

Sustained Progress and Remaining Inequities: Residual HIV Transmission in Cambodia toward the Controlled Epidemic

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**Sustained Progress and Remaining Inequities: Residual HIV Transmission in Cambodia
toward the Controlled Epidemic**

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35 **Abstract**

36 **Background**

37 Across the Western Pacific Region, national progress toward universal health coverage often
38 conceals persistent inequities in terms of who ultimately benefits from essential health
39 services. Cambodia's HIV response has achieved substantial national gains under the
40 National Strategic Plan 2021-2025, including 92% antiretroviral therapy (ART) coverage
41 among people living with HIV in 2024 and marked declines in HIV incidence and mortality.
42 Building on this progress, this study examines the key drivers behind Cambodia's success
43 while characterising inequities that continue to shape the remaining epidemic within this
44 near-controlled situation.

45 **Methods**

46 We conducted a descriptive analysis of national and subnational data compiled for the review
47 of the National Strategic Plan for HIV and STI Prevention and Care 2021–2025. Four
48 domains were assessed: HIV disease burden, prevention, testing, and treatment. Indicators
49 were disaggregated by population group, age and province where available to identify
50 inequities in HIV burden, access, coverage and continuity of care.

51 **Results**

52 In 2024, an estimated 76,000 people were living with HIV, with new infections declining by
53 45% and HIV-related deaths by 28% from 2010. The epidemic is concentrated among key
54 populations (KPs): 88% of new infections occur among KPs and their partners, with men
55 who have sex with men (MSM) and transgender people (TG) collectively contributing 58%.
56 Prevention coverage increased across KPs, reaching 80% for MSM, 91% for TG and 100%
57 for female entertainment workers (FEW), alongside a more than fourfold increase in
58 cumulative pre-exposure prophylaxis initiations between 2022 and 2024. HIV testing volume

more than doubled, and testing among MSM, TG and FEW exceeded population size estimates. Treatment outcomes reached 92%, >98%, and >98% against the UNAIDS 95%–95%–95% targets, but paediatric cascades lag at 62%, >98%, and 90%, with higher loss to follow-up and lower viral suppression than adults. Viral suppression is uniformly high across provinces, yet substantial subnational disparities persist in several treatment and diagnostic indicators.

Conclusions

Cambodia is approaching national-level epidemic control, yet residual transmission remains, driven by inequities affecting KPs, children and several provinces. Targeted, equity-focused strategies are essential to ensure that national gains translate into fully equitable epidemic control by 2030.

Keywords

HIV, AIDS, Cambodia, programmatic review, 95–95–95 targets, Western Pacific Region

Main Text

Background

Across the Western Pacific Region, governments have committed to advancing universal health coverage through approaches that deliberately target communities that remain beyond the reach of essential health services. The Regional Framework for Reaching the Unreached (2022–2030) [1] underscores that national health gains often mask persistent inequalities and explicitly cautions that many populations continue to be left behind even as countries make measurable progress toward health-related goals.- The framework, therefore, emphasises the

importance of equity-focused, people-centred health systems that can identify unreached groups and adapt services to ensure that all populations benefit from modern public health interventions.

Cambodia's HIV response over the past decade reflects this broader regional experience. Under the National Strategic Plan for HIV/AIDS and STIs (2021–2025) [2], the country has achieved substantial gains in prevention, testing, and treatment coverage. Cambodia now leads the WHO Western Pacific Region in progress toward controlling the HIV epidemic as a public health threat, having achieved the region's highest-level antiretroviral treatment (ART) coverage among all estimated people living with HIV (PLHIV) at 92% in 2024[3]. The country has recorded a substantial decline in new HIV infections, with a 45% reduction from 2010 to 2024, compared with a Western-Pacific regional average decline of 11.1% [4].

In parallel with these national achievements, evidence from other countries demonstrates that even where national HIV programmes have achieved substantial gains, the final phase of epidemic control is often deterred by persistent inequities in access, coverage, and continuity of care. Across the Western Pacific Region, HIV responses continue to face challenges in reaching people affected by structural barriers—such as adverse social determinants, stigma, discrimination, and difficult living or working conditions—allowing inequities to persist despite progress toward universal health coverage [1]. Comparable patterns are evident across the Western Pacific Region: in several Pacific Island Countries, limited service availability and difficult physical access hinder HIV testing, treatment, and continuity of care [5], while in Viet Nam, stigma reduces service uptake among men who have sex with men (MSM) [6], and in Malaysia, discrimination in health facilities deters transgender women from seeking timely HIV prevention and treatment [7].

Taken together, these regional patterns underscore the need to closely examine whether similar inequities are shaping the remaining HIV epidemic in Cambodia. This paper assesses Cambodia's near-controlled HIV epidemic —used here as a descriptive term to denote sustained declines in incidence and mortality alongside very high treatment cascade performance— highlighting the programme features that have driven national success while examining the inequities that continue to shape the residual epidemic. By synthesising the latest epidemiological evidence with programme performance indicators, the analysis aims to identify populations and geographic areas where progress has been uneven and inform strategies to address the remaining drivers of HIV transmission in Cambodia on the path toward Ending the AIDS Epidemic by 2030.

Methods

Study design

We conducted a secondary descriptive epidemiological analysis of national HIV surveillance, programme monitoring and modelled data to assess progress towards HIV epidemic control in Cambodia, identify residual HIV burden, and characterise remaining population and geographic inequities. The analysis was undertaken as part of the review of implementation of the National Strategic Plan for HIV and STI Prevention and Care in the Health Sector 2021-2025 [2]. Data from 2010-2025 were analysed where available, although the observation period varied by indicator according to data availability. Trends in HIV burden, prevention, testing and treatment indicators were examined, with particular attention to differences across population groups, age groups and provinces where disaggregated data were available.

Data sources

129 Indicators were grouped into four analytical domains: (A) HIV disease burden, (B) HIV
130 prevention programmes, (C) HIV testing programmes, and (D) HIV treatment programmes.
131 HIV disease burden was assessed using modelled estimates generated through the AIDS
132 Epidemic Model (AEM-Spectrum) [8], complemented by national HIV case reporting data
133 and data for KPs derived from sentinel surveillance and integrated biological and behavioural
134 surveys. Modelled disease burden indicators included the estimated numbers of new HIV
135 infections, PLHIV, and AIDS-related deaths. HIV prevalence among key populations was
136 obtained from IBBS data [9–11]. In addition, information on the age and sex distribution of
137 PLHIV was derived from the national Voluntary Confidential Counselling and Testing
138 database [12].

