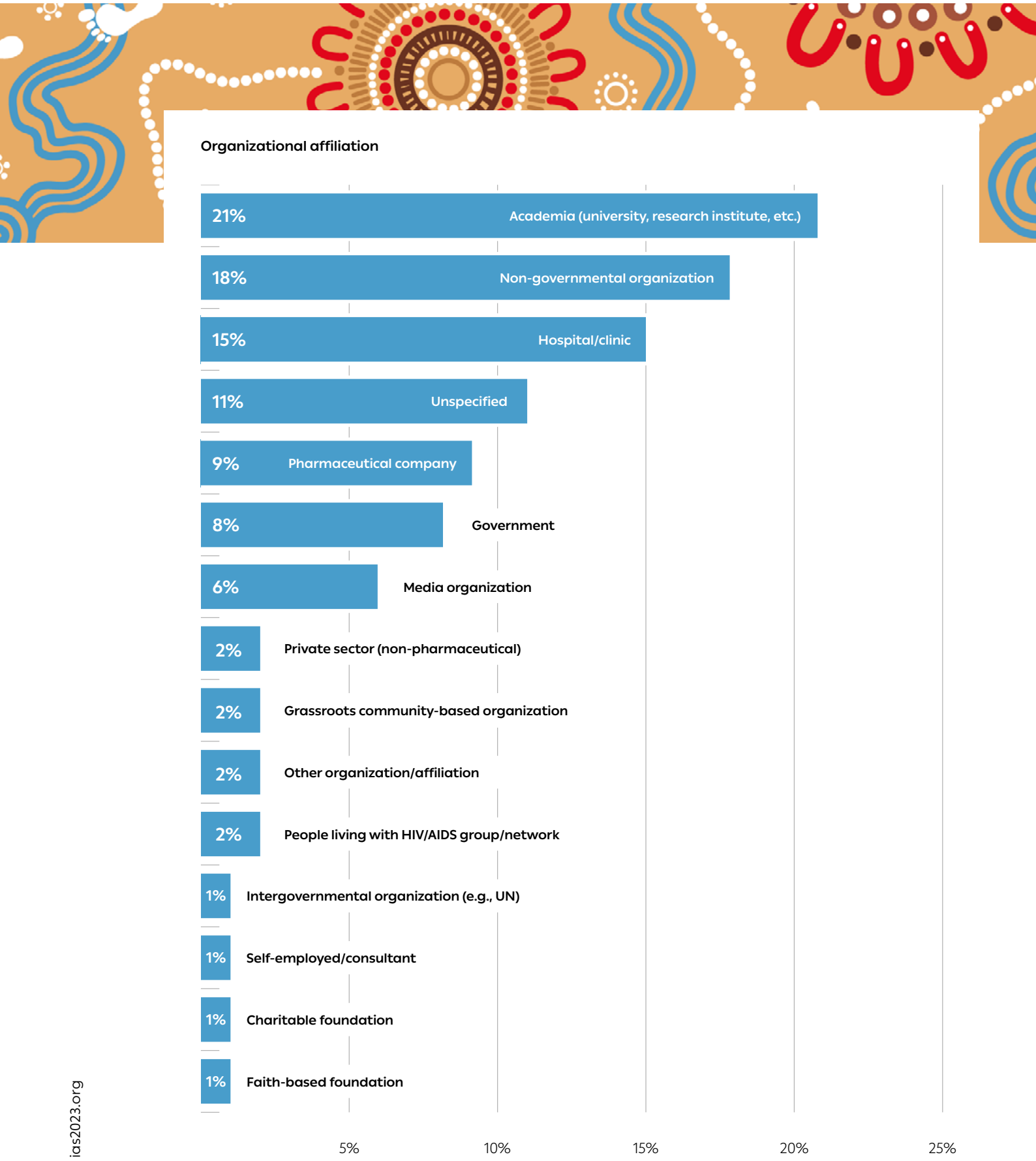


Delegates by age range

- 16–25 **3%**
- 26–35 **20%**
- 36–45 **28%**
- 46–55 **22%**
- 56+ **15%**
- Unspecified **12%**

Affiliations and institutions

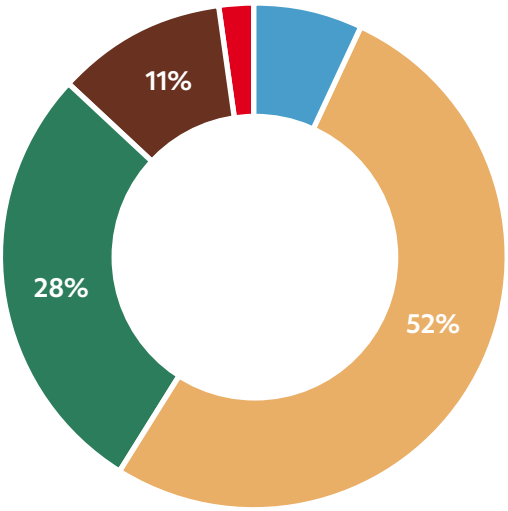
People from academia (21%, 1,096 participants) and those working in non-governmental organizations (18%, 983 participants) made up the largest share of participants of IAS 2023.



Scholarships

IAS 2023 awarded 327 scholarships: 199 in-person and 128 virtual scholarships to delegates from 63 countries. Scholarships consisted of 150 Educational Fund awards, 146 submission-based scholarships and 31 non-submission-based scholarships. Of scholarship recipients, 59% were aged 35 or below.

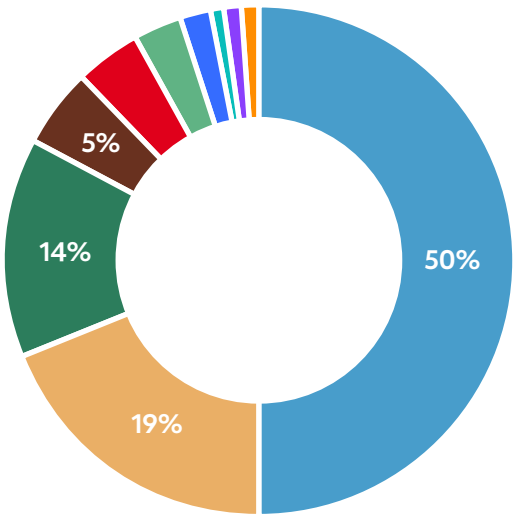
A total of 53% of scholarship recipients were female, 41% were male, 5% were non-binary or gender non-conforming, and 1% defined their gender as "other, not listed". Nine percent of scholarship recipients said their gender was different from their sex at birth.



Scholarship recipients by age

- Under 26 **7%**
- 27–35 **52%**
- 36–45 **28%**
- 46–55 **11%**
- 56+ **2%**

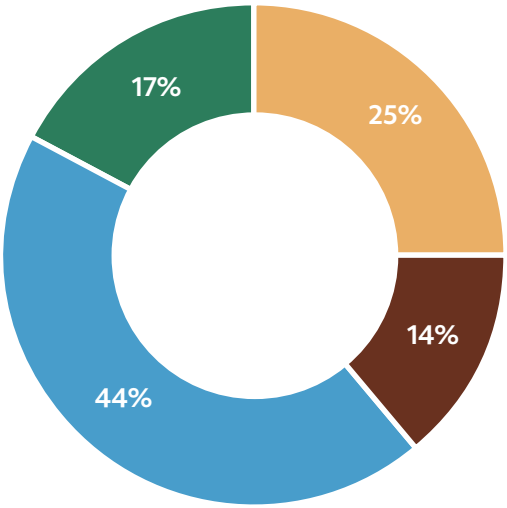
Half of all scholarships (50%) were awarded to people in central, eastern, southern and western Africa (Nigeria, Uganda and Zimbabwe were the top three countries), 18% to people in North America, 14% to people in South and Southeast Asia, and 6% to people in Latin America. In all, 44% of scholarships were awarded to people from lower-middle-income countries and 14% to people from low-income countries as the most common income level groups.



Scholarship recipients by region

- Central, Eastern, Southern & Western Africa **50%**
- North America **19%**
- South & Southeast Asia **14%**
- Latin America **5%**
- Western & central Europe **4%**
- East Asia **3%**
- Oceania **2%**
- Caribbean **1%**
- Middle East & North Africa **1%**
- Eastern Europe & Central Asia **1%**

The 2023 cohort reflected the diversity of the global HIV response. The most common profession of recipients was physicians (17%); 12% were activists or advocates, 10% were postgraduate students pursuing PhDs or doctorates, 8% were social workers and 5% were nurses.



Scholarship recipients income level of country of residence

- Lower-middle-income country **44%**
- High-income country **25%**
- Upper-middle-income country **17%**
- Low-income country **14%**

Educational tours

Conference delegates had the opportunity to sign up for one of three educational tours at two local community-based organizations: the RAPID clinic run by Queensland Positive People and the Queensland Council for LGBTI Health. The RAPID clinic is a peer-led service providing free HIV and sexually transmitted infection (STI) testing in the Brisbane area. At the clinic, delegates learned how a peer-led service model can increase access to care and support. The visit to the Queensland Council for LGBTI Health enabled delegates to learn about the organization's history and the delivery of its community-led health services. Visits to both organizations proved popular: 43 delegates took part in tours, and post-tour evaluations revealed an average satisfaction score of nine out of 10.

"I loved seeing how well a peer-led service operates in the metropolitan setting. I would like to learn how this can translate well into the regional, rural and remote settings also."

Delegate feedback after educational tour to RAPID clinic

"Great presentations, interactions and lessons from the team at the Queensland Council of LGBT Health. It was my highlight for the whole IAS conference!"

Delegate feedback after educational tour to Queensland Council for LGBTI Health

Volunteers

IAS 2023 was supported by 119 volunteers. The majority of volunteers (105) were from the host nation, Australia. Just less than half (45%) were under the age of 36 years, 19% were under 26 and 18% were over 55.

Volunteers at IAS 2023 helped coordinate programme activities, greeted delegates, assisted with registration, acted as guides during the conference, staffed various offices and activities, and performed other crucial tasks.

What was shared?

HIV treatment

Non-communicable diseases and metabolic complications

Data presented at IAS 2023 have major programmatic implications for the prevention and management of non-communicable diseases in people with HIV.

Results from REPRIEVE, the Randomized Trial to Prevent Vascular Events in HIV, demonstrated that in people living with HIV with no prior history of cardiovascular events and at low-to-moderate risk of cardiovascular disease, daily treatment with pitavastatin significantly reduced the likelihood of heart attack, stroke or other major cardiovascular event (MACE)[1][2].

