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REVIEW ARTICLE

Free antiretrovirals as a key tool against the HIV pandemic: A systematic review

Melissa Doutre[1,2] | **Marie-Pier Godin**[1,2] | **Iliya Dmitriev**[3] | **Ana Paula Pena-Gralle**[1] | **Amy Bergeron**[4] | **Lucie Blais**[1] | **Benoît Lemire**[2]

[1]Faculty of Pharmacy, University of Montreal, Montreal, Quebec, Canada

[2]Pharmacy Department, McGill University Health Centre, Montreal, Quebec, Canada

[3]Faculty of Medicine, University of Montreal, Montreal, Quebec, Canada

[4]Health Library, University of Montreal, Montreal, Quebec, Canada

Correspondence
Benoît Lemire, McGill University Health Centre, 1001 Decarie Blvd, Montreal, QC H4A 3J1, Canada.
Email: benoit.lemire@muhc.mcgill.ca

Abstract

Background/Objectives: Access to antiretroviral (ARV) drugs remains a critical challenge in achieving the WHO/UNAIDS 95-95-95 targets, with medication costs representing a substantial barrier. This systematic review evaluates the effect of free ARVs, without out-of-pocket cost to the patient, on the HIV cascade of care: the use of ARV therapy, viral suppression and the use of prophylaxis (PrEP).

Methods: The following databases were searched for publications between 1 January 1996 and 10 July 2024: MEDLINE, Embase, CINAHL, CNKI, Global Index Medicus, the Web of Science, the SciELO Citation Index and grey literature. Publications were eligible if they included people living with or at risk of HIV and compared free access to ARVs with out-of-pocket fees. Reviewers screened publications that focused on the outcomes: being on therapy, being virally suppressed and being on PrEP. The National Heart, Lung and Blood Institute (NHLBI) and Joanna Briggs Institute (JBI) Quality Assessment Tools were used to assess publication quality.

Results: A total of 34164 documents were identified, and 407 full-text manuscripts were reviewed. A total of 22 publications met the inclusion criteria. In six of the seven publications reporting on being on therapy, providing free ARVs increased the number of people who received treatment. All four publications reporting on viral suppression showed improvement with free access. Additionally, both publications reporting on PrEP use showed increased utilization with free access.

Conclusions: The review offers valuable insights for countries considering implementing free ARV programmes. It suggests that expanding access to free ARVs helps achieve the global HIV targets and improve health outcomes.

KEYWORDS

95-95-95 targets, antiretroviral therapy, cost-sharing, HIV, pre-exposure prophylaxis, systematic review

Melissa Doutre and Marie-Pier Godin contributed equally to the work.

INTRODUCTION

The Joint United Nations Program on HIV/AIDS (UNAIDS) and WHO 95-95-95 strategy for 2030—aimed at ensuring 95% of people living with HIV know their status, 95% of those diagnosed receive sustained treatment and 95% of those on treatment achieve viral suppression—has been adopted by many countries to end the AIDS pandemic. However, global progress towards ending the HIV/AIDS pandemic remains incomplete, with many countries still struggling to meet international targets [1]. Indeed, according to WHO data from 2023, 89% of people living with HIV were receiving antiretroviral (ARV) treatment, and 93% had achieved viral suppression, both falling short of the 95-95-95 targets set for 2030 [2]. Although there is a global decline in the number of new infections, reports indicate that some regions, such as the United States, continue to experience an increase [1].

One key concern is access to ARV drugs, which are both life-saving and essential for preventing transmission [1, 2]. Many public organizations, including the WHO and UNAIDS, advocate for free access to ARVs, a key component of Universal Health Coverage (UHC), to improve treatment uptake and retention in care [1, 3]. However, access policies vary widely across countries and even regions of the same country [4–6]. In North America, accessing medication often involves out-of-pocket fees [7, 8]. In contrast, countries like Brazil and most Western European nations provide free ARVs [9, 10]. This lack of consensus may stem from the fact that research findings remain fragmented in the literature. Indeed, a wide range of publications show that cost has an impact on willingness to take pre-exposure prophylaxis (PrEP), adherence to ARV drugs, financial burden and retention in care [11–18]. However, public authorities may view these outcomes as indirect indicators rather than direct measures of progress towards their countries' goals.

It is therefore crucial to determine whether providing free ARVs would effectively contribute to achieving the 95-95-95 targets and reducing the number of new infections. This systematic review aims to summarize evidence on the impact of providing free ARV drugs on the HIV care cascade (being on therapy and being virally suppressed) and on PrEP use.

METHODS

This systematic review was conducted based on the Cochrane Handbook for Systematic Reviews of Interventions and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines [19] and was registered in the International Prospective Register of Systematic Reviews (PROSPERO; CRD42024527274) [20].

Search strategy

The following sources were searched: MEDLINE, Embase, CINAHL Complete, the Web of Science Core Collection, the SciELO Citation Index, Global Index Medicus and CNKI. The searches were executed by AB, a health librarian, on 22 January 2024 and were rerun from 4 July to 10 July 2024 (see PRISMA-S, items 8 and 13). Searches were limited to publications from 1996 onwards to include only the period after the introduction of highly active antiretroviral therapy (ART). No limitations by language of publication were applied. Grey literature, targeting HIV-related health organizations and government sites of countries which provide free access to ARVs, was also searched. Our search was supplemented by screening the reference lists of publications included in our systematic review. Our search strategies in the databases and grey literature are available via Borealis, in accordance with PRISMA-S [21, 22].

Inclusion and exclusion criteria and outcomes

Publications were eligible if they reported either on people living with HIV or at risk of acquiring HIV from 1996 onwards. No restrictions were applied based on the number or age of participants. Our exposure of interest was free access to ARV drugs, defined as obtaining or providing ARV drugs without any direct costs for the end-user (e.g., no co-payment, deductible or purchase fees). Free access to ARVs needed to be specified or clearly implied and compared to any type of out-of-pocket (OOP) costs. Causal claims made by the authors on the relationship were not considered when reviewing studies for inclusion, recognizing that different study designs (e.g., observational studies, modelling studies) contribute to valuable but varying levels of causal inference. Moreover, publications were included if they reported at least one of our primary outcomes (being on therapy, defined as the initiation or uninterrupted use of ART; being virally suppressed, defined as the last viral load $\leq$200 copies/mL or the absence of virological failure; and being on PrEP, defined as receiving uninterrupted HIV PrEP according to the local guidelines) or at least one of our secondary outcomes (incident HIV infection; mortality). Studies were grouped for synthesis according to these outcomes.

Selection of publications and data extraction

Screening of titles and abstracts (ID, MD, MPG, BL, RR and ZER) and full text (ID, MD, MPG and BL) was done independently by two reviewers. Data extraction was undertaken independently by two reviewers (ID, MD and MPG). Discrepancies were resolved by consensus or by adjudication with a senior investigator (BL). Screening and extraction were facilitated using a web-based systematic review workflow application (Covidence, Veritas Health Innovation Ltd).