139 Programme performance for prevention, testing, and treatment was assessed using routine
140 national HIV programme monitoring data collected through the National Center for
141 HIV/AIDS, Dermatology and STD (NCHADS), with disaggregation by age, key population,
142 and HIV testing modality where applicable. Assessed indicators were guided by the WHO
143 consolidated strategic information guidelines for HIV [13] and aligned with the monitoring
144 and evaluation framework of the National Strategic Plan for HIV and STI Prevention and
145 Care in the Health Sector 2021-2025 [2].

146 Prevention programme indicators were obtained from the National Prevention Database [14]
147 and the national pre-exposure prophylaxis (PrEP) monitoring database [15]. Indicators
148 included numbers of individuals reached through HIV prevention services, prevention
149 coverage against key population size estimates, condom use among key populations, numbers
150 of PrEP users, and numbers of PrEP service delivery sites.

Testing programme indicators were extracted from the National Prevention Database [14] and included annual testing volume, HIV positivity by testing modality, and numbers of key population members tested for HIV.

Treatment programme indicators were obtained from the national antiretroviral therapy (ART) database [16] and included numbers of ART clients, same-day ART initiation, multi-month dispensing (MMD), ART retention, viral load testing coverage, and viral suppression.

Data analysis

All analyses were conducted using aggregated surveillance, programme monitoring and modelled data. Annual trends were assessed descriptively by examining changes over time in disease burden, prevention, testing and treatment indicators. Indicators were analysed overall and, where data were available, disaggregated by population group, age group and province.

Prevention programme coverage was calculated as the proportion of the estimated key population reached with HIV prevention services during a given year, using the number of individuals reached as the numerator and the corresponding national key population size estimate as the denominator. HIV positivity was calculated as the proportion of reactive HIV tests among all HIV tests conducted for a given testing modality. Progress along the HIV care cascade and towards the Joint United Nations Programme on HIV/AIDS (UNAIDS) 95-95-95 targets was assessed using modelled estimates generated through AEM-Spectrum estimates for all people living with HIV and for children aged <15 years.

Subnational analyses were conducted using provincial treatment programme data for 2024. Geographic variation was assessed by comparing provincial performance across selected treatment and diagnostic indicators, including same-day ART initiation, baseline CD4 testing

coverage, viral load testing coverage, viral suppression and proportion of those lost to follow-up. Prevention and testing indicators were analysed primarily at the national level because comparable provincial-level data were not routinely available for most indicators. Differences in HIV burden, service coverage and treatment outcomes across population groups and provinces were assessed descriptively through comparisons with national averages and available programme targets.

Ethics

Ethical approval was not required because the analysis used routinely collected, aggregated surveillance and programme monitoring data. No individual-level identifiable information was included.

Results

A. Disease burden

In 2024, the estimated number of PLHIV in Cambodia was approximately 76,000 (95% confidence interval (CI): 63,000 – 88,000), including 1,300 children aged 0- 14 (95% CI: 1,000 – 1,700), following a gradual decrease from 81,000 in 2010. The estimated annual number of new HIV infections was 1,200 (95% CI: 1,100 – 1,300) in 2024, representing a 45% decline since 2010 (Figure 1). Between 2023 and 2024 alone, new infections decreased by 20%. HIV-related deaths have steadily declined—from an estimated 1,400 in 2010 to 1,000 in 2024, marking a 28% reduction, with a consistent downward trend observed since 2015.

During the period 2010–2024, new HIV infections shifted from largely sex-work-driven to an epidemic increasingly concentrated among KPs, particularly MSM and TG (Figure 2). In

2024, an estimated 88% of new HIV infections occurred among KPs and their sexual partners. The highest burden was observed among MSM (48%) and TG (10%), followed by entertainment workers and their clients (28%), while PWID accounted for 2%.

HIV prevalence remains substantially higher among KPs than in the general population (0.5% in 2024). Among TG, prevalence was the highest at 13.5% in 2023, rising from 5.5% in 2015. PWID recorded the second-highest prevalence at 10.6% in 2024, though this represents a significant decline from 24.8% in 2012. HIV prevalence among MSM increased sharply from 2.2% in 2011 to 5.5% in 2023. In contrast, prevalence among FEW declined substantially—from 13.9% in 2011 to 4.9% in 2022.

Reported case data from 2017 to 2024 show divergent trends by sex: while newly reported cases among females declined slightly (1,483 to 1,137), cases among males increased substantially (1,618 to 3,928), resulting in a male-to-female ratio of 3.5 in 2024. Among females, cases were relatively evenly distributed across the 20–44 age range. In contrast, the proportion of young males aged ≤ 29 years rose steadily from 30% in 2017 to 50% in 2020 and accounted for approximately 50% of all male cases until 2024.

B. Prevention programme

Coverage of HIV prevention services against the population size estimates (PSE) expanded markedly across KPs during the reporting period (Figure 3, data are available in Supplementary file Table S1). Among MSM, the number of people reached more than doubled between 2021 and 2025, with coverage increasing from 39.7% to 79.8%. A similar substantial increase was observed among TG, with a 2.4-fold rise in the number reached and coverage against PSE reaching 91% in 2025. Coverage among FEW also rose steadily from 56.1% in 2021, reaching approximately 100% of the estimated population size in 2025.

Although the absolute number of PWID reached grew only modestly, coverage against PSE increased markedly—from 25.5% in 2021 to 68.7% in 2025—reflecting a decline in PSE. Between 2022 and 2024, 88.8% of MSM, 93.1% of TG, 93.8% of FEW and 67.0% of PWID reported using a condom during their last sex with a non-marital, non-cohabiting partner (Figure 4). Notably, all KPs showed an increasing trend over the years, and TG and FEW achieved the global target of 90% [17].

In addition, the pre-exposure prophylaxis (PrEP) programme expanded rapidly in recent years. The accumulated number of clients has increased from 7,134 in 2022 to 31,005 in 2024, while service delivery sites have expanded from 14 to 45 nationwide (Figure 5). Among clients, MSM accounted for 69%, followed by FEW (15%) and TG (13%).

C. Testing programme

The number of people receiving HIV screening services in Cambodia more than doubled, increasing from 90,171 in 2021 to 187,575 in 2024 (Figure 6). In 2024, physical outreach remained the predominant testing modality, accounting for 79% of all screenings, followed by virtual outreach (11%), mobile testing (6%), self-testing (3%) and Peer-Driven Intervention (2%). Peer-Driven Intervention and self-testing reached their highest levels in 2023, whereas other testing modalities continued to expand through 2024.

As testing services scaled up, HIV positivity rates declined across all modalities, although the magnitude of decline varied (Figure 6). Positivity rates in physical outreach only showed a modest decrease from 1.14% in 2021 to 1.08% in 2024, while self-testing experienced a sharper reduction, falling by 11 percentage points from 12.8% to 1.8% over the same period.