> **"I think we'll look back on Brisbane 2023 as the conference at which we saw some truly guideline-changing data."**
>
> **Laura Waters, UK** [3]

REPRIEVE randomized 7,769 people living with HIV, aged 40 to 75 years, to receive oral pitavastatin (4mg) or placebo once daily. All participants received antiretroviral therapy (ART). The study recruited participants from 145 sites in 10 countries (53% in high-income countries, 18% in Latin America and the Caribbean, 7.5% in Southeast or East Asia, 6.5% in South Asia, and 15% in central, eastern, southern and western Africa). The median age of participants was 50 years, and 31% were female. Participants were followed for a median of 5.1 years.

Pitavastatin was associated with a 35% reduction in major cardiovascular events (MACE) and a 21% reduction in the incidence of MACE or death compared with the placebo arm. Low-density lipoprotein (LDL) was lowered by 30% in the pitavastatin group but did not change significantly in the placebo group. The reduction in cardiovascular events was similar for people with high or low LDL cholesterol at baseline, indicating that the benefits

associated with statin treatment go beyond lowering LDL cholesterol. The risk reduction was consistent across major sub-groups and regions, and especially large among participants in the South Asia region and people aged 60 years and over. The incidence of diabetes mellitus was higher in the pitavastatin arm (incidence rate ratio 1.35, 95% CI 1.09 to 1.66) but did not exceed the background rate in the United States population. The incidence of muscle-related adverse events was higher in the pitavastatin group than the placebo group, but did not exceed rates observed in randomized studies in the general population.

> **"How best do we incorporate statins into a bag of [cardiovascular] preventative strategies to get the maximal gains, to halt or reverse the trajectory [of cardiovascular disease]? We cannot be complacent; we have to act now."**
>
> **Rosie Mngqibisa, South Africa [4]**

A conference symposium explored the implications of the REPRIEVE study results for cardiovascular disease prevention in people living with HIV[5]. It highlighted the rapid increase in the burden of cardiovascular disease in low- and middle-income countries and the substantial fraction of cardiovascular disease attributable to HIV in southern and eastern Africa[6]. Regional variations in non-lipid cardiovascular risk factors in REPRIEVE participants underline the need to address these risk factors as part of cardiovascular disease prevention and health promotion[7]. Further analysis of the sex-specific mechanisms of cardiovascular risk and risk reduction in the REPRIEVE study is awaited[8]. Speakers emphasized the need for prompt evaluation of the REPRIEVE data by policy makers, as well as consideration of where responsibility for prescribing statins to people with HIV should lie in health systems where HIV care and primary care are not integrated.

> **"Mass HIV treatment programmes need to include support and funding for diagnosis and treatment for hypertension."**
>
> **Francois Venter, South Africa [9]**

Research presented at IAS 2023 demonstrated the need for the management of hypertension within HIV programmes. Analyses of two randomized trials of first-line ART, one conducted in South Africa and one in Cameroon, showed that treatment with dolutegravir-based regimens was associated with a higher incidence of hypertension after 192 weeks of follow-up than non-dolutegravir-based regimens[10].

The NAMSAL study was a randomized comparison of dolutegravir/tenofovir disoproxil fumarate/lamivudine (TLD) and efavirenz 400mg/tenofovir disoproxil fumarate/lamivudine in 613 previously untreated people living with HIV in Cameroon. From week 144 of the study, a significantly higher proportion of dolutegravir (DTG) recipients had systolic blood pressure above 140mmHg or diastolic pressure above 90mmHg than non-DTG recipients (25 vs 12%, p=0.01). By week 192, 31% of the dolutegravir group versus 19% of the efavirenz group had hypertension (p=0.002). Anti-hypertensive treatment was not provided in the NAMSAL study.

The ADVANCE study was a randomized comparison of efavirenz 600mg/ tenofovir disoproxil fumarate/lamivudine, dolutegravir/tenofovir disoproxil fumarate/emtricitabine and dolutegravir/ alafenamide/emtricitabine in 1,053 previously untreated people with HIV in South Africa. People receiving dolutegravir were significantly more likely to have systolic blood pressure above 135mmHg or diastolic blood pressure above 85mmHg (54% of dolutegravir recipients compared with 47% of efavirenz recipients, p=0.047) by week 192. However, the average increase in systolic pressure after four years was 2mmHg due to routine treatment of hypertension.

The RESPOND consortium analysed the incidence of hypertension in 19 observational cohorts of people living with HIV receiving ART in Europe and Australia between 2012 and 2019; 9,704 were eligible for inclusion in the analysis[11]. Treatment with both an integrase inhibitor and tenofovir alafenamide was associated with a 48% increased risk of being diagnosed with hypertension during follow up after adjusting for time-updated body mass index (BMI). Exposure to either an integrase inhibitor or tenofovir alafenamide was also associated with an increased risk of hypertension compared with non-exposure.

Another observational cohort analysis by the RESPOND consortium identified a higher likelihood of new-onset diabetes mellitus in people living with HIV exposed to integrase inhibitors[12]. The analysis included 20,865 people living with HIV in Europe and Australia followed for a mean of 4.8 years. As well as risk factors of ethnicity, CD4 count below 200 and hypertension, the risk of developing diabetes mellitus was 48% in people exposed to integrase inhibitors after adjusting for BMI and other factors compared with other antiretroviral classes.

Weight gain is a common phenomenon after starting ART, but its causes and strategies for management are uncertain. Two studies presented at IAS 2023 found that switching from an integrase inhibitor-based regimen to a regimen containing another anchor drug class did not reverse weight gain on previous ART. The DEFINE study randomized 103 people who had gained at least 10% in body weight while taking an integrase inhibitor-containing regimen for at least three years to continue their existing regimen or switch to a regimen containing a boosted protease inhibitor (a once-daily combination of darunavir/cobicistat/tenofovir alafenamide/emtricitabine, Symtuza)[13]. At week 24, there was no significant difference between study arms in the primary outcome, percentage change in body weight. Study PO17 evaluated the effects on body weight and body composition of switching from any suppressive antiretroviral regimen to an experimental regimen of doravirine 100mg/islatravir 0.75mg. Study PO18 evaluated the same outcomes in people with HIV who switched from bictegravir/tenofovir alafenamide/emtricitabine (Biktarvy) to doravirine 100mg/islatravir 0.75mg[14]. In PO17, doravrine/islatravir treatment was associated with greater weight gain at week 48 than regimens containing either tenofovir disoproxil fumarate (TDF) or efavirenz, but not other regimens. In PO18, there was no significant difference in weight change between the study arms at week 48.

Virologic re-suppression on a dolutegravir-containing regimen

Current World Health Organization (WHO) guidelines recommend that people taking dolutegravir who experience viral rebound above 1,000 copies/ml on a dolutegravir-containing regimen should receive enhanced adherence counselling and undergo repeat viral load testing three months later . An analysis of the ADVANCE study, in which previously untreated participants were randomized to regimens containing either dolutegravir or efavirenz, showed that dolutegravir recipients were significantly more likely to achieve viral re-suppression than efavirenz recipients after viral rebound and enhanced adherence counselling (95% vs 66% at week 48)[16]. The findings support WHO guidelines and provide reassurance that switching from the most commonly prescribed first-line antiretroviral regimen immediately after viral rebound is unnecessary.

Supporting retention in care

An analysis of the impact of unplanned care interruptions lasting more than 180 days in people living with HIV in four sites in South Africa found that care interruption within six months of initiating ART was associated with more than a doubling of the likelihood of mortality after resuming treatment (aHR 2.32, 95% CI 2.06-2.61)[17]. The study population consisted of 63,421 adults living with HIV who initiated ART between 2004 and 2019, contributing 188,358 person-years of observation. During follow up, 22,593 people interrupted care for more than 180 days; of these, 3,585 died after resuming care. Being male, over 35 years old and having a CD4 cell count <350 cells/mm3 were each associated with an elevated risk of death after resuming care.

Providing counselling at home and peer navigation at a clinic visit was associated with a significantly higher rate of treatment initiation, retention in care and viral suppression 12 months after HIV diagnosis through home-based testing, the Ekkubo study found[18]. The study randomized 56 communities to receive either standard clinic referral and CD4 results at home or three counselling sessions to address barriers to care and peer navigation at the first clinic visit.

WHO recommends that ART initiation be offered on the same day as a confirmed HIV diagnosis and clinical assessment to people who are ready to start[19]. Outcomes according to the interval between diagnosis and treatment initiation were assessed in 252,239 people who began ART between 2014 and 2022 in Thailand[20]. ART initiation on the same day or within seven days of diagnosis significantly reduced mortality, while ART initiation within one month of diagnosis significantly lowered the likelihood of virological failure compared with longer intervals between diagnosis and treatment initiation.

Researchers in Thailand also reported on an implementation-effectiveness trial of key population-led ART initiation at two community-based organizations in Bangkok[21]. The study enrolled 587 people eligible for ART; 52% began ART on the day of HIV diagnosis, 84.6% of those who started ART on the day of diagnosis remained in care at 12 months, and 94.3% of those retained in care were virally suppressed. The novel service model expands the role of key population lay providers and has the potential to improve the uptake of treatment by bridging the care access gap in the community.

Treatment for children

The CHAPAS-4 study findings aligned with the current WHO guideline recommending the use of dolutegravir as the preferred anchor agent for second-line treatment in children living with HIV [22]. The study also highlighted the need for the development of fixed-dose combinations of tenofovir alafenamide, emtricitabine and dolutegravir or darunavir/ritonavir suitable for children. The CHAPAS-4 study evaluated two nucleoside reverse transcriptase inhibitor (NRTI) backbones (tenofovir alafenamide/emtricitabine) and four anchor drugs (dolutegravir, darunavir/ritonavir, atazanavir/ritonavir or lopinavir/ritonavir) in a 2 x 4 factorial randomization. The study recruited 919 treatment-experienced children aged 3-15 years in Zambia, Zimbabwe and Uganda. The primary outcome was the proportion of participants with HIV-1 RNA <400 copies at week 96. The study found that tenofovir alafenamide/emtricitabine was superior to the standard of care NRTI backbone while dolutegravir was superior to lopinavir/ritonavir and atazanavir/ritonavir.