Quality assessment

The National Heart, Lung and Blood Institute (NHLBI) Study Quality Assessment Tool was used to assess the quality of cohort, cross-sectional and ecological studies as well as modelling publications [23]. The quality of quasi-experimental studies was assessed using the Joanna Briggs Institute (JBI) checklist [24]. The assessment was done independently by two reviewers (MD, MPG) and discrepancies were resolved by consensus.

Data items

The synthesis of publications was stratified according to outcomes. Data extracted included the characteristics of the publication (authors' name, year of publication, country, number of patients, design, study period, population receiving free ARVs or paying OOP fees and outcome type), and results comparing free ARV access with OOP fees. Due to the heterogeneity in outcomes measurement across publications, they were summarized and presented in tables, allowing for comparison of the diverse effect measures used (e.g., risk ratio, mean difference). In cases where information was missing or unclear, the authors were contacted for clarification. If no response was received, the missing data were documented as such.

Synthesis method

The results for the primary outcomes are presented in the main results section, as they align directly with the HIV care and prevention cascades. Secondary outcomes (mortality and HIV transmission), which are less dependent on a single factor, such as free access to ARVs, are presented in the supplemental material. The findings are categorized based on their relative outcome. Key study

TABLE 1 Characteristics of the selected publications ($n = 22$).

	No. of studies (%)
Population type	
People living with HIV	17 (77)
People at risk of HIV infection[a]	5 (23)
Study outcomes[c]	
Primary	
Being on antiretroviral therapy	7 (32)
Being virally suppressed	4 (18)
Being on pre-exposure prophylaxis	2 (9)
Secondary	
Mortality	7 (32)
HIV infection	4 (18)
WHO geographic region	
Americas	10 (45)
Africa	5 (23)
Western Pacific	3 (14)
Europe	1 (5)
Southeast Asia	1 (5)
International[b]	2 (9)
Classification of countries by income level	
Low or middle-income countries	11 (50)
High-income countries	11 (50)
Last year of study period	
2000–2008	7 (32)
2009–2017	6 (27)
2018–2024	9 (41)
Sample size (number of persons)	
Missing	1 (5)
≤999	4 (18)
1000–4999	4 (18)
5000–9999	5 (23)
≥10 000	8 (36)
Study design[c]	
Cohort	10 (45)
Quasi-experimental	4 (18)
Cross-sectional	4 (18)
Ecological	3 (14)
Modelling	1 (5)
Type of out-of-pocket fees	
Cost-sharing	18 (82)
Full cost	1 (5)
Unclear/Unknown	3 (14)

[a]People at risk of acquiring HIV consist of men and transgender women who have sex with men, people who inject drugs, sex workers, serodiscordant couples, victims of sexual assault and vertical transmission.
[b]Two studies reported from the Antiretroviral Therapy in Lower Income Countries (ART-LINC) Collaboration, a network of treatment programmes in Africa, Asia and South America.
[c]Two studies reported on two outcomes [31, 45].

characteristics, metrics and results (e.g., rates of ARV use, viral suppression and PrEP uptake) are presented in Tables 1–3. In instances of missing data in the main finding section of Tables 2 and 3, the available information was utilized to perform calculations whenever feasible. The synthesis of each publication was guided by the structured data extraction tool outlined in Section 2.5. Due to the substantial heterogeneity among publications—such as variations in design and outcomes measurements—a meta-analysis was deemed inappropriate.

RESULTS

Search and selection

Our electronic search retrieved 34 164 publications. After removing 12 488 duplicates, 21 676 publications were screened by title and abstract. Full-text screening was performed on 407 publications, of which 22 were retained for inclusion in our systematic review (Figure 1). The main reasons for exclusion were the absence of a comparison between free ARV access and OOP fees, and the lack of a report on one of our selected outcomes.

Characteristics

Nearly half of the final set of 22 publications originated from the Americas ($n = 10$) (Table 1) [25–34]. Half of the publications included ($n = 11$) were conducted in high-income countries (HICs) [25–31, 34–37]. Most of the publications focused on treatment for individuals living with HIV ($n = 17$) [25–29, 32, 33, 35, 38–46], while the remaining publications focused on preventing HIV acquisition among people at risk ($n = 5$) [30, 31, 34, 36, 37]. Most of the designs were cohort ($n = 10$), quasi-experimental ($n = 4$) or cross-sectional ($n = 3$). Many publications measured the impact of free access to ARVs on being on therapy ($n = 7$), followed by being virally suppressed ($n = 4$) and being on PrEP ($n = 2$). Regarding the secondary outcomes, seven publications were identified on mortality and four publications on HIV infection (Table 2).

Publications under study examined various free ARV access programmes. Half were from universal national/state free ARV policies ($n = 11$) and eight were from government-funded support programmes. The latter includes programmes such as the AIDS Drug Assistance Program (ADAP), which provide free access to ARVs for people living with HIV who lack sufficient financial resources in the United States. A minority focused on clinics and hospitals offering ARVs free of charge to their populations ($n = 3$). Most of the publications' study periods ended between 2018 and 2024 ($n = 9$) and the median sample size was over 10 000 participants. The majority of the publications compared free ARVs to cost-sharing as a type of OOP fees ($n = 18$) and only one study compared free ARVs to paying the full cost of ARVs [42]. Most ($n = 15$) reported standard error (e.g., confidence intervals, standard deviation or standard error) alongside their result measures. Finally, data were obtained through surveys, interviews, hospital/clinic medical records, national/state surveillance databases or insurance claims databases.

HIV treatment outcomes

As displayed in Table 2, 11 publications reported on the impact of free ARVs on HIV treatment outcomes. Seven publications focused on the second HIV care cascade target, that is, being on therapy, and four reported on the third target, which is being virally suppressed. Many sub-populations, such as pregnant people living with HIV [41] and children living with HIV, were represented [42]. As for being on therapy, the definition of the outcome varied greatly across publications, as demonstrated in Table 1. Inconsistent outcome definitions made it challenging to compare results across studies.

Overall, free ART improved ARV use compared with OOP among people living with HIV. In one of the most robustly designed studies, Yi et al. [26] reported that women living with HIV enrolled in ADAP were more than two times more likely to be on ART compared with women not enrolled (OR = 2.35; 95% CI 1.49–3.71). Moreover, in the most recent study identified (2023), Fennell et al. reported a significant increase of about 37% in the use of ART after the implementation of a national free ARV programme in pregnant people with HIV [41].

For the third target of the HIV care cascade, achieving viral suppression, this review identified four publications, all from HICs (see Table 2). Three cohorts from the United States assessed the impact of ADAP [27–29], while the remaining publication was an Australian study conducted before and after implementing a state policy to remove ART co-payment [35]. Two publications reported the probability of maintaining virological suppression [27, 28] while the other two reported on the frequency of virological failure [29, 35]. All four studies showed that free ARV had a positive impact on viral suppression (see Table 2).

HIV prevention outcomes

This review identified only two studies reporting on the impact of OOP costs on PrEP use. Both were conducted

TABLE 2 Impact of free ARVs on HIV treatment outcomes.