The number of individuals tested for HIV among MSM, TG and FEW showed a substantial increase (Figure 7). Physical outreach was the predominant testing modality across all KPs. Virtual outreach was the second most common for MSM and TG, while for FEW, mobile

outreach was the second most utilised. By 2024, the number of individuals tested exceeded the corresponding PSE for MSM (93,985; 2023 estimate), TG (21,981; 2024 estimate), and FEW (52,338; 2022 estimate). This may reflect repeat testing by some individuals during the reporting year as well as uncertainty in the underlying population size estimates.

D. Treatment programme

In 2024, an estimated 92% of PLHIV in Cambodia knew their HIV status, >98% of them were receiving ART, and >98% of those on ART had achieved viral suppression against the UNAIDS 95%-95%-95% targets, which aim for 95% of all people living with HIV to know their status, 95% of those diagnosed to receive ART, and 95% of those on ART to achieve viral suppression [18] (Figure 8). Progress during 2021–2024 was primarily driven by improvements in the first 95% indicator, while the second and third 95% targets had already been achieved by 2021 and remained consistently above target throughout the same period. However, progress among children aged under 15 years remains slower, at 62%, >98%, and 90% in 2024. The first 95% target remained the principal gap in the paediatric cascade, showing only modest improvement between 2021 and 2024, whereas the second target had already been achieved and the third target remained below the global target with little change over time.

At the end of 2024, a total of 70,921 (69,994 adults and 927 children) were receiving ART (Figure 9). Between 2010 and 2024, the number of PLHIV receiving ART increased by 51%, while the number of ART service sites expanded from 51 to 74.

From 2021 to 2024, the percentage of adult ART clients who were lost to follow-up (LTFU) decreased from 4.7% to 3.8%. On the other hand, the percentage of ART clients who died

270 increased from 1.1% to 1.4% during the same period. Children living with HIV showed a
271 higher LTFU rate than adults, at 6.2%, and the same-level mortality of 1.3% in 2024.

272 Regarding treatment initiation, 83.7% of adults and 38.3% of children newly diagnosed with
273 HIV began ART on the same day in 2024. By 2024, more than 98% of adult and paediatric
274 ART clients were receiving TLD (tenofovir/lamivudine/dolutegravir), the WHO-
275 recommended first-line therapy. Among adult ART clients eligible for MMD, 97% received
276 MMD for more than three months in 2024. Viral load (VL) testing coverage among adults
277 receiving ART increased from 65.4% in 2021 to 84.9% in 2024, during which time VL
278 suppression remained consistently high at around 98%. Among children, VL suppression was
279 substantially lower—between 88.4% and 90.3%—with VL testing coverage ranging from
280 60.5% to 81.8% over the same period. Across all provinces, viral load suppression rates were
281 consistently high, showing only minimal variation between 92% and 100% (Supplementary
282 file Table S2). At the same time, there were substantial disparities in the number of adult ART
283 clients, same-day ART initiation, baseline CD4 and VL test coverage and LTFU rate among
284 provinces. Phnom Penh had the largest number of ART clients, covering 25,151 out of 69,166
285 adult clients (36%), whereas Mondul Kiri province had only 76 clients in 2024. There are
286 several provinces with a same-day ART initiation rate lower than 70%: Kampong Cham, Kep,
287 Kampong Chhnang, Kratie, Preah Sihanouk and Svay Rieng. Baseline CD4 testing coverage
288 was highest in Siem Reap province (79.6%), and no tests were conducted in four provinces:
289 Kep, Pailin, Pursat, and Ratanakiri provinces. VL test coverage was lower than 70% in five
290 provinces: Koh Kong, Stung Treng, Preah Vihear, Ratanakiri and Mondul Kiri. LTFU rate
291 was higher than 5% in Kampong Thom, Kep, Mondul Kiri, Oddar Meanchey, and Ratanakiri
292 (Supplementary file Table S2). Disparities between provinces are also evident in paediatric
293 ART data; however, these percentages may be influenced by the small size of the patient
294 population (Supplementary file Table S3).

295

296 **Discussion**

297 Cambodia's HIV response has achieved remarkable progress and sustained gains across
298 prevention, testing, and treatment, which have brought Cambodia close to national-level
299 epidemic control. These advancements reflect the combined effects of programmatic
300 expansion and system-level strengthening. At the same time, this review revealed remaining
301 challenges at the last mile with specific population groups and geographic areas that have not
302 experienced the same degree of progress. The findings of this review provide strong evidence
303 that Cambodia's HIV epidemic is approaching epidemic control at the national level.

304 National surveillance and modelling data demonstrate sustained declines in both HIV
305 incidence and mortality. Treatment outcomes, which are reflected in 92%, >98% and >98%
306 against the UNAIDS 95%-95%-95% targets following a continued improvement over recent
307 years, further reinforce this trajectory. In parallel, HIV testing data demonstrated a consistent
308 decline in positivity rates across all modalities, a pattern that aligns with decreasing HIV
309 incidence and/or improved early case detection in the population. Taken together, the
310 significant reductions in new infections and mortality, the high achievement across the
311 treatment cascade, and the downward trend in testing positivity collectively support the
312 assessment that Cambodia is approaching national-level epidemic control.

313 A major factor underlying Cambodia's progress is the expansion of a comprehensive
314 prevention and testing strategy that integrates in-person and virtual outreach, peer-network
315 approaches, mobile outreach and HIV self-testing, reflected in expanding testing coverage
316 across modalities and declining HIV positivity over time. These complementary modalities
317 have broadened national prevention and testing coverage and enhanced engagement with
318 KPs, supported by community-based organisations and outreach workers who play a central

role in sustaining uptake across the prevention-to-testing continuum. The rapid scale-up of PrEP and its substantial uptake among KPs have further reinforced the country's biomedical prevention response. Similar community-led and differentiated models—including community-based and web-enabled HIV self-testing, outreach services, and PrEP delivery for MSM and TG—have demonstrated feasibility and effectiveness in Viet Nam, a comparable concentrated epidemic setting in the Western Pacific Region [19–23].

On the treatment side, the national programme continues to deliver very high viral suppression, with viral load testing coverage reaching 85% in 2024. Routine same-day ART initiation, broad adoption of TLD as the preferred regimen, and strong retention collectively contribute to these treatment results. The expansion of MMD has further optimised treatment continuity and convenience. Notably, sustained declines in HIV-related mortality highlight the robustness of the treatment programme. Together, these findings underscore the high quality and effectiveness of HIV treatment in Cambodia.