New agents and long-acting technologies

A two-drug regimen containing doravirine, a non-nucleoside reverse transcriptase inhibitor, and the investigational nucleoside reverse transcriptase translocation inhibitor islatravir proved virologically non-inferior to bictegravir/tenofovir alafenamide/emtricitabine (Biktarvy) at week 48[23]. The MK-8591A-020 study randomized 597 previously untreated people with HIV to doravirine 100mg/islatravir 0.75mg or the comparator regimen, Biktarvy. In the MK-8591A-020 study, Biktarvy recipients experienced a similar level of viral suppression (88.3% vs 88.9% with HIV-1 <50 copies/mL) and significantly greater increases in CD4 cell count[24]. Of note, recruitment to the study was suspended in December 2021 when the US Food and Drug Administration placed the development of islatravir on clinical hold pending investigation of dose-related reductions in total lymphocyte and CD4 lymphocyte counts in recipients of islatravir in clinical trials, including the MK-8591A-020 study[25]. Development was resumed using an islatravir dose of 0.25mg.

A plenary session highlighted the broad range of agents and drug delivery systems now in development as long-acting antiretroviral products for treatment and prevention[26]. Novel delivery systems under evaluation include injectables, vaginal rings, implants, microarray/microneedle patches, wearable infusion pumps and gastric residence devices. Each technology presents unique opportunities and challenges in terms of duration of drug delivery, affordability and suitability for generic manufacturer adoption and regulatory approval[27].

A single long-acting technology will not be suitable for all settings or populations, emphasizing the need for the development of multiple long-acting antiretroviral products using a variety of drug delivery technologies. These products will need to be tailored according to the preferences and requirements of users for treatment or prevention purposes.

The session also highlighted the need to include adolescents, who have low rates of viral suppression, in trials evaluating novel long-acting agents and technologies to optimize dosing and evaluate tolerability and acceptability in this population[28]. More evidence is also needed on how to use long-acting antiretrovirals in people with unsuppressed HIV, who represent a critically important population for ending the HIV pandemic. People with unsuppressed HIV on current regimens tend to have concomitant challenges affecting adherence, including mental illness, addiction and marginal housing[29].

Several symposium presentations reviewed evidence from recently published studies and presentations showing that long-acting injectable treatment with cabotegravir and rilpivirine achieved high rates of viral suppression in people previously virally unsuppressed. This underscored the need for a pooled analysis of cohort studies and ongoing demonstration studies to develop the evidence base for use of injectable cabotegravir and rilpivirine in people who are virally unsuppressed[30][31].

The conference also highlighted questions about the implementation of long-acting injectable antiretrovirals in lower- and middle-income countries[32]. Although long-acting ART is attractive for people with HIV and for health systems, considerable work is needed to develop a sustainable and affordable public health approach to the use of injectable cabotegravir/rilpivirine. Long-acting treatment will require changes in healthcare client flow, the organization of clinic space and staff training protocols. It will also require refrigeration facilities and the development of cold chain capacity within the medicines supply system. Algorithms for viral load testing and genotypic resistance testing that are unique to long-acting treatment will be required, together with greater access to point-of-care viral load testing. Further research is needed on the safety and efficacy of cabotegravir/rilpivirine in pregnancy, in neonates and children, and its use in people with HIV who have hepatitis B[33].

Co-morbidities in people living with HIV

The COVID-19 death rate after hospitalization did not decline to the same extent in people living with HIV as in the rest of the population during the Omicron wave of the pandemic, WHO reported at IAS 2023[34]. WHO compared mortality rates in 821,331 people admitted to hospital with COVID-19 in 42 countries, submitted to the WHO Global Clinical Platform, between three waves of the pandemic. The pre-Delta variant wave occurred in 2020, the Delta variant wave in 2020-21, and the Omicron variant wave from late 2021 to May 2023.

The study found that whereas the death rate declined during each phase of the pandemic in people not living with HIV (from 22.0% in the pre-Delta wave to 20.9% in the Delta wave and 9.8% in the Omicron wave), the reduction in the death rate in people living with HIV (5.3% of the sample) was modest (24.2% in the pre-Delta wave, 23.4% in the Delta wave and 19.6% in the Omicron wave). People living with HIV had a 54% higher likelihood of death

"The [weight gain] results of ADVANCE show the need for alternatives to dolutegravir-based regimens in low- and middle-income countries."

Yazdan Yazdanpanah, ANRS, France

during the pre-Delta variant wave, 56% higher risk during the Delta variant wave and 142% higher risk during the Omicron variant wave than people not living with HIV. A CD4 count below 200 significantly increased the risk of death during each wave, highlighting the importance of early HIV diagnosis and treatment and the need for regular SARS-CoV-2 vaccine booster doses for people living with HIV.

A study of SARS-CoV-2 vaccine effectiveness in the Canadian province of British Columbia demonstrated that vaccine effectiveness was lower in people living with HIV with a history of injecting drug use than in people living with HIV without a history of injecting drug use. Although the sample size was small, the study investigators concluded that their findings raise the question of whether people living with HIV and who inject drugs might benefit

from more frequent vaccine booster doses[35]. The study matched 2,700 people living with HIV and 375,043 people not living with HIV who tested for SARS-CoV-2 in British Columbia between December 2020 and December 2021. A total of 40% of people living with HIV and 4% of people not living with HIV had a history of injecting drug use. Vaccine effectiveness with two doses was lower among people living with HIV and with a history of injecting drug use (65%, 95% CI 43.5%-79.3%) than people not living with HIV (80%, 95% CI 62.7-89.6).

The WHO Global mpox Epidemiology Team presented an analysis of 82,290 cases of mpox reported to WHO's global case-based surveillance system in 2022[36]. Information on HIV status was available for 38.9% of cases, of which 52.0% occurred in people living with HIV. The clinical presentation of mpox did not differ according to HIV status although people living with HIV were more likely to present with a concurrent sexually transmitted infection (5.5% vs 3.8%). Immunosuppressed people living with HIV were more likely to be hospitalized than people living with HIV who were not immunosuppressed (OR 2.00, CI 1.64-2.43, p=<0.001) and HIV alone was not a risk factor for hospitalization due to mpox.

A cross-sectional study of 3,041 men who have sex with men in the United States recruited through the American Men's Internet Survey found that 33.3% had received at least one dose of mpox vaccine. Vaccination was significantly associated with HIV status, STI screening, mpox-related stigma, awareness, concern and HIV PrEP visits for individuals vulnerable to HIV acquisition[37]. The findings highlight the need for further integration of mpox vaccination into sexual health services and additional delivery mechanisms to broaden the uptake of vaccination.

Hepatitis C continues to be a major co-morbidity in people living with HIV. In 694 people who were hepatitis C-seronegative on entry to a cohort study of early treatment of acute HIV infection conducted in Bangkok, Thailand, 14% acquired hepatitis C, an incidence rate of 2.7 per 100 person-years of follow up[38]. The median time to hepatitis C acquisition was three years. Of 98 people diagnosed with hepatitis C, 72 completed treatment, 68 achieved a sustained virologic response and 10 cleared hepatitis C spontaneously. Nine of 78 people who cleared hepatitis C later reacquired hepatitis C, with an incidence of 8.5 cases per 100 person-years of follow up.

A short-course regimen for the prevention of tuberculosis in people living with HIV proved safe and effective when combined with an integrase inhibitor-containing antiretroviral regimen, a study conducted in Taiwan reported[39]. Like other rifamycin antimicrobials, rifapentine significantly increases the clearance of integrase inhibitors through the induction of hepatic drug-metabolizing enzymes. The multicentre retrospective study identified 205 people treated with a one-month course (1HP) and 274 people treated with a three-month course of rifapentine and isoniazid (3HP). There was no significant difference in attainment of the primary study outcome (maintenance of HIV-1 RNA <200 copies/ml) for 12 months following the completion of treatment by intent-to-treat analysis (97.6% vs 96.8%, p=0.068). There was no significant difference in virological response according to the integrase inhibitor regimen.

HIV cure and remission

At IAS 2023, researchers shared details of a case of HIV remission after a stem cell transplant from a non-CCR5 delta32 homozygous donor[40]. The "Geneva Patient" was diagnosed with HIV in 1990 and had received continuous suppressive ART since 2005. He received chemotherapy and radiotherapy followed by an allogeneic hematopoietic stem cell transplant in 2018 to treat biphenotypic sarcoma. The stem cell transplant came from a CCR5-wild-type donor. Full chimerism was achieved within one month of transplant, and acute hepatic graft-versus-host disease (GVHD) was treated with a corticosteroid/calcineurin inhibitor. Chronic hepatic GVHD occurred eight months after the transplant and was treated with ruxolitinib, which was transiently discontinued but had to be resumed due to GVHD relapse.

The man undertook a supervised treatment interruption from November 2021, and 54 months post-transplant, HIV RNA measured by ultrasensitive assay remained undetectable, HIV proviral DNA had declined significantly, and it was not possible to amplify HIV from CD4+ T-cell cultures. Investigators suggest three potential mechanisms to explain the absence of viral rebound: the chronic graft versus host reaction may have contributed to the elimination of infected cells; the use of ruxolitinib may have suppressed viral reactivation events; and strong natural killer cell responses to HIV may also have contributed to HIV control.

Several studies reported on the use of experimental agents to reduce the reservoir of cells latently infected by HIV. In the Phase Iia A5336 trial, 60 virologically suppressed adults on ART were randomized in a 2:1 fashion to receive 10mg of the oral JAK ½ inhibitor ruxolitinib twice daily for five weeks in addition to ART, or continue ART alone, followed by biomarker analyses up to week 12 [41]. Participants who received ruxolitinib experienced a significant decay of HIV-1 reservoir between weeks 5 and 12 compared with the ART control group. Viral decay between weeks 5 and 12 was correlated with a decrease in activation and expansion markers by week 5 in the ruxolitinib recipients, leading to reservoir decay by week 12. Modelling of decay rates predicts a 99.99% decay in 2.5 years, indicating the potential for future human trials of JAK ½ inhibitors towards HIV elimination.

A study in humanized mice showed that inhibition of pro-survival proteins induced depletion of HIV-1 latently infected cells and delayed rebound[42]. Latently infected T-cells upregulate anti-apoptotic molecules like Bcl-2 and thus are resistant to cell death. Using the Bcl-2 inhibitor venetoclax, it was possible to delay viral rebound by up to two weeks compared with a vehicle substance. Combination therapy with venetoclax and the Mcl-1 inhibitor S63845 significantly delayed viral rebound after a shorter treatment period compared with venetoclax alone.