Publication	Study design and period	People receiving free ARVs	People with OOP fees to access ARVs	Outcome	Main findings
Being on antiretroviral therapy					
Fennell (2023) Botswana $n = 1516$ [41]	Quasi-experimental, 2014 to 2021	Pregnant non-citizens living with HIV under the National free ARV programme starting in December 2019	Pregnant non-citizens living with HIV self-paying or having OOP fees under a personal health insurance prior to December 2019	Receiving antenatal ART	The proportion of pregnant non-citizen living with HIV receiving antenatal ART increased from 65.5% to 89.9% after the implementation of the national free ARV programme (24.4% difference, $p < 0.001$)
Kahn (2002) United States $n = 154\,196$ [25]	Cross sectional, 1998	People living with HIV enrolled in ADAP[a] in four states in 1998	People living with HIV enrolled in Medicaid[d] in four states in 1998	ART use measured by the 90-day snapshot	ART use was higher in ADAP enrollees compared with Medicaid enrollees for each of the four states: California (ADAP 67% vs. Medicaid 44%), Florida (ADAP 63% vs. Medicaid 48%), New York (ADAP 76% vs. Medicaid 55%), Texas (ADAP 56% vs. Medicaid 37%)
Singh (2009) India $n = 454$ [42]	Cohort, 2004 to 2008	Children living with HIV provided ART free of cost starting in January 2005 at a tertiary care centre	Children living with HIV followed at a tertiary care centre prior to December 2004 (ART available to families who could afford it)	Not being lost to follow-up while on ART	In December 2004, 82.3% of children were on ART and not lost to follow-up. Three years after implementing free access to ART (May 2008), this percentage increased to 91.7%
Weigel (2009) Malawi $n = 7246$ [44]	Quasi-experimental, 2003–2006	Adults and children living with HIV followed at the Kamuzu Central Hospital after the implementation of the national free ARV programme starting in June 2004	Adults and children living with HIV followed at the Kamuzu Central Hospital prior to june 2004 (ART available on a cost-recovery basis)	ART initiation	The average number of adults initiated on ARV per quarter went from 182 before the start of the national free ARV programme to 494 after ($p < 0.001$)[b]
Ye (2024) China $n = 6433$ [26]	Cross sectional, 2023	People living with HIV receiving free ART in Ningbo City	People living with HIV receiving Medicare covered or self-funded ART in Ningbo City	Antiviral drugs discontinuation	Among people living with HIV with ART records, the proportion of medication discontinuation was lower in people receiving Medicare covered or self-funded

(Continues)

TABLE 2 (Continued)

Publication	Study design and period	People receiving free ARVs	People with OOP fees to access ARVs	Outcome	Main findings
					ART (1.0%, 6/626) compared with those with free access (3.4%, 196/5807) (difference 2.4%, $\chi^2 = 10.85$, $p < 0.001$)
Yi (2011) United States $n = 1094$ [41]	Cross sectional, 2008	Women living with HIV participating in the WIHS who are enrolled into ADAP[a]	Women living with HIV participating in the WIHS who are not enrolled into ADAP	Self-reported current use of ART	After adjustment, women not enrolled in ADAP were more than twice as likely not to be on ART (OR 2.35; 95% CI 1.49–3.71).
Zachariah (2008) Kenya $n = 435$ [45]	Cohort, 2005	People living with HIV receiving free ART at the Mbagathi District Hospital	People living with HIV offered ART on a cost-sharing basis (500 shillings/month, approximately US$7) at the Mbagathi District Hospital	Being alive and on ART	There was a trend suggesting that more people were alive and on ART in the free ART group (151/170, 88.8%) compared with those sharing the cost for their medication (222/265, 83.7%) (difference 5.1%, $p = 0.1$)
Being virally suppressed					
Diepstra (2017) United States $n = 13\,104$ [27]	Cohort, 2014	Adults and adolescents living with HIV in Virginia receiving ADAP[a] assistance	Adults and adolescents living with HIV in Virginia not receiving ADAP assistance	Viral suppression, defined as the last viral load ≤ 200 copies/mL	The viral suppression varied across different combinations of classes of Ryan White services,[c] with better aORs for recipients with ADAP assistance compared with no ADAP but other service classes: • Support plus ADAP aOR 1.7 (95% CI 1.2–2.5) versus Support only aOR 0.8; • Core plus ADAP aOR 1.9 versus Core only aOR 1.5; • Comprehensive Care Assistance aOR 4.3 versus Core plus support aOR 2.9 Viral suppression in people receiving ADAP only versus no Ryan White services was not statistically different (aOR 0.91; 95% CI 0.79–1.0)
Erly (2023) United States	Cohort, 2017 to 2019			Viral suppression defined as the last viral load ≤200	After disenrolling, former ADAP clients' viral suppression decreased

TABLE 2 (Continued)

Publication	Study design and period	People receiving free ARVs	People with OOP fees to access ARVs	Outcome	Main findings
$n = 5238$ [28]		People living with HIV in Washington State who are enrolled in ADAP[a]	People living with HIV in Washington State who are disenrolled from ADAP	viral copies/mL or not having a viral load test done in the last 12 months	from 83% to 69% (RD 12%; 95% CI 9%–15%)
Lee (2021) Australia $n = 364$ [35]	Ecological, 2013 to 2017	People living with HIV participating in a national 2-year cohort study after co-payment removal by the New South Wales state on 1 October 2015.	People living with HIV participating in a national 2-year cohort study before October 1, 2015 paying incurring ART co-payment in New South Wales state (mean quarterly ART co-payment A$ 48 [95% CI 41–54])	Virological failure defined as one instance of viral load >200 copies/mL plasma, two consecutive viral loads >50 copies/mL or a single viral load >50 copies/ml followed by an ART switch	Virological failure went from 5.0 (95% CI 2.9–8.4) before co-payment removal to 3.7 (95% CI 1.8–7.4) episodes per 100 persons-year after co-payment removal (NS)
Ludema (2016) United States $n = 1481$ [29]	Cohort, 2006	Women living with HIV participating in the WIHS with various insurance coverage statuses who were enrolled into ADAP[a]	Women living with HIV participating in the WIHS with Medicaid coverage (without ADAP)	Unsuppressed viral load, defined as a single viral load measurement of >200 copies/mL	Uninsured women living with HIV with ADAP had a lower risk of unsuppressed viral load compared with those with Medicaid without ADAP (HR 0.49; 95% CI 0.28–0.85) Privately insured women living with HIV with ADAP had a lower risk of unsuppressed viral load compared with Medicaid without ADAP (HR 0.52; 95% CI 0.31–0.91) Medicaid covered women living with HIV with ADAP did not have a statistically different risk of unsuppressed viral load compared with those without ADAP (HR 0.77; 95% CI 0.47–1.27)

Note: All amounts are in USD unless otherwise indicated. Where applicable, we restricted to the data pertaining to periods after 1996.

Abbreviations: ADAP, AIDS Drug Assistance Program; aOR, adjusted odds ratio; ART, antiretroviral therapy; ARV, antiretroviral drug; CI, confidence interval; HR, Hazard Ratio; NS, non-statistical difference; OOP, out-of-pocket; RD, Risk Difference; ref., reference value; WIHS, Women's Interagency HIV Study.