Despite system-wide successes, national progress has not been evenly distributed. Newly reported cases are increasingly concentrated among young males and KPs. Hidden and mobile sub-groups of MSM and TG may remain especially under-reached; although reported coverage of prevention programmes among MSM and TG has increased, it remains below the global target of 95% [17]. Persistently high HIV prevalence among MSM (5.5%) and TG (13.5%) nonetheless points to continuing gaps in prevention and testing. Evidence from Viet Nam—a comparable epidemic context in the Western Pacific Region—shows low HIV testing and PrEP uptake among adolescent and young MSM, alongside enduring stigma-related and structural barriers affecting MSM and TG more broadly, which may contribute to unmet prevention and testing needs among younger and more hidden sub-groups [24,25].

In contrast to adult treatment outcomes, paediatric HIV indicators continue to lag. Gaps exist in case detection, same-day ART initiation, higher LTFU, and VL suppression rates, which disproportionately affect early diagnosis and effective management among children. These findings indicate structural gaps in case detection and follow-up for children compared with adults. The persistent gaps in paediatric HIV diagnosis, retention in care, and viral suppression observed in Cambodia are consistent with global evidence showing that paediatric HIV cascades continue to lag behind those of adults, even in settings where overall treatment outcomes have improved [26]. These paediatric disparities also reflect broader Elimination of mother-to-child transmission programme challenges observed across diverse settings, where gains in strong antenatal service delivery have not been matched by equally strong systems for postnatal follow-up, infant tracking, and integrated surveillance of mother–infant pairs [27].

Although viral suppression among adults is consistently high across provinces, other treatment and diagnostic indicators vary markedly by geography. Subnational differences appear in same-day ART initiation, baseline CD4 testing, LTFU rate and VL testing coverage, further underscoring geographic inconsistencies in treatment continuity and service quality [28,29]. These patterns may indicate localised bottlenecks within health-system capacity, availability of skilled providers, and infrastructure for testing and follow-up—factors that require tailored provincial-level interventions to strengthen local capacity for implementing national HIV guidelines [30].

This study has several limitations. First, it draws on routine programme data, the completeness and quality of which vary across sites and reporting periods. Inconsistent data entry, missing values, and differences in reporting practices may introduce bias, reduce accuracy, and limit the feasibility of detailed subgroup analyses, thereby affecting the robustness of trend interpretation and regional comparisons. A further limitation relates to the

interpretation of subnational and paediatric outcomes. The number of children receiving ART has declined substantially over time, leaving very small paediatric cohorts in several provinces. These small denominators produce unstable percentages for indicators and limit meaningful geographical comparison. Similarly, provincial disparities in CD4 testing, VL coverage, same-day ART initiation, and ART client volume mean that some provincial indicators may reflect data sparsity rather than programme performance. Together, these factors constrain the reliability of provincial and paediatric trend interpretation. Lastly, estimates of new HIV infections and the number of PLHIV are derived from outputs of the AEM-Spectrum and are therefore subject to uncertainties inherent to modelled data, including assumptions related to KP size estimates, transmission parameters, and calibration to surveillance trends. Despite these limitations, the review has several strengths, including the use of comprehensive national programme data across the HIV cascade, a focused equity-oriented analysis applied to key indicators of residual transmission and service gaps, and triangulation with the AEM-Spectrum estimates to contextualise programme performance.

These findings point to ‘last-mile’ priorities. For prevention, intensified peer-led and digital outreach is needed to reach young and hidden MSM and TG with low testing yield and delayed diagnosis. For care and treatment, stronger child case-finding and mother–infant follow-up are required, alongside tailored provincial quality-improvement support for low-performing provinces to strengthen same-day ART initiation, CD4 and viral load testing, and retention in care.

Conclusions

Cambodia has made remarkable progress toward a near-controlled HIV epidemic, with sustained declines in new infections and mortality driven by a high-performing treatment programme and expanded differentiated prevention and testing services supported by community-led delivery models. At the same time, important inequities persist at the last mile: new infections remain concentrated among KPs, paediatric case detection and treatment outcomes continue to lag behind those of adults, and substantial provincial variation in diagnostic and treatment indicators persists. Addressing these gaps—particularly among hidden and young MSM and TG, children living with HIV, and underserved provinces—will be essential to ensure that national gains translate into equitable and comprehensive epidemic control. By consolidating its well-established programme strengths and intensifying targeted, equity-focused interventions, Cambodia is well-positioned to convert its near-controlled epidemic into fully and sustainably controlled progress on the path toward ending AIDS by 2030.

412 **List of Abbreviations**

413 **AEM:** AIDS Epidemic Model

414 **ART:** Antiretroviral Therapy

415 **CI:** Confidence Interval

416 **FEW:** Female Entertainment Worker(s)

417 **IBBS:** Integrated Biological and Behavioral Survey

418 **KP:** Key Population

419 **LTFU:** Lost to Follow-Up

420 **MMD:** Multi-Month Dispensing

421 **MSM:** Men Who Have Sex with Men

422 **MSW:** Male Sex Worker(s)

423 **NCHADS:** National Center for HIV/AIDS, Dermatology and STD

424 **PLHIV:** People Living with HIV

425 **PrEP:** Pre-Exposure Prophylaxis

426 **PSE:** Population Size Estimate

427 **PWID:** People Who Inject Drugs

428 **STI:** Sexually Transmitted Infection

429 **TG:** Transgender People

430 **TLD:** Tenofovir/Lamivudine/Dolutegravir

431 **UNAIDS:** Joint United Nations Programme on HIV/AIDS

432 **VL:** Viral Load

433 **WHO:** World Health Organization

434

435 **Declarations**

436 **Ethics approval and consent to participate**

437 Ethical approval and consent to participate were not required because the analysis used
438 routinely collected, aggregated surveillance and programme monitoring data. No individual-
439 level identifiable information was included.

440 **Clinical trial number**

441 Not applicable

442 **Consent for publication**

443 Not applicable

444 **Availability of data and materials**

445 The data used in this study are available from the corresponding author upon reasonable
446 request.

447 **Competing interests**

448 All authors declare no conflict of interest.

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Authors' contributions

Conceptualisation: KI, FM, SD; Data collection: SS, NB, VO, YYS, SD; Data analysis: MO, KI, YYS; Writing original draft: MO; Writing review & editing: FM, SD, SS, NB, YYS, TMN, RPY, HTGT, KI, VO; Supervision/Administration: VO, HTGT, KI.

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Artificial Intelligence (AI)

Artificial intelligence tools were used solely to improve spelling, grammar, and syntax; no content generation or data analysis was performed.

Disclaimer

The authors alone are responsible for the views expressed in this article and they do not necessarily represent the views, decisions or policies of the institutions with which they are affiliated.