Male children who acquire HIV before or during birth may have a better chance of sustained HIV remission than girls due to innate immune sex differences, results from a longitudinal study in KwaZulu-Natal, South Africa, of 281 mother-child pairs following in utero HIV transmission show[43]. All children in the study received ART at birth; more than 92% also received antiretrovirals before birth through their mothers (combination antiretroviral therapy, or cART). The study identified five boys (and no girls) born with HIV who maintained an undetectable viral load despite low adherence or non-adherence to cART. HIV remission in these infants was associated with HIV sensitive to type 1 interferon and low replicative capacity. Innate sex differences in type 1 interferon production in utero may lead to the selection of viruses that are more sensitive to type 1 interferon in boys, the researchers concluded.

A plenary session explored the use of broadly neutralizing antibodies in strategies to achieve HIV remission through combination immunotherapy, in combination with ART and a latency reversal agent to restrict reservoir formation in acute infection, or with therapeutic vaccination to boost and expand antibody responses[44][45].

The conference featured sessions exploring advances in gene delivery and engineering of T and B cells. These included the use of lipid nanoparticles delivering CRISPR Cas9 mRNA to knock down the CCR5 gene or generate CAR T cells, and the use of virus-like particles coated with CD7 antibodies to deliver CRISPR ribonucleoprotein complexes to edit CCR5 in humanized mice[46][47][48]. These techniques have the potential to alter host factors, as well as integrated provirus.

HIV prevention: Epidemiology, PrEP and testing

"We are now on the brink of achieving a monumental milestone – the elimination of HIV in Australia."

Charles Gilks, Australia [49]

Australia is close to achieving the 95-95-95 targets for HIV diagnosis, treatment initiation and viral suppression, according to an analysis of the HIV treatment cascade presented at the conference[50]. By the end of 2021, 91% of people living with HIV in Australia were diagnosed, 91% of those diagnosed were on treatment, and 97% of those on treatment were virally suppressed. Gaps remain in the HIV cascade, notably a lack of change since 2017 in the proportion of people diagnosed with HIV on treatment. Further work is needed to support populations that are less likely to be diagnosed and linked to care.

In the Australian state of New South Wales, new HIV diagnoses declined by 56% in men who have sex with men and by 37% in other populations between the baseline period of 2008-2012 and 2022. In Sydney areas where men who have sex with men make up more than 20% of the population, new HIV diagnoses decreased by 88% between 2008-2012 and 2022, compared with a decrease of 31% in outer Sydney areas where men who have sex with men make up less than 5% of the population. Community-based monitoring of HIV prevention modalities showed that in 2022, 87% of gay and bisexual men in Inner Sydney areas were using combination prevention (including PrEP, treatment as prevention and condom use) compared with 76% in outer Sydney areas[51].

A plenary reviewed progress towards HIV elimination, defined by UNAIDS as a 90% reduction in HIV transmission from 2010[52][53]. UNAIDS epidemiological estimates show substantial regional variation in progress towards this target. New HIV acquisitions declined by 57% in eastern and southern Africa and 49% in western and central Africa between 2010 and 2022. But in the same period, new HIV acquisitions declined by only 14% in the Asia-Pacific region and 15% in the Caribbean[54]. Furthermore, increases in HIV acquisitions were observed in three regions (eastern Europe and central Asia, 49%; Middle East and North Africa, 61%; and Latin America, 8%) between 2010 and 2022.

New HIV diagnoses have declined in higher-income countries, notably in England, where new HIV diagnoses fell by 53% between 2012 and 2021, and the Netherlands, where new diagnoses fell by 68% in men who have sex with men during the same period. Although new HIV acquisitions have declined globally by 38% since 2010, the rate of decline is not sufficient to reach the 2030 target without a substantial intensification of prevention activity and improvements in PrEP coverage. A global target of providing PrEP to 10 million people with substantial vulnerability to HIV acquisition by 2025 is far from being met, with only southern and eastern Africa and western and central Africa approaching regional targets.

To review progress towards PrEP coverage targets in key populations, the US Centers for Disease Control and Prevention (CDC) assessed trends in PrEP initiation by year in 27 countries with complete testing and PrEP initiation data[55]. The CDC supported 1,371,984 PrEP initiations between 2019 and 2022, including 38% in key populations. Despite COVID-related disruptions to service access, the proportion of HIV-negative key population members who initiated PrEP in CDC-funded programmes increased from 3.1% in 2019 to 19.6%, a 532% increase. However, more than 70% of female sex workers and men who have sex with men who tested HIV negative in 2022 did not initiate PrEP. Additional innovations, such as long-acting injectable PrEP, oral event-driven PrEP, and programmes to increase PrEP awareness and literacy among beneficiaries and providers may increase uptake among key populations.

Estimates of HIV incidence in key populations are lacking in many settings, notably in people who inject drugs in Africa. Researchers used programmatic data to estimate HIV incidence in people who use drugs who accessed harm reduction services in four South African provinces from 2019 to 2022[56]. The study population consisted of 2,457 people who had an initial HIV-negative test and at least one HIV test during the follow-up period. A total of 300 people who inject drugs acquired HIV over 2,190 person-years of follow up: an HIV incidence rate of 13.7 per 100 person-years.

HIV incidence was approximately three times higher in the provinces of Gauteng and KwaZulu-Natal than in the Eastern Cape and Western Cape. Multivariable analysis showed that the use of opioid agonist treatment (OAT) reduced the likelihood of acquiring HIV by 62% during the follow-up period (aHR 0.38, 95% CI 0.18 - 0.81). Although 97.5% of the study population used heroin, only 1.9% had accessed OAT at baseline, emphasizing the importance of improving access to OAT in South Africa.

The HIV prevention programme in Thailand has focused on key populations and key population-led health services delivered through community-based organizations since 2015. But an analysis of new HIV diagnoses by self-reported risk category, comparing three periods (2008-2014, 2015 and 2016-2022), found lower CD4 counts at diagnosis in non-key population males and females and significantly reduced survival probability in non-key population males and females after 7.5 years of follow up[57].

At the end of the study period, non-key population females still accounted for 25% of diagnoses, and non-key population males accounted for 40% of diagnoses. Thailand has implemented a successful key population-focused HIV prevention programme, but policies to target non-key populations, particularly non-key population women, are necessary to end the AIDS epidemic in Thailand.

Voluntary medical male circumcision (VMMC) reduced HIV acquisition among men who have sex with men in a randomized controlled trial in China[58]. In the study, 248 HIV-negative men who predominantly practised insertive anal intercourse were randomized to immediate or delayed VMMC. No men in the intervention arm and five in the control arm acquired HIV during a follow-up period of 12 months.

Differentiated service delivery for PrEP

Models of differentiated service delivery for PrEP can improve PrEP uptake. A study in Malawi demonstrated the successful integration of PrEP initiation within a clinic providing STI care[59]. An evaluation enrolled 175 index participants initiating oral PrEP. Some 40% reported exchanging sex for money or goods in the previous month and 13% had a sexual partner living with HIV. After assisted partner notification, 100 sexual partners were contacted; 58 attended a clinic and 27 initiated PrEP. The service model proved to be an effective means of engaging young heterosexual men in PrEP and enabling referral for female partners.

In Kenya, a comparison of direct-to-pharmacy PrEP refill visits or standard-of-care PrEP provision enrolled 746 people already taking PrEP[60]. The intervention reduced time spent in the clinic by 35% and was associated with a higher rate of PrEP continuation than in the standard of care group. In a three-city demonstration study in Brazil, 87% of adolescent men who have sex with men and trans women aged 15-17 eligible for PrEP chose to initiate on the day of the offer, emphasizing the acceptability of same-day initiation for this populatio[61].

In the Philippines, a community-led PrEP programme called e-PREPPY demonstrated that PrEP can be delivered virtually during testing, prescription and dispensing [62]. People could order an HIV self-test online and it was supplied by post. Through telemedicine, trained community peers and doctors assessed people with non-reactive test results for PrEP. A courier delivered the PrEP, with further prescriptions dispensed after follow-up self-testing. Between August 2022 and April 2023, 230 men who have sex with men initiated PrEP and 100 completed their first month of PrEP, with 92 taking oral PrEP daily.

PrEP preferences

Studies presented at IAS 2023 explored preferences for PrEP modalities among cisgender female adolescents, women and key populations. The need for choice in PrEP options was emphasized, as well as the need to address potential barriers to access when planning PrEP service delivery.

In the open-label extension phase of the HPTN 084 randomized trial of long-acting injectable cabotegravir or daily oral TDF/emtricitabine, participants were given the option of continuing their existing regimen, switching or withdrawing. Of 3,028 eligible participants, 2,472 chose to continue their regimen: 78% to receive CAB-LA and 22% to receive TDF/emtricitabine[63] . Of those randomized to TDF/emtricitabine, 67% chose to switch to CAB-LA, and of those randomized to CAB-LA, 11% chose to switch to TDF/emtricitabine. The main reason for switching was a preference for a new modality (either injections or pills). Participants who chose to continue or switch to CAB-LA were more likely to be sexually active but not live with a partner ($p<0.025$), to have experienced recent physical intimate partner violence ($p<0.013$) and to have been paid for sex (0.002) than those who chose to continue or switch to TDF/emtricitabine. The preferred product choice varied by country, with 8% of participants in Botswana, 22% in South Africa and 31% in Uganda opting for TDF/emtricitabine.

A qualitative study of 15 participants in the HPTN 084 trial found that injectable CAB-LA was acceptable to cisgender adolescent female participants due to the lack of adherence challenges and the discretion offered by injectable PrEP[64]. In a cross-sectional study of PrEP preferences in 1,522 trans women in 11 countries in Asia, 10% were currently using PrEP, with cost the major stated barrier[65]. Respondents preferred free long-acting injectable PrEP provided through a peer-led community clinic and six- to 12-monthly clinic visits to obtain PrEP services.

In Zimbabwe, a two-arm prospective cohort study evaluated the dapivirine vaginal ring or TDF/emtricitabine in 1,466 adolescent girls and young women aged 16-25 eligible for PrEP[66]. The majority (76%) opted for the dapivirine vaginal ring with continuation rates at months 1-4 consistently higher in users of the dapivirine vaginal ring (64% vs 59% at month 4) than in those on daily oral TDF/emtricitabine. The proportion opting for the dapivirine vaginal ring was higher in rural than urban areas (97% vs 61%).

Access to long-acting PrEP

In 2022, WHO updated PrEP guidelines recommending that long-acting CAB be offered as an additional prevention choice for people highly vulnerable to HIV acquisition as part of combination prevention approaches[67]. However, access and implementation have been very limited with many challenges, including the slow pace of local regulatory approval[68]. In July 2023, CAB-LA had received regulatory approval in seven countries, including South Africa and the United States.