[a]ADAP: AIDS Drug Assistance Program in the United States provides HIV-related prescription drugs to low-income individuals with no out-of-pocket cost.

[b]The *p*-value was calculated using a two-tailed independent *t*-test conducted by the authors.

[c]Ryan White HIV/AIDS Program: A U.S. federal programme offering various services for uninsured and underinsured people living with HIV (Core, Support and ADAP). Among the services, only ADAP addresses the out-of-pocket costs of ARVs. The Comprehensive Care Assistance comprises all three service categories.

[d]Medicaid: programme created in the United States to provide health insurance for low-income individuals and families. The level of out-of-pocket contribution varies from state to state.

TABLE 3 Impact of free ARV on HIV prevention outcomes.

Publication	Study design and period	People receiving free ARVs	People with OOP fees to access ARVs	Outcome	Main findings
Being on PrEP					
Dawit (2024) United States $n = 36\ 204$ [30]	Cross sectional, 2016 to 2019	Adults registered in a national claim database living in the same state as their physician, on PrEP with $0 OOP cost	Adults registered in a national claim database living in the same state as their physician, on PrEP with OOP costs up to >500$ for 30 days of supply	PrEP abandonment, defined as a PrEP prescription that is not picked up by an individual within 365 days	Compared with people with free ARV, those with high co-payments (>$100) had a statistically significant risk of abandonment (aOR from 2.71 to 3.75). Those with low co-payments (≤$100) showed no difference in PrEP abandonment
Dean (2024) United States $n = 58\ 529$ [31]	Cohort, 2015 to 2019	Adults registered in a national claim database on PrEP with $0 OOP cost	Adults registered in a national claim database on PrEP with OOP cost up to >500$ for 30 days of supply	PrEP abandonment, defined as a PrEP prescription that is not picked up by an individual within 365 days	Risk-adjusted abandonment rates differed from 5.5% for people with free access to PrEP to 10.6% to 42.6% for people imposed an OOP cost up to >$500 An OOP cost of up to $10 doubled the rate of abandonment compared with free access (aRR 11.3 vs. aRR 5.6)

Note: All amounts are in USD unless otherwise indicated.
Abbreviations: aOR, adjusted odds ratio; ARV, antiretroviral; OOP, out-of-pocket; PrEP, pre-exposure prophylaxis.

in the United States, where OOP costs vary across counties [30, 31]. Furthermore, data were collected through a nationwide insurance claims database, meaning all types of populations using PrEP (men and transgender women who have sex with men, people who inject drugs, sex workers, etc.) were likely included. The first publication, a cross-sectional study [30], analyzed PrEP discontinuation and abandonment across various United States counties and the second, a cohort study [31], assessed how changes in OOP costs affected PrEP abandonment rates. Both studies found that higher OOP costs were associated with higher abandonment rates.

Mortality and HIV infection

Seven publications investigating the impact of free ARVs on mortality were identified (see Table S1). Most of the studies ($n = 6$) showed a reduction of mortality with free ART for both the adult/adolescent population ($n = 6$) as well as the paediatric population ($n = 1$) [32]. Five publications focused on overall mortality, while two reported AIDS-related deaths [32, 33]. All studies were from low/middle-income countries (LMIC). For most ($n = 5$), the study period ended prior to 2005, before efforts to roll out ART on a global scale. Braitstein et al. [39] evaluated 18 ART programmes across Africa, Asia and South America from the ART-LINC collaboration, a network of HIV/AIDS treatment programmes and cohorts. They demonstrated that free access to treatment in low-income settings reduced mortality rates by 75% (aHR = 0.25; 95% CI 0.08–0.78). Using data from the same international collaboration, Brinkhof et al. [40] also presented a significantly higher risk of mortality associated with OOPs programmes (HR = 4.64; 95% CI 1.11–19.41). Two ecological studies from Mexico investigated the effects of the 2003 universal ARV governmental policy and reported decreased mortality rates after the new policy was implemented [32, 33]. Finally, three African publications found a positive association between initiation of free ART and mortality [38, 43, 45].

Four studies investigated the association between free PrEP and HIV infection, including one modelling study [34] and three observational studies [31, 36, 37] (see Table S1).