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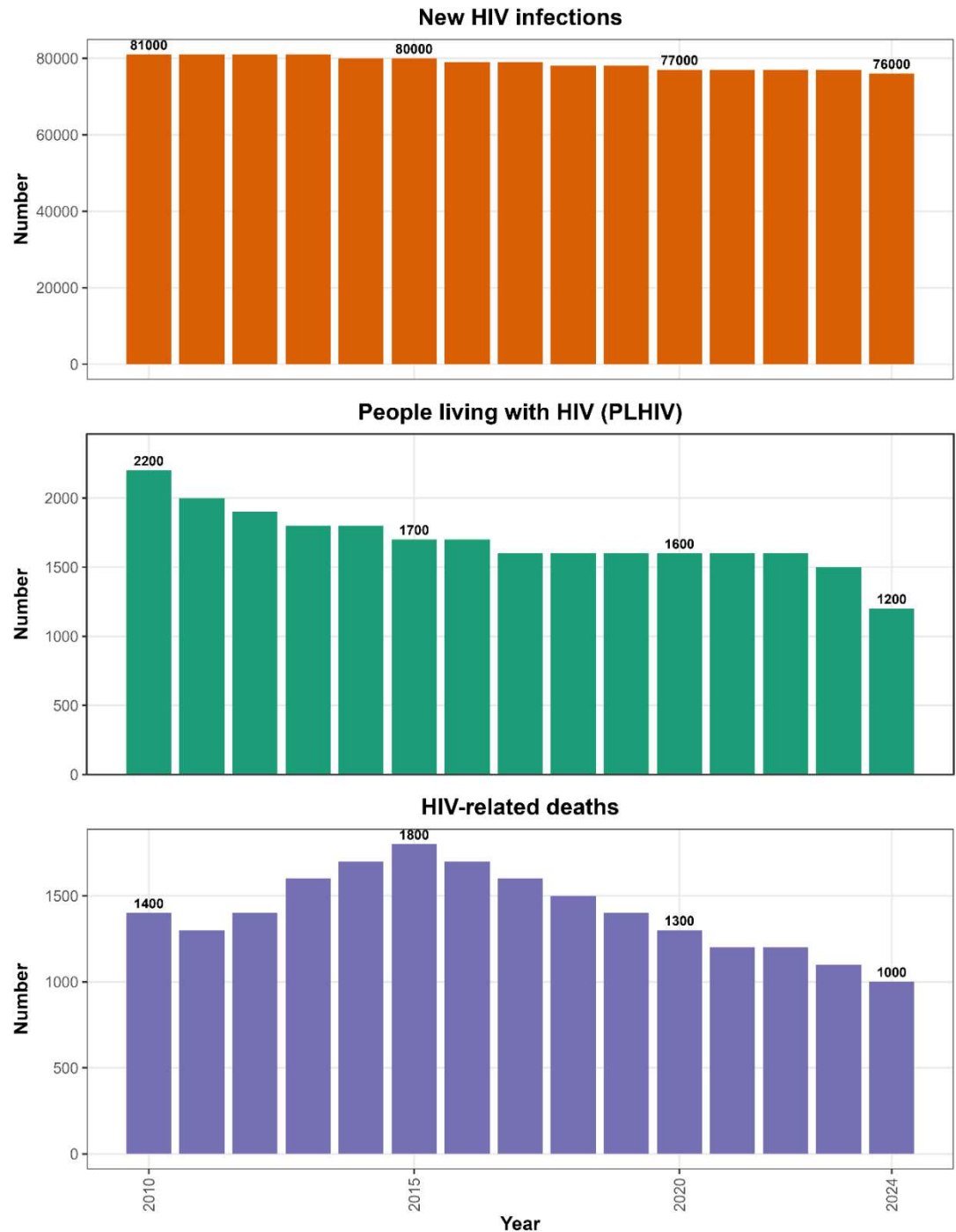
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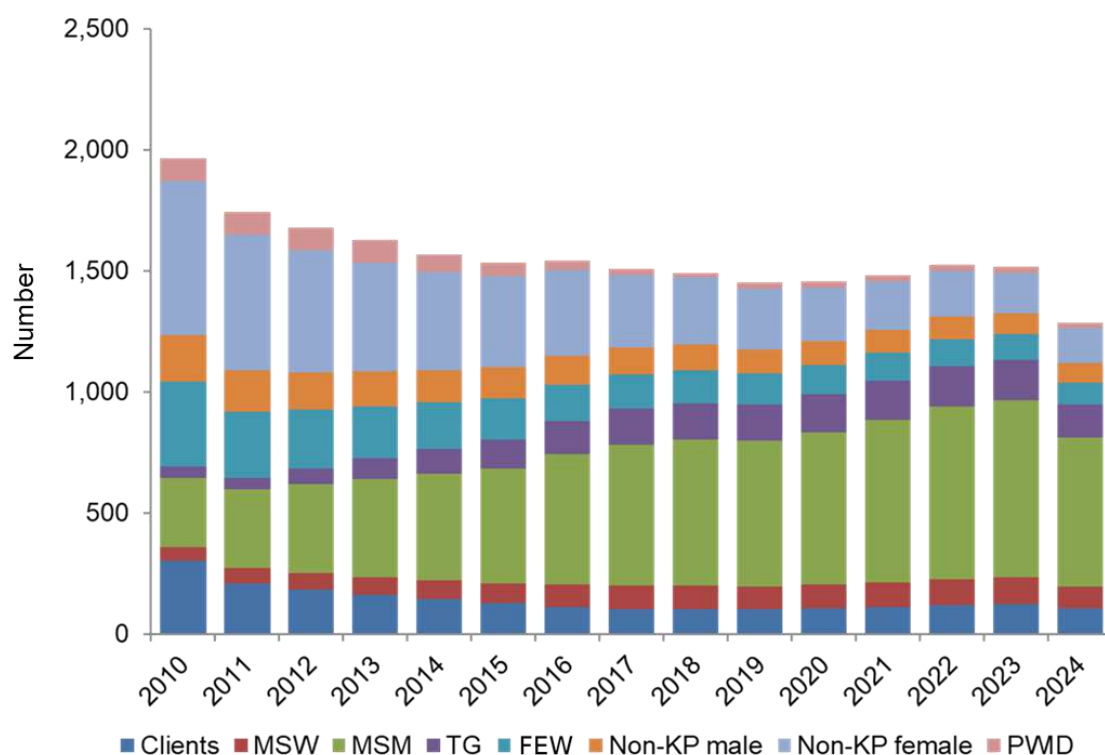
Figures

Figure 1. Estimated number of new HIV infections, people living with HIV and HIV-related deaths in Cambodia, 2010-2024.



Annual numbers of new HIV infections, people living with HIV and HIV-related deaths are presented based on estimates generated using the AIDS Epidemic Model (AEM)-Spectrum.