> **"I picture it like this [on progress to approval of CAB-LA]: we have a Ferrari injectable, we are driving from Brisbane to Sydney, but we are going at 20km an hour."**
>
> **Andrew Mujugira, Uganda** [69]

High cost combined with significant supply constraints remain barriers to global CAB-LA access and to implementation research on CAB-LA delivery. Global health inequities exposed by COVID-19 persist for injectable antiretrovirals. To make long-acting injectables available to lower- and middle-income countries, large implementation studies should be performed earlier in the product development cycle to determine the optimal means of delivering these products at scale[70][71].

Modelling presented at IAS 2023 showed that for several upper-middle-income countries, the price of CAB-LA would need to fall substantially for it to become a cost-effective alternative to oral PrEP. Ninety lower-income countries may eventually be able to obtain generic versions of CAB-LA for prevention because of an agreement between ViiV Healthcare and the Medicines Patent Pool at a proposed access price of USD 210 to USD 240.

A model of PrEP use and HIV acquisition in a cohort of adolescent girls and young women in South Africa found an incremental cost-effectiveness ratio of USD 3,440 per life-year gained for CAB-LA at an annual price of USD 80 over 10 years[72]. A model of HIV incidence in Brazil, assuming 5% incidence in those eligible for PrEP, showed that where the annual budget for PrEP was fixed at the current level of USD 6 million, devoting this budget to CAB-LA at prices of USD 3,500 or USD 250 a year would result in higher HIV incidence than provision of daily TDF/FTC PrEP at an annual cost of USD 48[73]. Event-driven oral PrEP at USD 12 a year would avert the greatest number of HIV acquisitions in this model.

U=U and viral load monitoring

During IAS 2023, WHO published a policy brief on viral load monitoring[74]. WHO emphasized the importance of communicating the benefits of viral load suppression to all people living with HIV. It noted three key categories for HIV viral load measurements: unsuppressed (>1,000 copies/mL); suppressed (detected but ≤1,000 copies/mL); and undetectable (viral load not detected by test used). People with undetectable viral load have zero risk of transmitting HIV to their sexual partner(s), WHO stressed, while people with HIV who have a suppressed but detectable viral load and are taking medication as prescribed have almost zero or negligible risk of transmitting HIV to their sexual partner(s).

This guidance is based on a systematic review of eight studies of sexual transmission of HIV in 7,762 serodifferent couples. The review identified two possible cases of transmission associated with viral loads below 1,000 copies/ml and concluded that the likelihood of sexual HIV transmission at viral loads above 50 copies/ml but below 1,000 copies/ml was almost zero[75].

Testing

A symposium explored the need for new approaches to HIV testing in the context of long-acting PrEP delivery[76]. Algorithms for the detection of acute HIV in people on CAB-LA recommend the use of either an HIV-1 RNA test, a fourth-generation antibody/antigen test or two different rapid antibody tests[77]. Forthcoming demonstration projects and clinical trials of injectable PrEP will provide an opportunity to evaluate different testing modalities, as well as the performance of quantitative and qualitative HIV-1 RNA testing in the detection of acute HIV[78].

At IAS 2023, WHO published guidance recommending that HIV self-testing be offered as an additional option for testing at facilities and that HIV self-testing be used to support PrEP delivery, including for initiation, re-initiation and continuation[79]. The guidelines also recommended that social network testing approaches be offered as an additional approach to HIV testing. Social network HIV testing encourages individuals to promote HIV testing to others in their social networks. A systematic review and meta-analysis of the literature presented at IAS 2023 identified 43 studies evaluating various aspects of social network testing. Implementation of social network testing increased the uptake of HIV testing (RR 1.67, 95% CI 1.35-2.02) and a higher proportion of contacts of promoters tested HIV positive than in standard facility-based testing[80].

A social network intervention increased HIV self-testing among a harder-to-reach population of fishermen in Kenya[81]. A cluster-randomized study compared the impact of the distribution of HIV self-tests on HIV self-testing uptake and linkage to care by testing promoters within social networks or referral to local clinics to obtain self-tests. The study recruited 733 men, of whom 666 were available for follow up after three months. Self-reported HIV self-testing (60% vs 10%) and the proportion of individuals linked to ART or PrEP evaluation after testing (70% vs 17%) were significantly higher in the intervention group (all p<0.001).

Structural and social issues

Stigma and discrimination

Conference presenters reflected critically on current approaches to the conceptualization and measurement of stigma in HIV research. They appealed for a shift away from framing HIV stigma as an individualized experience towards using experiences of stigma as a means of thinking about how power acts upon people and bodies and who profits from the power to stigmatize[82][83].

> **"We need theory-based indices and interventions that go beyond conceiving and measuring stigma as individual negative attitudes and include the social and cultural contexts and power relations that produce it."**
>
> **Catherine Dodds, United Kingdom**

Research presented at IAS 2023 demonstrated the impact of the legal reinforcement of stigma and discrimination on access to services and sexual and reproductive health rights. In Uganda, the intersection between stigma and service delivery was highlighted in the period leading up to the passing of the Anti-Homosexuality Act in May 2023. The legislation further criminalizes same-sex sexual relations and prohibits the "promotion" of homosexuality, potentially including the provision of HIV prevention services. In the face of this legislation, 84 PEPFAR-funded drop-in clinics that served key populations had to recalibrate care models to ensure continuity of care, safety and confidentiality. Telehealth, home delivery of medication and enhanced systems of security and social protection were implemented[84].

Women living with HIV are being coerced into sterilization and the involuntary use of contraception or experience coercion relating to pregnancy and infant feeding, an analysis of data gathered using the People Living with HIV Stigma Index 2.0 showed[85]. The study interviewed 10,555 women living with HIV in 11 countries in central, eastern, western and southern Africa and five countries in eastern Europe and central Asia from 2020 to 2022. Forced sterilization was reported by 1% in central, eastern, western and southern Africa and 3% in eastern Europe and central Asia. Two percent in central, eastern, western and southern Africa and 4% in eastern Europe and central Asia were coerced into the use of unwanted forms of contraception; 5% in central, eastern, southern and western Africa and 10% in eastern Europe and central Asia experienced coercion related to pregnancy[86].

Empowering Indigenous and First Nations communities

A cross-track symposium recognized the need for enhancing the well-being of First Nations and Indigenous peoples living with HIV[87]. In response to ongoing marginalization and discrimination, speakers called for empowerment initiatives to address inequalities, enact human rights and facilitate community participation in decision-making processes. Speakers highlighted disproportionate HIV incidence and incarceration rates among Indigenous populations in Canada, as well as lack of access to health services, including harm reduction[88].

HIV and migration

The pre-meeting, "IAS 2023 forum: ACT NOW on global HIV migration, mobility and health equity", brought together advocates, policy makers and scientists to develop a global advocacy agenda on HIV and migration[89]. The number of migrants is increasing in all regions due to economic and environmental pressures, war and natural disasters. This community forum focused on the structural and legal barriers facing migrants living with HIV, who continue to be treated as a special case when moving between countries and characterized as a public health risk despite scientific evidence about viral suppression and zero transmission risk.

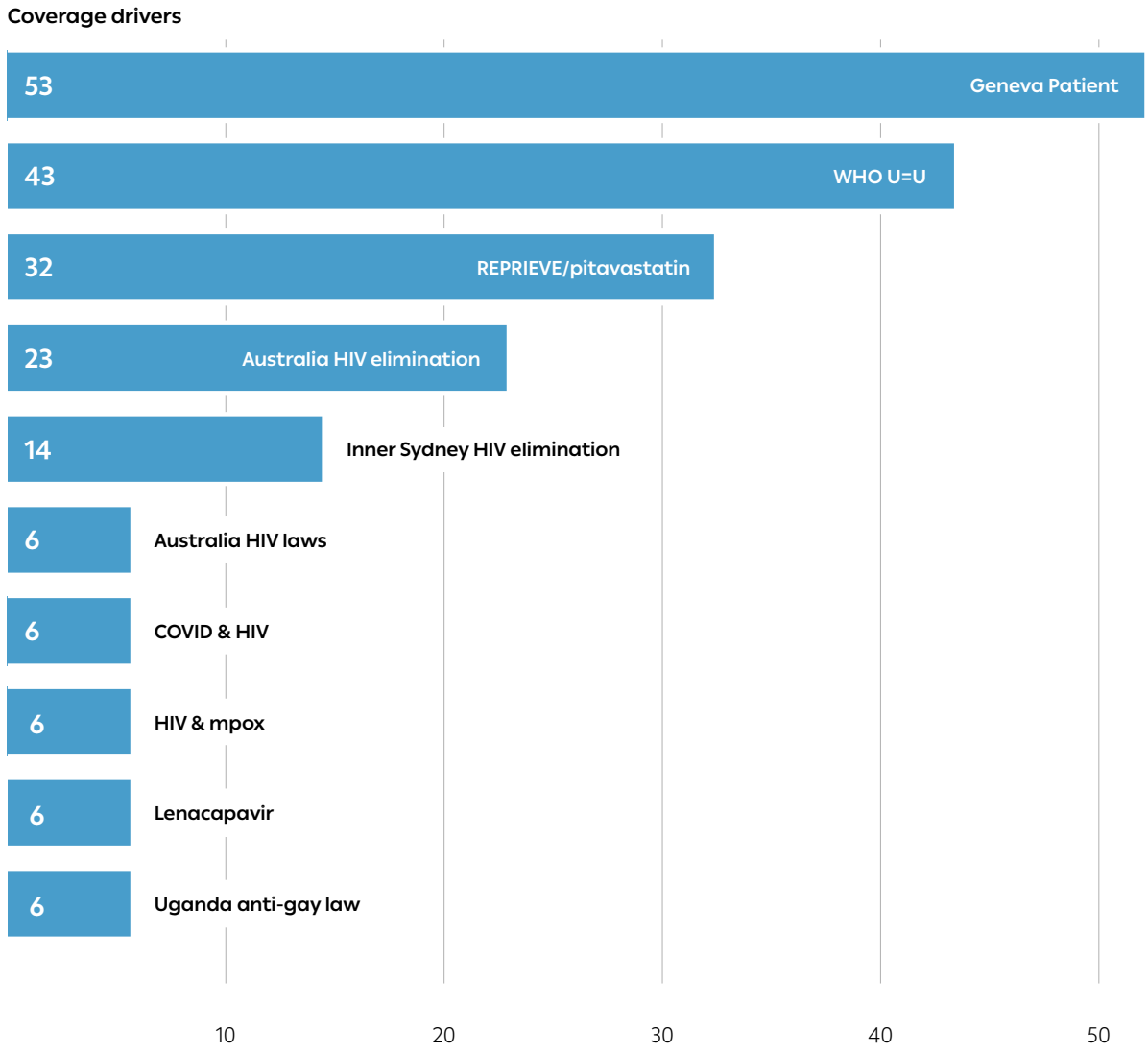
Out-of-date assumptions about the costs of HIV treatment and life expectancy cause immigration authorities to underestimate the economic contribution that people living with HIV can make to destination countries. Delegates attending the forum agreed on the need for the development of a consensus statement on best practice principles to guide the development and implementation of policy towards migrants living with HIV. Raising awareness of the harms of current policies on migration and HIV and strengthening the evidence base about the economic and human costs of current discriminatory policies will also be critical.