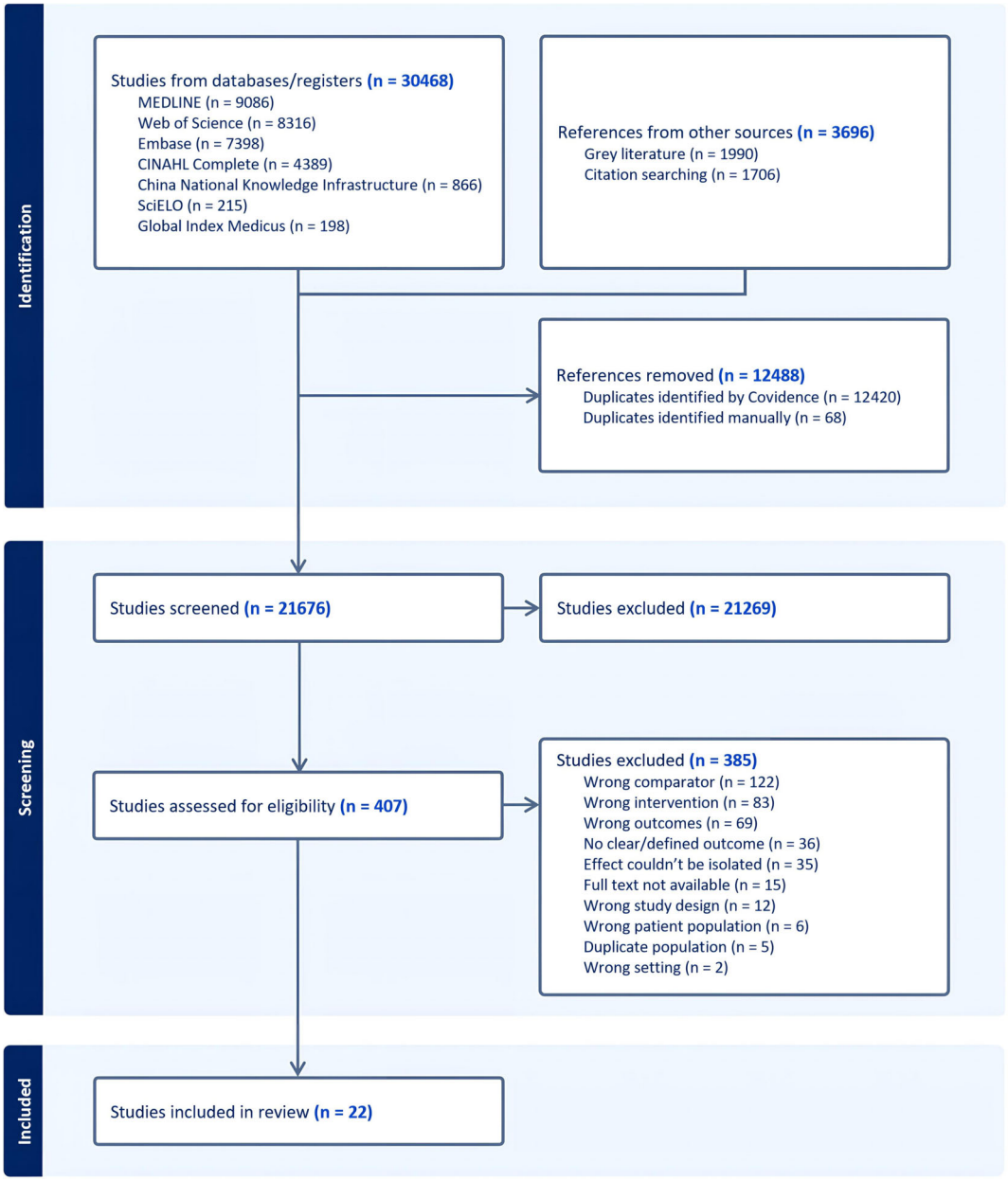

FIGURE 1 PRISMA flowchart.

These were all conducted in HICs, consisting of Australia, Canada, Ireland and the United States. Two studies reporting on the impact of free PrEP included only men who have sex with men [34, 37], while the two other studies included insurance claims to tackle the whole population on PrEP [31, 36]. In their modelling study, Doyle et al. showed that if Montreal, a Canadian city where PrEP access involves OOP costs, achieved the same coverage as Vancouver, where PrEP is free, up to 63% (90% CI 54%–70%) of new HIV cases could have been prevented between 2015 and 2021 [34]. Three of the four studies identified reported a statistically significant reduction in incident HIV infection with the implementation of free programmes [34, 36, 37].

Quality assessment

Ten cohorts, four cross-sectional, three ecological and one modelling study were assessed for quality using a modified NHLBI tool, and four quasi-experimental publications with a modified JBI tool. Key quality concerns were present mainly in studies reporting on our secondary outcomes. They were related to sample size justification, exposure assessment frequency and

blinded outcome assessment. Table S2 shows the quality assessment of all reviewed studies.

DISCUSSION

To our knowledge, this is the first systematic review to assess the impact of free ARV drugs on multiple aspects of the HIV cascade of care and on HIV prevention. It covered a wide range of literature, searching eight databases and sorting through no less than 34 000 publications, allowing for the inclusion of diverse populations under different healthcare systems over two decades. It encompasses 22 publications, mostly observational studies, including seven on ARV use for the treatment of HIV, four on viral suppression, seven on mortality, four on incident HIV infection and two on PrEP use.

The provision of free ARV drugs was associated with a higher proportion of patients on ARV therapy and with viral suppression, with only one study showing converse outcomes [26]. This negative association can be explained by the fact that the Chinese National free ARV programme offers limited treatment options with more side effects than regimens offered to patients with private insurance. In the preventative context, free PrEP was associated with lower abandonment rates. Free ARV drugs were also associated with a decrease in HIV-related and all-cause mortality, as well as a reduction in incident HIV infections.

Although our literature review focused on selected outcomes, many others were found during the literature review. Many publications have also shown that providing free access to ARVs, either for treatment [47–51] or prevention [48], improves adherence. Better retention in care was also commonly reported as being a positive impact of free access to ARVs [15, 49, 52–54].

The findings of this systematic review are consistent with those reported in a previous review from 2005 focusing on developing countries where free ARVs improved viral suppression rates [55]. Our study also underscored the benefits of universal ART access in developed countries, with findings aligning closely with a systematic review conducted by a non-profit organization [56]. This review similarly identified a strong association between free ARV access and improvements in both individual and population-level health outcomes. Like our review, it suggested that access to free ARV reduces HIV transmission, enhances viral suppression rates and lowers mortality. Furthermore, the authors highlighted the cost-effectiveness of offering free ARVs for people living with HIV. As for PrEP, several studies support its cost-effectiveness [57–60]. Although there is a lack of literature specifically reporting on the cost-effectiveness of offering PrEP for free, through a significant number of qualitative studies in various key populations, many researchers were able to show that people at risk of HIV infection are more inclined to take PrEP if it is free, suggesting that cost is a major barrier to PrEP uptake [16, 61–69]. Thus, if willingness to take PrEP increases when it is offered for free, this could be hypothesized to be associated with savings in healthcare costs.

Our systematic review also has several limitations that should be kept in mind while interpreting the results. A systematic approach was followed to minimize biases, but many may persist due to the publications' methodology. It is conceivable that many biases will occur when comparing people having access to free ARVs with people paying to obtain them. For example, the ADAP programme, featured in seven of our selected publications, supports people living with HIV/AIDS who lack sufficient healthcare coverage or financial resources [25–29]. The programme eligibility criteria, such as meeting state-specific income limits (typically 200%–500% of the Federal Poverty Level) and being uninsured or underinsured, may have influenced outcomes as much as free access to treatment. However, according to our review, free access through ADAP leads to better outcomes, a sign that free access to ARV might be able to mitigate poor socio-economic status.

Another significant source of bias was the study periods. Indeed, the clinical approaches to the treatment of HIV tend to vary over time. The efficacy and tolerability of ARVs have improved considerably over the years, leading to a possible overestimation of the benefits of free ARVs when pre/post designs were used.

The President's Emergency Plan for AIDS Relief (PEPFAR) has been crucial in expanding access to ARVs in LMIC, significantly enhancing HIV care by providing free ARVs for millions since 2003 [70, 71]. However, no studies on PEPFAR were included in our review. This is because the support provided by PEPFAR made the difference between 'being unable to take ARVs' and 'ensuring that everyone receives ARV'. Thus, studies reporting on the implementation of PEPFAR compared individuals with free access to ARVs with individuals most likely not receiving ARVs at all. Despite the lack of studies included in our review, we believe decision-makers should recognize the programme's success as evidence that providing free ARVs is both feasible and vital for addressing HIV.

Further, in LMICs, fees can represent a significant barrier to access, whereas in HICs, they may pose only a minor constraint, potentially amplifying the impact observed in LMIC studies. However, this effect is likely most relevant for the mortality outcome, which was only assessed in LMICs. For other outcomes, our review included numerous studies conducted in HICs, where the benefits of free ART appeared equally favourable, suggesting that the disparity

in cost barriers had minimal influence on our overall results. In addition, our analysis did not identify a consistent trend linking variations in ARV access policies to the type of healthcare system in place. While structural and systemic factors undoubtedly play a role, the diversity of countries from which our final selection of studies came suggests that differences in access are more strongly influenced by policy priorities and the degree to which public authorities prioritize healthcare and achieving international targets. Our findings also suggest that free ARV programmes contribute directly to the principles of UHC by improving access to life-saving treatment and reducing financial barriers.