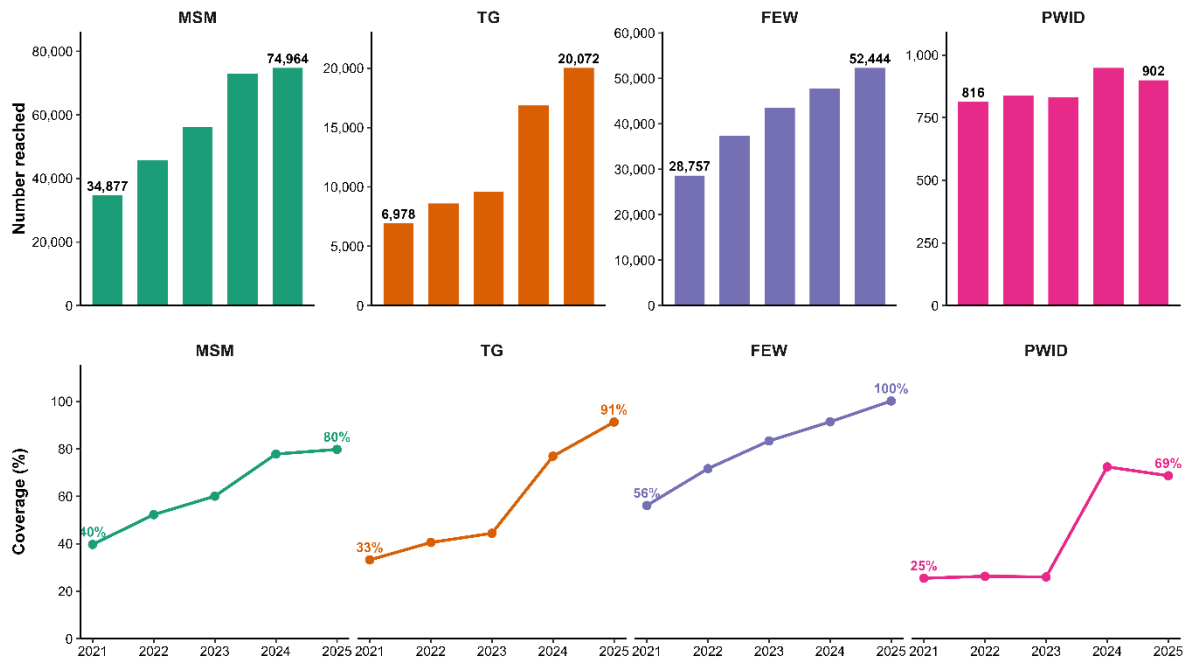
Figure 2. Estimated population distribution among new HIV infections, 2010-2024.



Annual new HIV infections and their distribution across population groups, based on AEM-Spectrum modelling.

FEW: female entertainment workers, KP: key population, MSM: men who have sex with men, MSW; male sex workers, PWID: people who inject drugs, TG: transgender people.

Figure 3. Prevention service coverage among key populations, 2021-2025.



Coverage was calculated as the number of individuals reached through HIV prevention services divided by the corresponding population size estimate (PSE) for each key population. Population size estimates are subject to uncertainty and should be interpreted as approximations of the true size of key populations. Data are available in Supplementary Table 1.

FEW: Female Entertainment Workers, MSM: men who have sex with men, PSE: population size estimation, PWID: people who inject drugs, TG: transgender people.

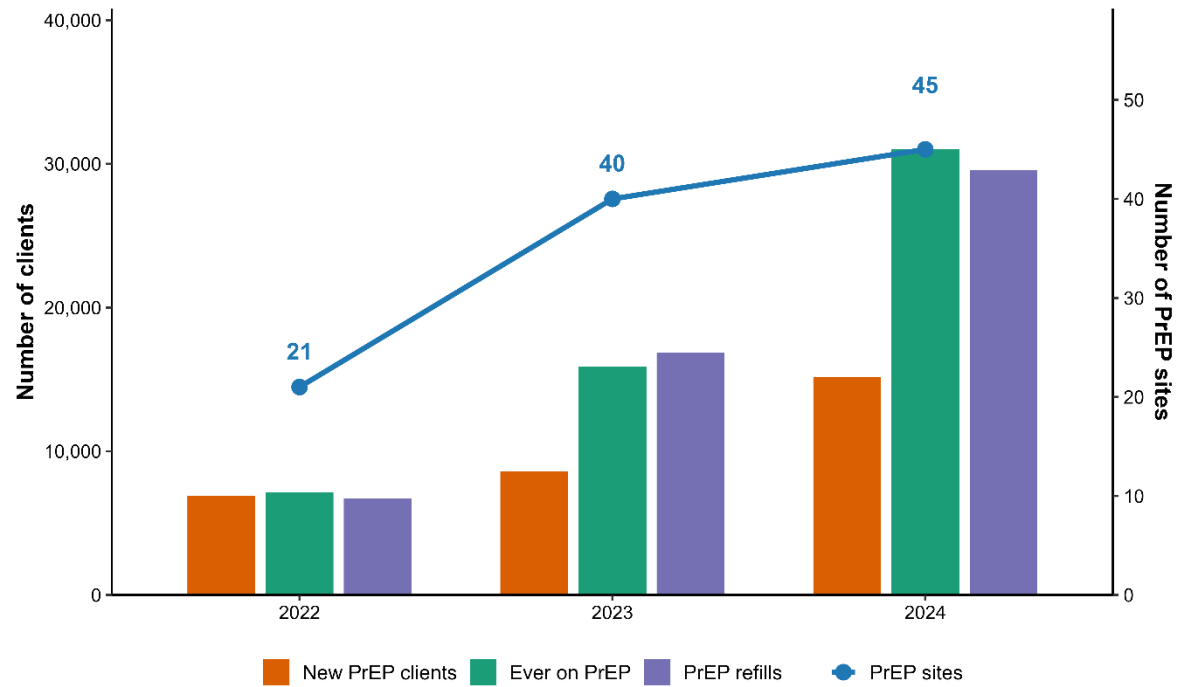
Figure 4. Condom use among key populations.



Condom use was defined as “percentage of individuals who reported using a condom during their last sex with a non-marital, non-cohabiting partner”.

FEW: Female Entertainment Workers, MSM: men who have sex with men, PWID: people who inject drugs, TG: transgender people.