How was it covered?

IAS 2023 achieved a similar level of media coverage to IAS 2021 and generated 57% more news coverage than IAS 2017, with 312 news articles reporting on the conference. Top-tiered media outlets, including CNN, The Financial Times, The Guardian, France 24, WIRED and The Australian, published 16 stories on IAS 2023.

The IAS 2023 press programme drove the news stories coming out of the conference. The topics that attracted the greatest media attention were the "Geneva Patient" (53 stories), WHO U=U "zero risk" brief (43 stories), the REPRIEVE study (32 stories), and HIV transmission virtually eliminated in Inner Sydney (14 stories).

Nearly all the news drivers stemmed from the press programme



Headlines from IAS 2023

"Sydney almost eliminates HIV transmission in global first"

Financial Times

"HIV could be eliminated in Australia"

The Guardian

"A Patient May Be Free of HIV, Thanks to This Drug"

Wired

"HIV patients face double the risk of heart disease. Taking a statin could help"

CNN

"Researchers say 'Geneva patient' is the sixth person with HIV in long-term remission"

France 24

IAS 2023 digital highlights

IAS 2023 digital platforms (social media, website and emails) saw significant growth from IAS 2021 thanks in part to engaging strategic campaigns that were promoted across platforms.

1 million +

social media impressions by IAS accounts (+49% more than at IAS 2021)

45,000 +

social media engagements on IAS accounts (+140% more than at IAS 2021)

14,000 +

conference website visitors (+55% more than at IAS 2021)

31% +

Daily Digest open rate (+7% more than at IAS 2021)

How did it go?

Key informant interviews

Sixteen stakeholders (including conference co-chairs, track chairs, sponsors, partners, community members and other civil society representatives) provided in-depth feedback on the scientific content of the conference, organization, expected outcomes and recommendations for maximizing impact.

Online delegate survey

Of the 5,335 participants, 792 (15%) responded to an online survey on 19 topics. The quotations presented here are all drawn from the survey and key informant interviews. The quotations have been minimally edited for clarity and brevity where needed.

Survey respondents were broadly representative of all delegates regarding region, age, gender and organizational affiliation.

Responses were received from 86 of the 139 countries represented at the conference.

- Of survey respondents who shared their gender, 49% identified as female, 50% as male, and 1% as gender non-conforming or non-binary. Two percent of survey respondents reported that their gender differed from their sex at birth.

- In all, 62% of respondents were healthcare workers, 17% were researchers, 8% worked in policy or administration, 6% were students and 2% were advocates or activists.

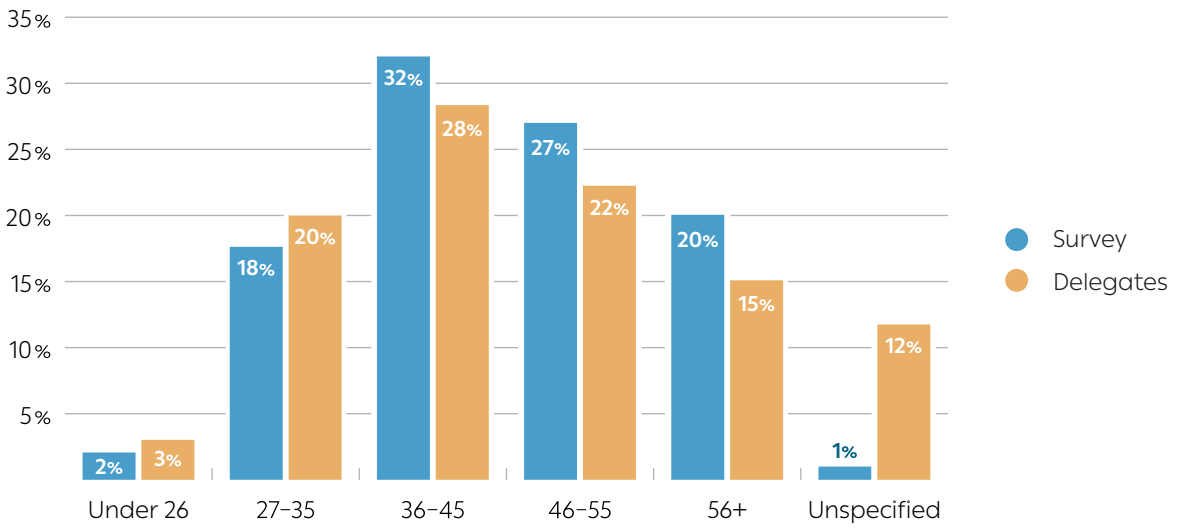
- A total of 29% of respondents identified as members of at least one key or vulnerable population.

- The response rate matched the rate for IAS 2017 (15%) but was below delegate survey response rates for IAS 2019 (19%) and IAS 2021 (24%).

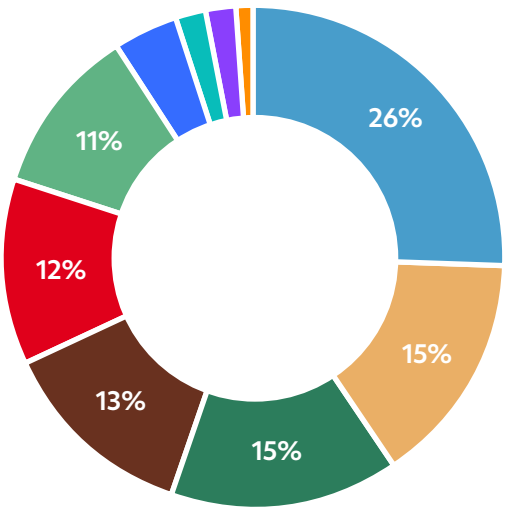
The majority of respondents (62%) had been working in the field of HIV for more than 10 years, including 46% who had been working in the field for more than 15 years. Of the remainder,19% had been working in the field for 6-10 years, 12% for 2-5 years, and 6% were newcomers (0-2 years in their field).

More than half of the survey respondents (52%) said that they had attended a previous IAS Conference on HIV Science.

Delegates and survey respondents by age



Survey respondents by region



- Central, Eastern, Southern & Western Africa **26%**
- South & Southeast Asia **15%**
- Oceania **15%**
- Latin America **13%**
- North America **12%**
- Western & central Europe **11%**
- East Asia **4%**
- Caribbean **2%**
- Middle East & North Africa **1%**
- Eastern Europe & Central Asia **1%**

What did people get out of it?

New knowledge on practice-changing scientific advances

Delegates and key informants were highly satisfied with the scientific content of IAS 2023. Delegate survey respondents frequently cited the results of the REPRIEVE study as a key take-home message from IAS 2023. REPRIEVE demonstrated that daily treatment with pitavastatin reduced the likelihood of major cardiovascular events in people with HIV at low-to-moderate risk of cardiovascular disease by 35%[90][91]. Delegates were highly likely to say that they had learned about co-morbidities at IAS 2023; 88% of delegates said they acquired a lot or some new information on co-infections and co-morbidities, including 45% who said they gained a lot.

In their assessment of the conference's scientific highlights, key informants also drew particular attention to the results of the REPRIEVE study. Key informants expected the study findings to result in changes in clinical practice. But they noted that these data should be reviewed by guideline panels for HIV and cardiovascular disease before the findings translate into clinical recommendations. Further analysis is needed to understand the regional variation in prevention effect and the metabolic correlates of protection.

Several key informants questioned whether limited access to pitavastatin in lower- and lower-middle-income countries, together with lack of cardiovascular screening capacity in primary care, might limit the implementation of primary prevention of cardiovascular disease using statins in these settings. Key informants stressed the importance of considering the study findings within a larger public health approach to cardiovascular disease prevention in low- and lower-middle-income countries, noting the lack of monitoring and treatment for hypertension in many settings.

"REPRIEVE was the scientific highlight for me, and I greatly appreciated a full symposium to explore the implications of the data. This is what IAS conferences do so well. I'm looking forward to more discussions on how we implement statin treatment at future IAS conferences."

Key informant, international organization

"Now, how to incorporate statins into our clinical practice?"

Delegate survey respondent

"Low-resource countries need statins for adults."

Delegate survey respondent

Extending the U=U message

Of the delegate survey respondents, 83% said they gained a lot or some new information on undetectable equals untransmittable (U=U) at IAS 2023. As at AIDS 2022, the U=U message was widely discussed during conference symposia, satellite meetings and a U=U global roundtable preceding the conference. Key informants consistently highlighted the WHO statement on low-level viremia and zero HIV transmission risk presented at the conference as a key message from IAS 2023, extending the relevance of the message that undetectable equals untransmittable for people with viral loads between 1,000 copies/ml and 50 copies/ml (low-level viremia). Delegate survey respondents frequently cited the WHO statement and other learnings on U+U as a key take-home message from IAS 2023.

"Promote U=U to help with breaking the chain of transmission, toward the goal of ending the AIDS epidemic by 2030 and more importantly, bringing dignity back to lives of people living with HIV."

Delegate survey respondent

"The change in WHO language about transmission of HIV was very impactful."

Delegate survey respondent

Greater insight into PrEP implementation and future PrEP

A total of 86% of survey respondents said they gained a lot or some new information on PrEP at IAS 2023, with 53% saying they gained "a lot" of information on the topic. Survey respondents often reported that they valued learning about long-acting PrEP and having the opportunity to begin thinking about implementation challenges.

"Implementation for long-acting PrEP will require addressing challenges of testing, co-infection with STIs, and novel engagement and maintenance strategies to achieve impact."

Delegate survey respondent

"We need urgent access to CAB-LA to do 'real-life' demonstrations."

Delegate survey respondent

"I am an HIV treatment literacy officer in my organization, so the conference helped me to understand and share the new treatment of using injections, its side effects and why my community of people living with HIV should start thinking of the LA injectables. This will help me and my organization to know how to advocate for access to the new treatment methods in Zambia."