Our study is the first systematic review reporting evidence of the impact of free ARVs on various aspects of HIV care and prevention continuums. The majority of the selected articles showed a positive impact on various aspects of the HIV care cascade and prevention continuum when providing free ARV drugs. The diversity of the studies allows for a broad perspective, strengthening the generalizability of our findings across various contexts and populations. The review focused on critical outcomes for decision-makers by examining how both HIV treatment and prevention cascade components demonstrate that free access to ARVs is essential to achieving WHO/UNAIDS 2030 targets and ending the HIV epidemic. Although the variability among studies underscores the need for further research, the overall benefits of free ARV access suggest it could be a valuable strategy for nations still debating its implementation. Alternatives to free ARVs such as co-payments, co-insurance and deductibles shift the financial burden from healthier, higher-income individuals to sicker, lower-income ones, putting vulnerable groups like people living with HIV at a disadvantage. While not the focus of this review, it is interesting for policymakers to consider other strategies such as 'Lump-Sum Remuneration' [72]—a volume-delinked subscription model where manufacturers receive fixed, recurring payments from governments for therapies offered to their populations regardless of sales volume, to enhance the affordability of ARVs, reduce healthcare costs and prevent cost-shifting or rationing. As we work towards global HIV targets, increasing ARV coverage, particularly through free and accessible programmes, is crucial to ensure that more people use ARVs and achieve viral suppressions, which are key factors in both individual health outcomes and control the epidemic on a global scale.

AUTHOR CONTRIBUTIONS

BL, MD, MPG, ID, APBPG, LB conceived the study design; AB conducted the searches, MD, MPG, ID, BL screening, data extraction and analysis (RR and ZER helped for the screening); MD, MPG wrote the first draft; ID, APBPG, LB and BL commented on all subsequent drafts. All authors read and approved the final version.

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CONFLICT OF INTEREST STATEMENT

BL reports honoraria from Gilead Sciences, Inc. and ViiV Healthcare for participation in speakers' bureaus and consulting fees from Merck Canada and Gilead Sciences, Inc. LB receives grants and personal fees from AstraZeneca, grants from TEVA and grants from GlaxoSmithKline. The other authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this review.

DATA AVAILABILITY STATEMENT

An ethics statement was not required for this work.

ORCID

Amy Bergeron https://orcid.org/0000-0002-4224-0307
Benoît Lemire https://orcid.org/0000-0003-1363-7687

REFERENCES

1. UNAIDS. 2023 Report. UNAIDS - Global Report 2023. n.d. accessed October 14, 2024. https://thepath.unaids.org/
2. HIV and AIDS. n.d. Accessed October 24, 2024. https://www.who.int/news-room/fact-sheets/detail/hiv-aids
3. Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: recommendations for a public health approach. n.d. Accessed October 26, 2024. https://www.who.int/publications/i/item/9789240031593
4. Summary: HIV antiretroviral medication coverage in Canada 2023. Accessed October 26, 2024. https://www.canada.ca/en/public-health/services/publications/diseases-conditions/summary-hiv-antiretroviral-medication-coverage.html
5. McCann NC, Horn TH, Hyle EP, Walensky RP. HIV antiretroviral therapy costs in the United States, 2012-2018. *JAMA Intern Med*. 2020;180:601-603. doi:10.1001/jamainternmed.2019.7108
6. Goldman DP, Bhattacharya J, Leibowitz AA, Joyce GF, Shapiro MF, Bozzette SA. The impact of state policy on the costs of HIV infection. *Med Care Res Rev*. 2001;58:31-53. doi:10.1177/107755870105800102
7. Cost Considerations and Antiretroviral Therapy | NIH. 2024. Accessed October 24, 2024. https://clinicalinfo.hiv.gov/en/guidelines/hiv-clinical-guidelines-adult-and-adolescent-arv/antiretroviral-therapy-cost-considerations