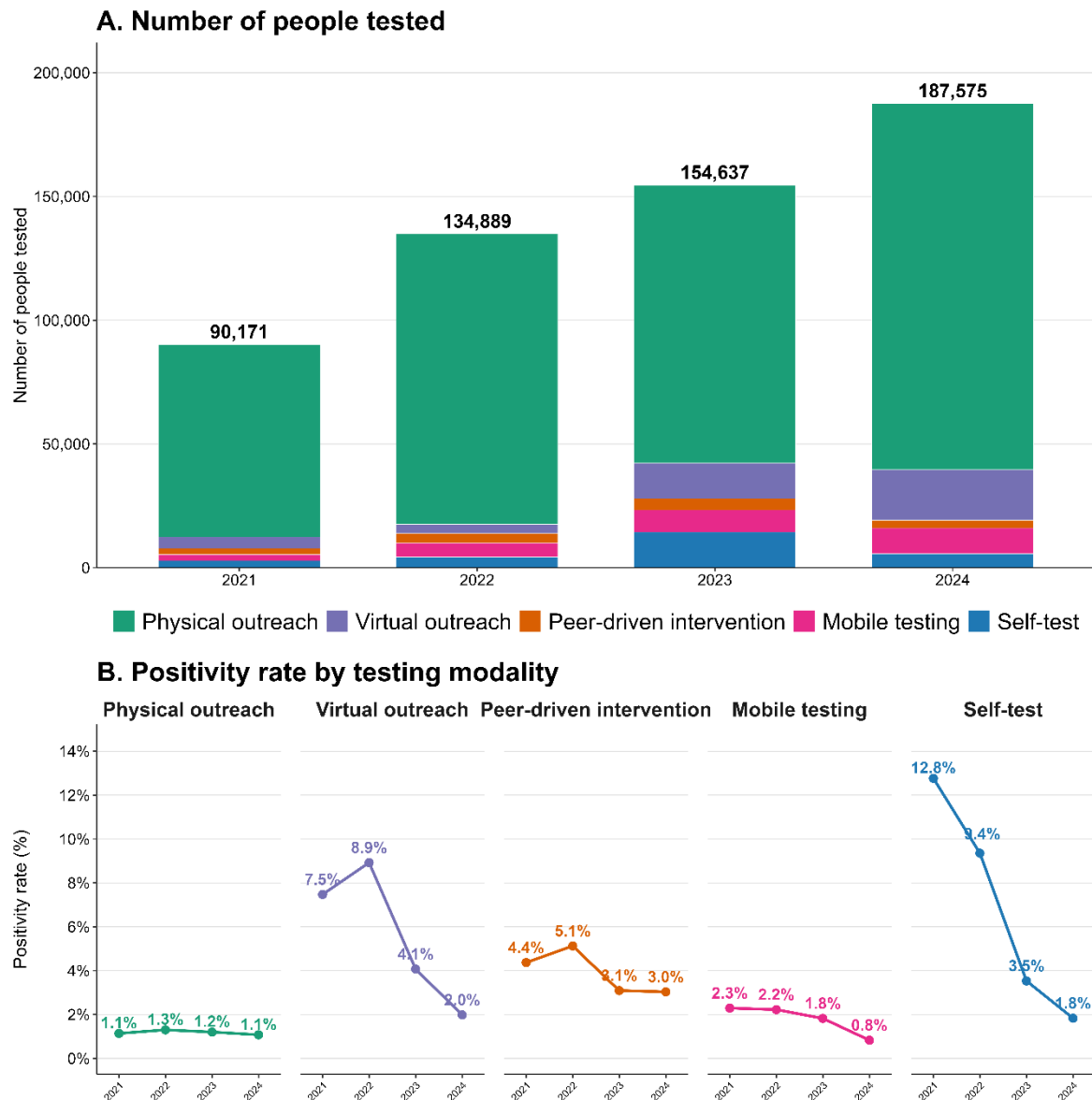
Figure 5. Pre-exposure prophylaxis (PrEP) programme data, 2022-2024.



The figure presents annual numbers of new PrEP initiations (PrEP_New), cumulative numbers of individuals who have ever received PrEP (Ever_on_PrEP), and the number of PrEP service delivery sites (PrEP_Sites).

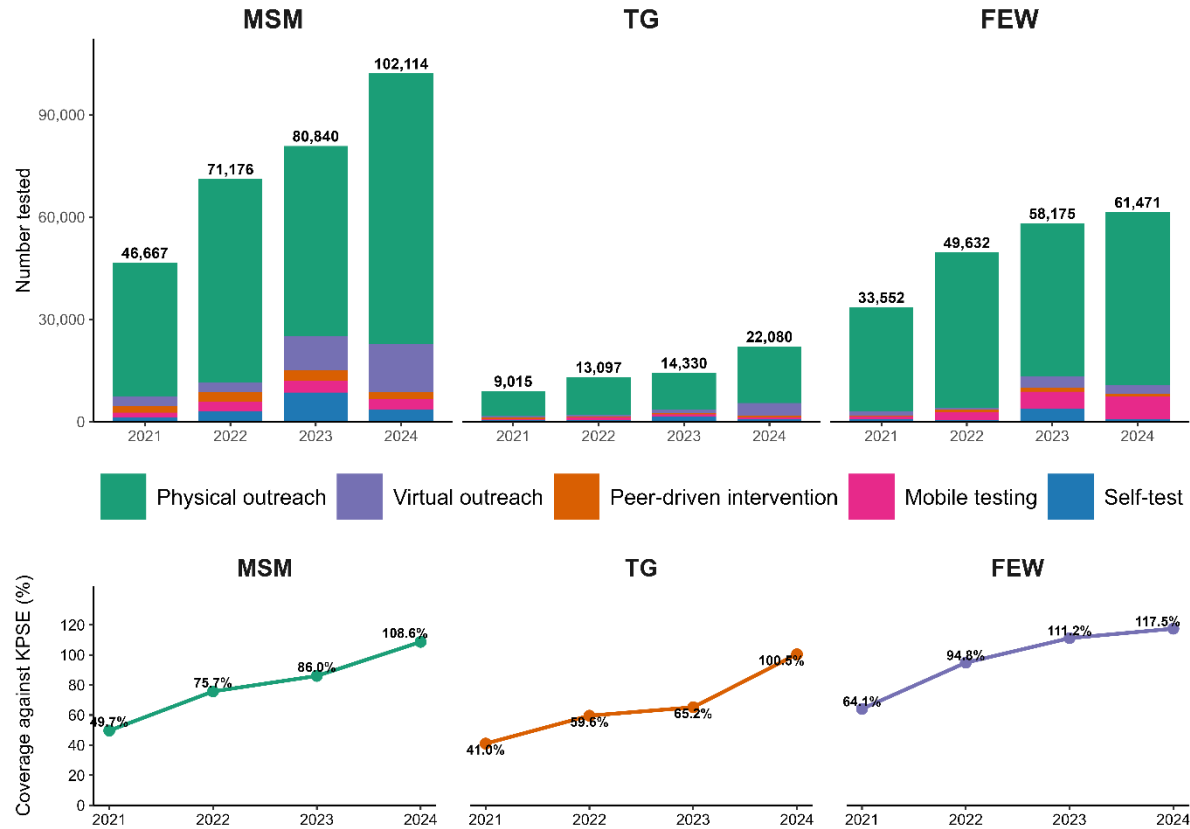
PrEP: Pre-exposure prophylaxis.