Scholarship recipient

Some delegates and key informants felt there had been too little attention paid to challenges in securing access to long-acting PrEP and increasing the uptake of oral PrEP.

> **"Between the long-acting [PrEP] and the bNAbs, we seem to be focusing a lot on the technology and not a lot on the 'how do we get it to people?' "**
>
> Key informant, track chair

> **"There are no programmes currently implementing CAB-LA. There was entirely too much focus on an intervention that is yet to be fielded, and that had little new research to contribute."**
>
> Delegate survey respondent

One key informant highlighted the value of discussing long-acting PrEP before access, as it provided an opportunity to initiate a dialogue with policy makers attending the conference about the opportunities and challenges of implementing long-acting PrEP.

> **"Oral PrEP has been so successful in Australia, the fastest uptake in the world, so justifying to our government why they should spend an enormous amount of money on a new mode of administration when something that costs close to nothing is so effective will be a very hard ask. But being able to have that discussion in front of decision makers and raise the awareness of the importance of long-acting injectables at a conference like this is really important."**
>
> Key informant, community sector

Sharing Australia's progress towards HIV elimination

All Australian key informants saw the conference as an opportunity for Australia to learn from global experts about recent advances in HIV prevention and treatment. However, they were also excited and proud to share the outstanding progress towards HIV elimination that has been achieved in Australia. IAS 2023 was the third IAS conference to be hosted by an Australian city, following IAS 2007 in Sydney and AIDS 2014 in Melbourne.

"I think these are great opportunities for Australia to seek out international experts to collaborate, to learn, and to look at ways in which Australia's best practice in this field can be improved or strengthened."

Key informant, community

"We show, even [in] some of the most challenging national settings, that there's a light at the end of the tunnel in terms of progressing effort and investing in measures to address HIV and that you can reach virtual elimination. I think what Australia can show so many places around the world is that it's possible."

Key informant, community

Community involvement

Key informant interviews highlighted the critical role played by community and civil society in the planning and delivery of IAS 2023. Community and civil society contributed to the conference in several ways. Civil society members of the Conference Organizing Committee played a critical role in shaping the IAS 2023 programme. Members of the Local Organizing Committee – representatives of state and federal community-based organizations involved in the HIV response in Australia – played a leading role in mobilizing political engagement with the conference at the state and national level.

Long experience of working together and engaging with government enabled a broad spectrum of community organizations to work effectively to secure meaningful commitments on the decriminalization of HIV transmission and removal of co-payments for antiretroviral drugs in Queensland, both long-standing community objectives. These decisions were announced during IAS 2023, adding to a sense among Australian key informants that the conference had provided a platform to achieve policy change and promote awareness of Australia's progress towards HIV elimination among politicians and the general public.

> **"We were really able to demonstrate GIPA [Greater Involvement of People with AIDS] and MIPA [Meaningful Involvement of People with AIDS] in action."**
>
> **Key informant, community**

> **"The conference gave us the opportunity to shine and show how effective we can be."**
>
> **Key informant, community**

Key informants also drew attention to the community programme accompanying the conference and to conference sessions that addressed the role of communities in the HIV response.

> **"The challenge that I think we delivered the best on was a particular issue relating to HIV science, which is: how do you meaningfully involve and engage community? I know that [for] the science conference, the expectation is, it's full of scientists, but increasingly you can't have a conference without meaningful engagement of community."**
>
> **Key informant, Organizing Committee**

The scientific programme recognized community expertise in sessions on empowering Indigenous and First Nations communities, community-led models of HIV care, and empowering and promoting community engagement and practices in science, as well as community responses to sexualized drug use and decolonization of HIV science[92][93][94][95][96].

The IAS 2023 pre-meeting, "HIV Cure and Immunotherapy Forum", included a session on community engagement and the importance of a diversified study population in HIV cure studies.

"Putting communities first was a recurring theme throughout IAS 2023. The potential of communities to interact with science and develop knowledge, as delegates heard, is still undervalued; crucial populations and individuals living with HIV are frequently excluded from research. Community researchers, on the other hand, are pioneering essential science, and researchers can benefit from best methods for effective community participation, from conception to implementation."

Delegate survey respondent

Strengthened global advocacy on HIV and migration

The pre-meeting, "IAS 2023 forum: ACT NOW on global HIV migration, mobility and health equity", brought together advocates to review the barriers to mobility and healthcare created by HIV-related migration restrictions. Attendees called for coordinated global advocacy to promote evidence-based policies that reflect current knowledge of ART, HIV transmission, life expectancy and health system costs.

"We were incredibly pleased by the way it raised the profile of the issue in Australia and catalysed a global advocacy movement on HIV and migration in the same way as already exists for decriminalization of HIV. There hasn't been that opportunity to come together to look at this issue globally. We hope that the conversation can continue and grow bigger next year."

Key informant, Local Organizing Committee

Will it make a difference?

Almost all delegates (98%) identified at least one way in which attending IAS 2023 would lead them to take action or develop their work.

Impact on participants' work

Two-thirds (66%) expected to apply the knowledge they had gained to contribute to HIV science; 56% agreed that IAS 2023 would improve their ability to engage in the HIV response; and 65% expected to adjust their practices to the latest evidence after IAS 2023.

Survey respondents anticipated that the conference would support their work in several ways. For example, 60% expected to share information gained at IAS 2023 with colleagues, peers and networks, whether through presentations or the development of materials, and 36% would build capacity within their organizations, through training or the development or updating of guidelines or procedures.

"I established networks with other attendees from my region working to ensure equitable access to care for key populations. This will enable me to do my job better in engaging governments in ensuring the inclusion of key populations in government interventions and ensuring a wider reach through these CSO groups."

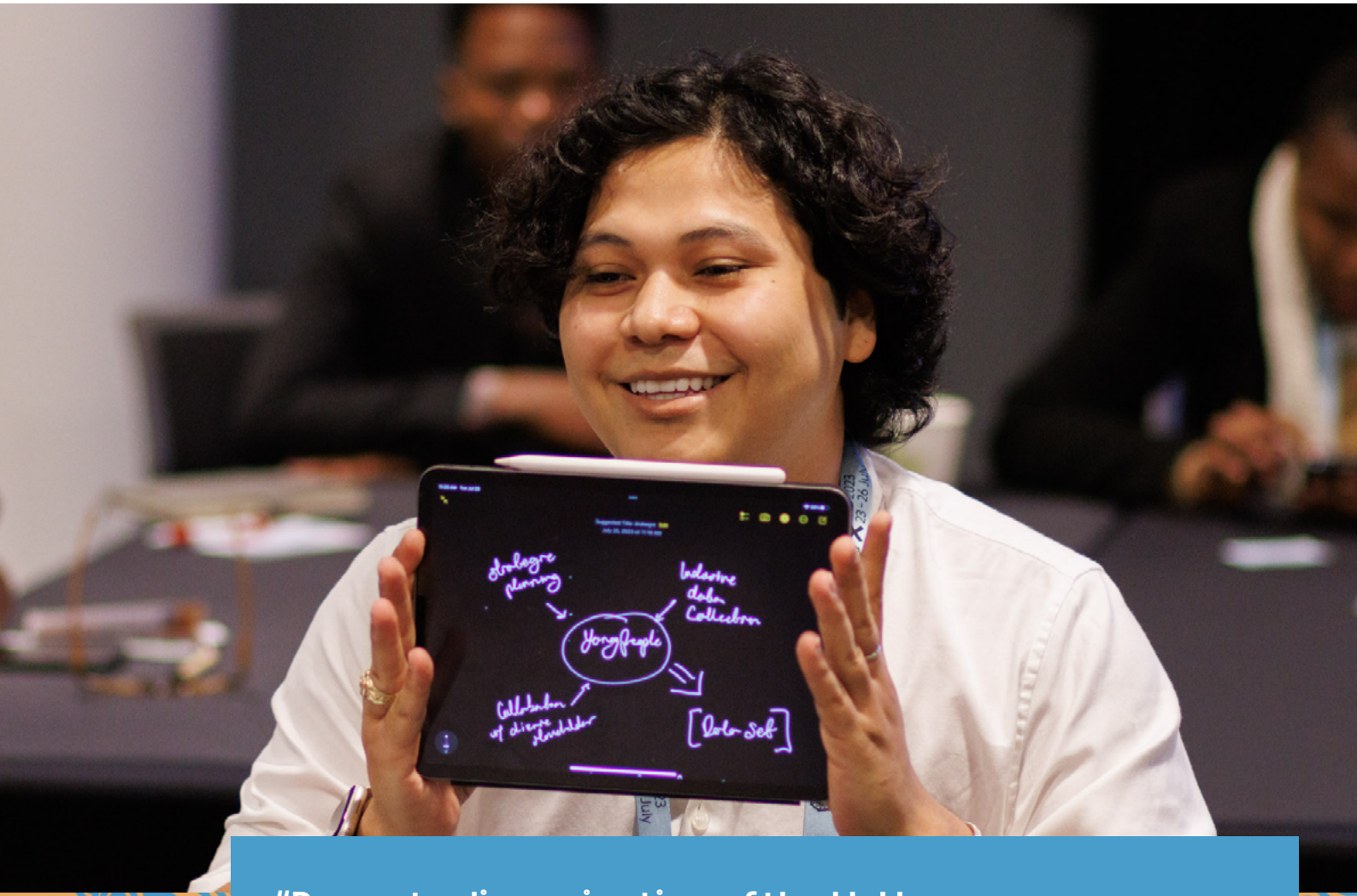
Scholarship recipient

"Since my focused areas are in stigma and discrimination (related to mental health condition) and chemsex among transgender people, I got to attend relevant sessions and met researchers who worked [in] the fields where I could learn a lot from them and their findings. Some of them even have the specific tools that could be a perfect match for our potential research and service implementation."

Scholarship recipient

More than half (54%) of survey respondents said that they had either identified new opportunities for partnerships or strengthened existing partnerships at IAS 2023, and 35% had identified opportunities for new interdisciplinary research partnerships or strengthened existing interdisciplinary research partnerships during the conference.

Just over one in three (34%) anticipated developing new projects or research or scaling up existing projects or programmes as a result of taking part in the conference, and 40% expected that they would improve or refine their existing work or research methodology as a result of attending IAS 2023.



"Promote dissemination of the U=U message, particularly across the spectrum of clinical colleagues."