8. Out-of-pocket costs associated with HIV in publicly funded high-income health care settings – The Ontario HIV Treatment Network 2024. Accessed October 24, 2024. https://www.ohtn.on.ca/out-of-pocket-costs-associated-with-hiv-in-publicly-funded-high-income-health-care-settings/
9. European PrEP programmes face two big issues: how to get more people coming forward, and how to serve them if they do. AidsmapCom. 2021. Accessed November 30, 2023. https://www.aidsmap.com/news/jan-2021/european-prep-programmes-face-two-big-issues-how-get-more-people-coming-forward-and
10. Brazil has been at the forefront of HIV treatment and prevention in Latin America, says the scientific journal. n.d. Accessed November 3, 2024. https://www.unodc.org/lpo-brazil/en/frontpage/2018/02/brazil-has-been-at-the-forefront-of-hiv-treatment-and-prevention-in-latin-america--says-the-scientific-journal-.html
11. Beer L, Tie Y, Weiser J, Shouse RL. Nonadherence to any prescribed medication due to costs among adults with HIV infection - United States, 2016-2017. *MMWR Morb Mortal Wkly Rep*. 2019;68:1129-1133. doi:10.15585/mmwr.mm6849a1
12. Ahonkhai AA, Regan S, Idigbe I, et al. The impact of user fees on uptake of HIV services and adherence to HIV treatment: findings from a large HIV program in Nigeria. *PLoS One*. 2020;15:e0238720. doi:10.1371/journal.pone.0238720
13. Johns B, Chau LB, Hanh KH, et al. The importance of assessing out-of-pocket payments when the financing of antiretroviral therapy is transitioned to domestic funding: findings from Vietnam. *Trop Med Int Health*. 2017;22:908-916. doi:10.1111/tmi.12897
14. Blutinger EJ, Solomon S, Srikrishnan AK, et al. Dropout from care among HIV-infected patients enrolled in care at a tertiary HIV care center in Chennai, India. *AIDS Care*. 2014;26(12):1500-1505. doi:10.1080/09540121.2014.934654
15. Djarma O, Nguyen Y, Renois F, Djimassal A, Banisadr F, Andreoletti L. Continuous free access to HAART could be one of the potential factors impacting on loss to follow-up in HAART-eligible patients living in a resource-limited setting: N'djamena, Chad. *Trans R Soc Trop Med Hyg*. 2014;108:735-738. doi:10.1093/trstmh/tru130
16. Weinstein ER, Puccinelli M, Cardenas N, Safren SA, Harkness A. PrEP to party: exploring MSM's PrEP use and interest in the context of sexually themed events. *AIDS Behav*. 2024;28(4):1384-1389. doi:10.1007/s10461-023-04225-7
17. Barennes H, Frichittavong A, Gripenberg M, Koffi P. Evidence of high out of pocket spending for HIV care leading to catastrophic expenditure for affected patients in Lao People's Democratic Republic. *PLoS One*. 2015;10:e0136664. doi:10.1371/journal.pone.0136664
18. Bisson GP, Frank I, Gross R, et al. Out-of-pocket costs of HAART limit HIV treatment responses in Botswana's private sector. *AIDS*. 2006;20(9):1333-1336. doi:10.1097/01.aids.0000232245.36039.2b
19. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. doi:10.1136/bmj.n71
20. Free HIV Drugs as a Key Tool Against the HIV Pandemic - A Systematic Review. n.d. Accessed July 15, 2024. https://app.covidence.org/reviews/324139/extraction/index
21. Bergeron A. Search strategies for "Free HIV Drugs as a Key Tool Against the HIV Pandemic: A Systematic Review". 2024. 10.5683/SP3/YNSEEA
22. Rethlefsen ML, Kirtley S, Waffenschmidt S, et al. PRISMA-S: an extension to the PRISMA statement for reporting literature searches in systematic reviews. *Syst Rev*. 2021;10(1):39. doi:10.1186/s13643-020-01542-z
23. NHLBI, NIH. Study Quality Assessment Tools. n.d. Accessed October 24, 2024. https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools
24. The revised JBI critical appraisal tool for the assessment of risk of bias for quasi-experimental studies - PubMed. n.d. Accessed October 24, 2024. https://pubmed.ncbi.nlm.nih.gov/38287725/
25. Kahn JG, Zhang X, Cross LT, Palacio H, Birkhead GS, Morin SF. Access to and use of HIV antiretroviral therapy: variation by race/ethnicity in two public insurance programs in the U.S. *Public Health Rep*. 2002;117:252.
26. Yi T, Cocohoba J, Cohen M, et al. The impact of the AIDS drug assistance program (ADAP) on use of highly active antiretroviral and antihypertensive therapy among HIV-infected women. *J Acquir Immune Defic Syndr*. 2011;56:253-262. doi:10.1097/QAI.0b013e31820a9d04
27. Diepstra KL, Rhodes AG, Bono RS, Patel S, Yerkes LE, Kimmel AD. Comprehensive Ryan White assistance and human immunodeficiency virus clinical outcomes: retention in care and viral suppression in a Medicaid nonexpansion state. *Clin Infect Dis*. 2017;65:619-625. doi:10.1093/cid/cix380
28. Erly SJ, Khosropour CM, Hajat A, Sharma M, Reuer JR, Dombrowski JC. AIDS Drug Assistance Program disenrollment is associated with loss of viral suppression beyond differences in homelessness, mental health, and substance use disorders: an evaluation in Washington state 2017-2019. *PLoS One*. 2023;18:e0285326. doi:10.1371/journal.pone.0285326
29. Ludema C, Cole SR, Eron JJ, et al. Impact of health insurance, ADAP, and income on HIV viral suppression among US women in the Women's interagency HIV study, 2006-2009. *J Acquir Immune Defic Syndr*. 2016;73:307-312. doi:10.1097/QAI.0000000000001078
30. Dawit R, Goedel WC, Reid SC, et al. Geographic variations of pre-exposure prophylaxis reversal and abandonment among United States counties. *AIDS*. 2024;38:557-566. doi:10.1097/QAD.0000000000003790
31. Dean LT, Nunn AS, Chang H-Y, et al. Estimating the impact of out-of-pocket cost changes on abandonment of HIV pre-exposure prophylaxis. *Health Aff*. 2024;43:36-45. doi:10.1377/hlthaff.2023.00808
32. Palacio-Mejía LS, Hernández-Ávila JE, Molina-Vélez D, et al. Trends in mortality by HIV/AIDS in children in Mexico: towards the elimination of mother-to-child transmission. *Arch Med Res*. 2021;52:746-754. doi:10.1016/j.arcmed.2021.04.008
33. Hernández- Ávila JE, Palacio- Mejía LS, Hernández- Romieu A, Bautista- Arredondo S, Sepúlveda Amor J, Hernández- Ávila M. Implementation and operational research: effect of universal access to antiretroviral therapy on HIV/AIDS mortality in Mexico 1990-2011. *J Acquir Immune Defic Syndr*. 2015;69:100-108. doi:10.1097/QAI.0000000000000645
34. Doyle CM, Milwid RM, Cox J, et al. Population-level effectiveness of pre-exposure prophylaxis for HIV prevention among men who have sex with men in Montréal (Canada): a modelling study of surveillance and survey data. *J Int AIDS Soc*. 2023;26:e26194. doi:10.1002/jia2.26194
35. Lee E, Mao L, de Wit J, et al. Impact of the removal of patient co-payments for antiretroviral therapy (ART) on out-of-pocket