Figure 6. Number of people tested for HIV and positivity rate by modality from 2021 to 2024.



Annual testing volume and HIV positivity rate are presented for each testing modality. Positivity rate was defined as the percentage of HIV tests with a reactive result among all tests conducted through the respective modality during the reporting year. Testing volume may include individuals who received more than one HIV test during the same year through different testing modalities or service sites.

Figure 7. Number of people tested for HIV by modality among key populations from 2021 to 2024.

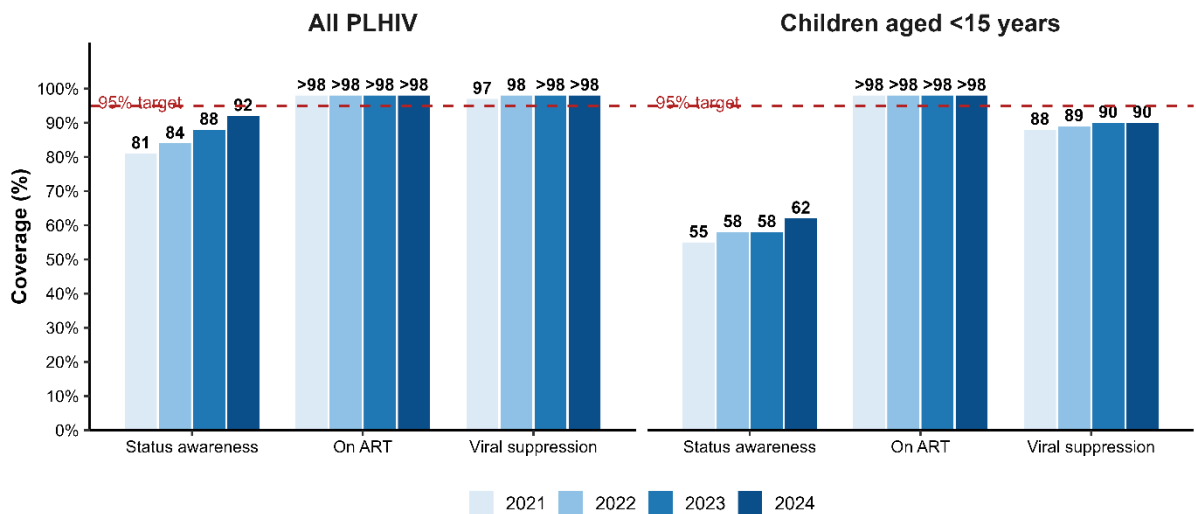


Size estimates for key populations are shown in the box, based on MSM (2023), TG (2024), and FEW (2022).

The number of individuals tested may exceed the corresponding population size estimate because routine monitoring data may include repeat testers during the same year and because population size estimates are subject to uncertainty and should be interpreted as approximations of the true size of key populations.

FEW: Female Entertainment Workers, MSM: men who have sex with men, TG: transgender people.

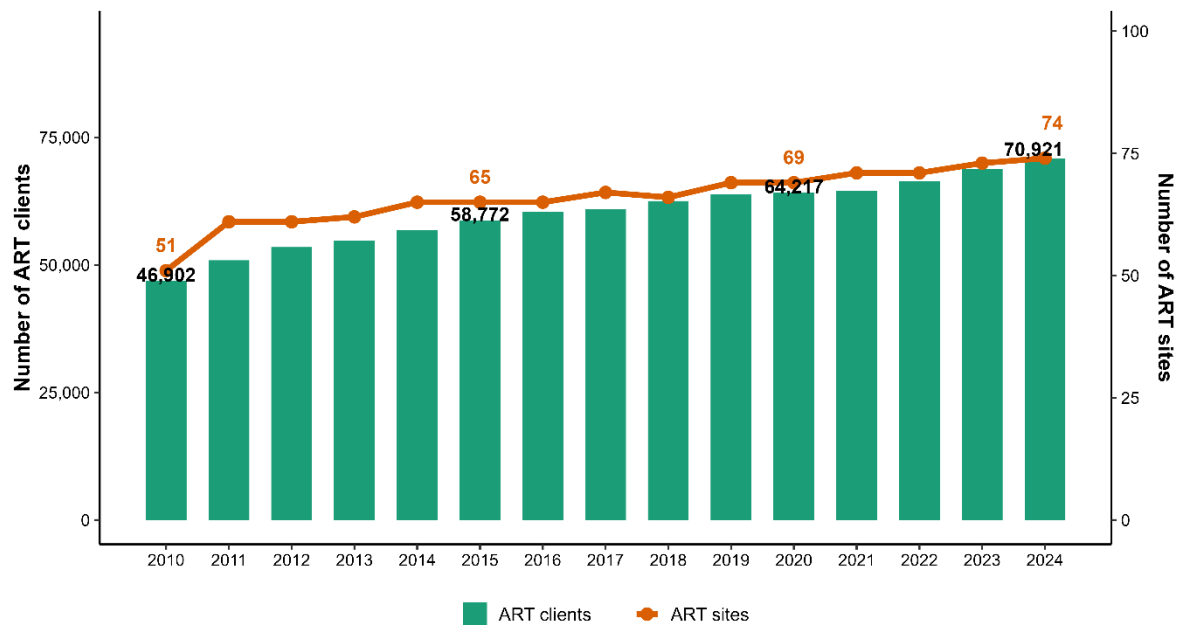
Figure 8. Progress toward the 95–95–95 targets among all people living with HIV compared with children aged <15 years in Cambodia, 2021–2024.



Trends in the HIV treatment cascade are presented for all PLHIV and children aged <15 years. Status awareness was defined as the percentage of PLHIV who knew their HIV status; on ART as the percentage of PLHIV who knew their HIV status and were receiving antiretroviral therapy (ART); and viral suppression as the percentage of PLHIV receiving ART who achieved viral suppression.

ART: antiretroviral therapy, PLHIV: people living with HIV.

679 **Figure 9. Number of antiretroviral therapy clients and sites, 2010-2024.**



680

681 Annual numbers of adults and children receiving ART and the number of ART service sites are shown from
682 2010 to 2024. ART clients refer to individuals receiving ART at the end of each reporting year. The number
683 of ART sites represents health facilities providing ART services during the corresponding year.

684 *ART: antiretroviral therapy.*

Supplementary Files

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