Delegate survey respondent

Impact on policy and programming

Overall, 30% of survey respondents expected to take at least one policy-related action as a result of attending IAS 2023, and 27% expected that their advocacy or policy work would be strengthened after attending the conference. Similarly, 27% expected that they would use what they learnt at the conference to raise awareness among communities, policy makers and scientific leaders.

Conclusions: Did we achieve our objectives?

Objective 1: Accelerate basic science and clinical science innovation in the development and application of person-centred precision medicine for HIV treatment, reducing HIV transmission, vaccines, pathogenesis, co-infections, and the search for a cure.

Overall, 93% of survey respondents agreed that the conference had met this objective; 93% reported they had obtained new knowledge on person-centred approaches to prevention, treatment and care, co-infections and co-morbidities; and 94% agreed they had obtained new knowledge on gaps in HIV cure or remission and vaccine research.

Qualitative responses to the delegate survey revealed a strong sense among attendees that the future of HV treatment and prevention lies in the development of long-acting products, and 52% of survey respondents said they learned a lot about new developments in ART.

Key informants viewed the conference as scientifically strong, pointing to a range of studies on HIV cure that suggested promising new avenues for research, including the use of experimental agents to reduce the HIV reservoir. They also highlighted data that has immediate and global relevance for person-centred care: the use of statins to reduce cardiovascular risk; management of hypertension in African populations; reduced SARS-CoV-2 vaccine effectiveness in people who inject drugs; lack of reversal of weight gain after switching antiretroviral regimen; and new antiretroviral regimens in children.

"Great data was presented that will change my practice and care for people living with HIV. It allows management of complex patients with more confidence and better understanding of the ART options available."

Delegate survey respondent

Objective 2: Advance interdisciplinary collaboration in implementation research to reduce HIV transmission and improve treatment outcomes across all life stages with a special focus on translating research outcomes into policy and practice through simplified practical guidelines for low- and middle-income countries and key populations.

Overall, 81% of survey respondents agreed that they had obtained new knowledge of how to translate research outcomes into policy and practice for low- and middle-income countries and key populations. In their take-home messages, delegates frequently expressed concern regarding the gap between evidence and policy in many settings and stressed the importance of advocacy for translating evidence into policy and practice.

"We have a lot of information available, based on excellent research, but national governments are not yet using it as the basis for policy and programming. A great deal more advocacy is needed to ensure science-based approaches."

Delegate survey respondent

"The actual application/programme implementation/policy seems to be sluggish in catching up with the science. There needs to be more policy advocacy and translating the science into the language which policy makers and the community can better understand."

Delegate survey respondent

"HIV & [blood-borne virus] elimination is possible, but commitment is needed from global, political and community levels. So much has been done, from basic science to activism. However, more commitment and action is what will translate into achieving elimination goals."

Delegate survey respondent

Most key informants agreed that the conference format had provided numerous opportunities for scientific disciplines to learn from each other, for example, through cross-track symposia and plenary sessions. Many delegate survey respondents and key informants cited plenary sessions and symposia on broadly neutralizing antibodies and long-acting treatment and prevention as highly illuminating, but also posing questions for implementation science, behavioural science and health economics. Several key informants also commented on the importance of community partnerships when developing interdisciplinary partnerships and saw community-related sessions at the conference as a valuable means of promoting interdisciplinary collaboration.

Objective 3: Strengthen HIV prevention research to improve cost-effective biomedical, behavioural and structural interventions with a special focus on understanding implementation challenges, overcoming system barriers and replicating successes in HIV prevention practice and programmes.

Overall, 90% of survey respondents agreed that this objective had been met. A total of 94% of delegates reported that they obtained new knowledge to improve prevention, treatment and care and progress towards a vaccine and cure; 89% obtained new knowledge on implementation challenges and systems barriers for HIV prevention; and 87% obtained new knowledge on conditions for successful replication of HIV prevention interventions.

Delegate survey respondents were more likely to mention PrEP than any other topic when asked to share their take-home message from IAS 2023.

"Though injectable PrEP is still not readily available, it is an option. I will continue to advocate for availability and uptake."

Delegate survey respondent

"There were several inspiring pharmacy-led projects in Africa delivering PrEP and PEP to vulnerable communities and it is wonderful to see the data showcased on an international stage."

Delegate survey respondent

"[A] highlight of the conference was the growing research and acceptance for long-acting PrEP with cabotegravir."

Delegate survey respondent

Objective 4: Address HIV vulnerability, determinants of HIV burdens and poor clinical outcomes among key and marginalized populations, including interventions to reduce stigma and discrimination and improve access and uptake of ART for prevention and treatment with a special focus on First Nations and Indigenous communities and on person-centred approaches.

Overall, 85% of survey respondents reported that they obtained new knowledge of HIV vulnerability, determinants of HIV burdens and poor clinical outcomes among key and marginalized populations, including First Nations and Indigenous populations.

A total of 45% of respondents said they gained a lot of information on key populations at IAS 2023. In their qualitative responses, they most often cited the importance of U=U for stigma reduction and the accessibility of PrEP as takeaway messages regarding key populations.

"Australia is tracking well in its response in the major cities, but our First Nations people are marginalized and being left behind in the response and investment."

Delegate survey respondent

"[My takeaway message from IAS 2023] was the importance of political will and mobilization to ensure engagement with key populations who are being left behind in the HIV response. This can be achieved by interdisciplinary collaboration (community, government, researchers, clinicians and importantly, those with lived experience)."

Delegate survey respondent

Objective 5: Re-engage and re-energize community, clinical, social and political efforts to address unmet HIV needs and strengthen HIV policy in the Asia-Pacific region in the COVID-19 era, paying special attention to the needs of marginalized First Nations and Indigenous communities.

Overall, 78% of delegates reported that they obtained new knowledge of unmet needs in the HIV response in the Asia-Pacific region. Key informants highlighted priority knowledge gaps for the region: research that addresses the intersection between sexualized drug use and HIV; co-infection with hepatitis C; management of stigma in healthcare settings; and the implementation of doxyPEP in settings of high antibiotic resistance.

Key informants from the Asia-Pacific region noted strong attendance by government agencies in the region, although less so by ministers of health. They anticipated that attendance at IAS 2023 would give government agencies new insights into working with community-based organizations, community-based service delivery, and the needs of key populations, including trans women and men who have sex with men. They also noted the value of IAS conferences for enabling government agencies and healthcare professionals to gain deeper insight into WHO guidance.

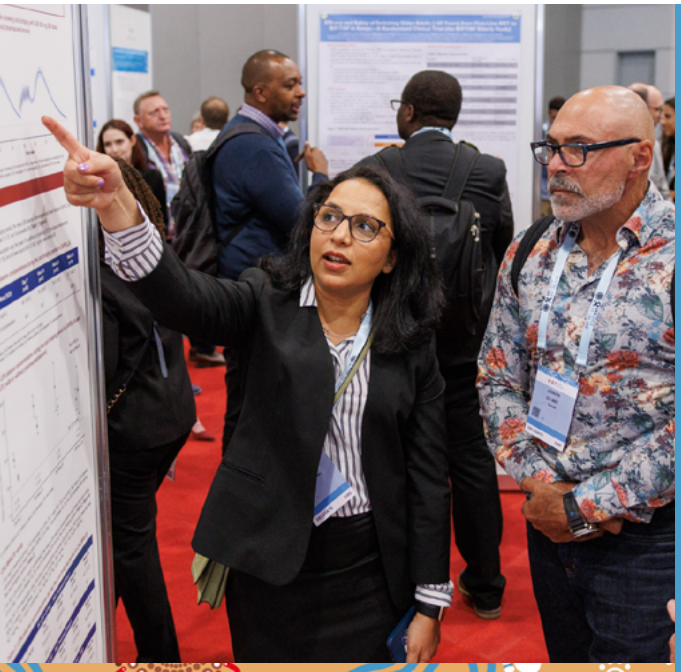
> "It's also good to build their capacity and knowledge in terms of the guidelines and then they can reflect back when they return to the countries to [update] the local policy. I also believe that [attending the conference] fosters evidence-based policy development through research finding dissemination."
>
> Key informant

Australian key informants highlighted the holding of the IAS 2023 Affiliated Independent Event, the "Indigenous Peoples Conference on HIV and Hepatitis Health Equity", as a highly significant step in raising the profile of health needs relating to HIV and hepatitis among First Nations and Indigenous communities.

How can we do better next time?

Enlarge the poster exhibition

Key informant interviews revealed a strong desire for the poster exhibition to be enlarged and given greater prominence at the conference. Key informants stressed the importance of poster display for maintaining scientific participation in the meeting, supporting the development of early-career researchers and promoting interdisciplinary collaboration.



"I've actually met many people there whom I have developed grants with going forward from those posters [or] they've used some of our methods in their countries and things like that. So, I think that in-person contact not being there limits any growth in that direction."

Key informant, track chair

"Please bring back real poster sessions. The cost of printing a poster is less than $100. Posters are unique opportunities, especially for young investigators to present and socialize with small numbers of attendees, from peers to big shots. Keep e-posters for virtual attendees and as a record."

Key informant, track chair

Maintain scientific strength through breadth and depth

Key informants frequently drew attention to the strength of the scientific programme at IAS 2023. Yet it was notable that what they valued most in the scientific programme was the opportunity to look in detail at new scientific developments in symposia that either shared new data or allowed greater discussion of the data by a broader range of experts and stakeholders than other meetings. No track chair advocated a substantial increase in the number of oral abstract sessions at future meetings, but all wanted to see more symposia in which key data could be presented and evaluated in depth. Key informants and delegate survey respondents frequently commented on the value of having first sight of the REPRIEVE study findings in a symposium that addressed the data from multiple perspectives.

Attracting a broad range of speakers will also be important for maintaining the scientific strength of the IAS Conference on HIV Science. Key informants praised the quality of plenary presentations and the work undertaken to identify new speakers and broaden the range of presenters at IAS 2023. But they also asked that future programmes avoid duplication of topics.

Political science

Several key informants spoke of the need to give greater emphasis to the discipline of political science in Tracks D (social and behavioural sciences) and E (implementation science, economics, systems and synergies) at future IAS conferences, through plenary speakers and symposia participation, as well as promotion of the meeting to researchers working in political science. They called for greater study and discussion of the mechanisms through which scientific evidence is translated into policy in different political systems, together with case studies of successful political change. They encouraged researchers to go beyond discrete studies of law reform success to identify the institutional factors that aid change at both national and multilateral levels.

"We need greater attention to the mechanics of policy change, especially in the settings that are likely less open to the pressure from communities."

Key informant, track chair

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