expenditure, adherence and virological failure among Australian adults living with HIV. *Health Policy*. 2021;125:1131-1139. doi:10.1016/j.healthpol.2021.07.002
36. Grulich AE, Jin F, Bavinton BR, et al. Long-term protection from HIV infection with oral HIV pre-exposure prophylaxis in gay and bisexual men: findings from the expanded and extended EPIC-NSW prospective implementation study. *Lancet HIV*. 2021;8:e486-e494. doi:10.1016/S2352-3018(21)00074-6
37. Keane A, Regan SO, Quinn L, et al. Evaluation of the impact of human immunodeficiency virus pre-exposure prophylaxis on new human immunodeficiency virus diagnoses during the COVID-19 pandemic. *Int J STD AIDS*. 2022;33:99-102. doi:10.1177/09564624211054587
38. Araya T, Tensou B, Davey G, Berhane Y. Burial surveillance detected significant reduction in HIV--related deaths in Addis Ababa, Ethiopia. *Trop Med Int Health*. 2011;16:1483-1489. doi:10.1111/j.1365-3156.2011.02867.x
39. Braitstein P, Brinkhof MWG, Dabis F, et al. Mortality of HIV-1-infected patients in the first year of antiretroviral therapy: comparison between low-income and high-income countries. *Lancet*. 2006;367:817-824. doi:10.1016/S0140-6736(06)68337-2
40. Brinkhof MWG, Dabis F, Myer L, et al. Early loss of HIV-infected patients on potent antiretroviral therapy programmes in lower-income countries. *Bull World Health Organ*. 2008;86(7):559-567. doi:10.2471/blt.07.044248
41. Fennell C, Escudero D, Zash R, et al. The impact of free antiretroviral therapy for pregnant non-citizens and their infants in Botswana. *J Int AIDS Soc*. 2023;26:e26161. doi:10.1002/jia2.26161
42. Singh S, Jat KR, Minz RW, Arora S, Suri D, Sehgal S. Clinical profile of 516 children affected by HIV in a tertiary care centre in northern India: 14 years of experience. *Trans R Soc Trop Med Hyg*. 2009;103:627-633. doi:10.1016/j.trstmh.2009.01.009
43. Weigel R, Hochgesang M, Brinkhof MW, et al. Outcomes and associated risk factors of patients traced after being lost to follow-up from antiretroviral treatment in Lilongwe, Malawi. *BMC Infect Dis*. 2011;11(31):31. doi:10.1186/1471-2334-11-31
44. Weigel R, Kamthunzi P, Mwansambo C, Phiri S, Kazembe PN. Effect of provider-initiated testing and counselling and integration of ART services on access to HIV diagnosis and treatment for children in Lilongwe, Malawi: a pre- post comparison. *BMC Pediatr*. 2009;9:80. doi:10.1186/1471-2431-9-80
45. Zachariah R, Van Engelgem I, Massaquoi M, et al. Payment for antiretroviral drugs is associated with a higher rate of patients lost to follow-up than those offered free-of-charge therapy in Nairobi, Kenya. *Trans R Soc Trop Med Hyg*. 2008;102:288-293. doi:10.1016/j.trstmh.2007.12.007
46. 宁波市HIV感染者抗病毒治疗医疗保险药物使用情况及相关因素分析 - 中华流行病学杂志. n.d. Accessed July 15, 2024. https://rs.yiigle.com/cmaid/1489672
47. Byakika-Tusiime J, Polley EC, Oyugi JH, Bangsberg DR. Free HIV antiretroviral therapy enhances adherence among individuals on stable treatment: implications for potential shortfalls in free antiretroviral therapy. *PLoS One*. 2013;8:e70375. doi:10.1371/journal.pone.0070375
48. Shover CL, Shoptaw S, Javanbakht M, et al. Mind the gaps: prescription coverage and HIV incidence among patients receiving pre-exposure prophylaxis from a large federally qualified health center in Los Angeles, California: Mind the Gaps: Cobertura de recetas e incidencia de VIH entre pacientes recibiendo profilaxis pre-exposición de un centro de salud grande y federalmente calificado en Los Ángeles, CA. *AIDS Behav*. 2019;23(10):2730-2740. doi:10.1007/s10461-019-02493-w
49. Hosseinipour MC, Neuhann FH, Kanyama CC, et al. Lessons learned from a paying antiretroviral therapy service in the public health sector at Kamuzu Central Hospital, Malawi: 1-year experience. *J Int Assoc Physicians AIDS Care*. 2006;5:103-108. doi:10.1177/1545109706288722
50. Cortés CP, Lizana D, Northland R, Wolff RM. Evolution of mortality, retention and loss to follow up of HIV infected subjects followed in a special clinic. *Rev Med Chil*. 2018;146:290-299. doi:10.4067/s0034-98872018000300290
51. Batavia AS, Balaji K, Houle E, et al. Adherence to antiretroviral therapy in patients participating in a graduated cost recovery program at an HIV care center in South India. *AIDS Behav*. 2010;14:794-798. doi:10.1007/s10461-009-9663-6
52. Amanzi P, Michelo C, Simoonga C, Dambe R, Chongwe G. Survival of people on antiretroviral treatment in Zambia: a retrospective cohort analysis of HIV clients on ART. *Pan Afr Med J*. 2016;24:144. doi:10.11604/pamj.2016.24.144.6004
53. Belaunzarán-Zamudio PF, Caro-Vega YN, Shepherd BE, et al. The population impact of late presentation with advanced HIV disease and delayed antiretroviral therapy in adults receiving HIV Care in Latin America. *Am J Epidemiol*. 2020;189:564-572. doi:10.1093/aje/kwz252
54. Mosoko JJ, Akam W, Weidle PJ, et al. Retention in an antiretroviral therapy programme during an era of decreasing drug cost in Limbe, Cameroon. *J Int AIDS Soc*. 2011;14:32. doi:10.1186/1758-2652-14-32
55. Ivers LC, Kendrick D, Doucette K. Efficacy of antiretroviral therapy programs in resource-poor settings: a meta-analysis of the published literature. *Clin Infect Dis*. 2005;41:217-224. doi:10.1086/431199
56. Impact of universal coverage for antiretroviral therapy (ART) on health outcomes – The Ontario HIV Treatment Network 2024. Accessed October 24, 2024. https://www.ohtn.on.ca/rapid-response-impact-of-universal-coverage-for-antiretroviral-therapy-art-on-health-outcomes/
57. Ouellet E, Durand M, Guertin JR, LeLorier J, Tremblay CL. Cost effectiveness of 'on demand' HIV pre-exposure prophylaxis for non-injection drug-using men who have sex with men in Canada. *Can J Infect Dis Med Microbiol*. 2015;26(1):23-29. doi:10.1155/2015/964512
58. Cambiano V, Miners A, Dunn D, et al. Cost-effectiveness of pre-exposure prophylaxis for HIV prevention in men who have sex with men in the UK: a modelling study and health economic evaluation. *Lancet Infect Dis*. 2018;18:85-94. doi:10.1016/S1473-3099(17)30540-6
59. O Murchu E, Teljeur C, Hayes C, Harrington P, Moran P, Ryan M. Cost-effectiveness analysis of a National Pre-Exposure Prophylaxis (PrEP) program in Ireland. *Value Health*. 2021;24:948-956. doi:10.1016/j.jval.2021.02.005
60. Mizushima D, Nagai Y, Mezzio D, et al. Cost-effectiveness analysis of HIV pre-exposure prophylaxis in Japan. *J Med Econ*. 2023;26:886-893. doi:10.1080/13696998.2023.2233824
61. Golub SA, Gamarel KE, Rendina HJ, Surace A, Lelutiu-Weinberger CL. From efficacy to effectiveness: facilitators and barriers to PrEP acceptability and motivations for adherence

among MSM and transgender women in New York City. *AIDS Patient Care STDS*. 2013;27:248-254. doi:10.1089/apc.2012.0419
62. Wang Z, Lau JTF, Yang X, et al. Acceptability of daily use of free oral pre-exposure prophylaxis (PrEP) among transgender women sex workers in Shenyang, China. *AIDS Behav*. 2017; 21(12):3287-3298. doi:10.1007/s10461-017-1869-4
63. Inwards-Breland DJ, Rodriguez A, Horvath K, et al. 75. Awareness and utilization of pre-exposure prophylaxis and HIV prevention services among transgender and non-binary adolescent and young adults. *J Adolesc Health*. 2023;72:S45. doi:10.1016/j.jadohealth.2022.11.096
64. Irie WC, Calabrese SK, Patel RR, Mayer KH, Geng EH, Marcus JL. Preferences for HIV preexposure prophylaxis products among black women in the U.S. *AIDS Behav*. 2022;26: 2212-2223. doi:10.1007/s10461-021-03571-8
65. Peng Y, Zong Y, Wang D, et al. Current drugs for HIV-1: from challenges to potential in HIV/AIDS. *Front Pharmacol*. 2023; 14:1294966. doi:10.3389/fphar.2023.1294966
66. Kuo I, Olsen H, Patrick R, et al. Willingness to use HIV pre-exposure prophylaxis among community-recruited, older people who inject drugs in Washington, DC. *Drug Alcohol Depend*. 2016;164:8-13. doi:10.1016/j.drugalcdep.2016.02.044
67. Lal V, Kant S, Dewan R, Rai SK, Biswas A. A two-site hospital-based study on factors associated with nonadherence to highly active antiretroviral therapy. *Indian J Public Health*. 2010;54: 179-183. doi:10.4103/0019-557X.77256
68. Chowdhury P, Beer L, Shouse RL, Bradley H, Medical Monitoring Project. Brief report: clinical outcomes of young black men receiving HIV medical care in the United States, 2009-2014. *J Acquir Immune Defic Syndr*. 2019;81:5-9. doi:10.1097/QAI.0000000000001987
69. Lanièce I, Ciss M, Desclaux A, et al. Adherence to HAART and its principal determinants in a cohort of Senegalese adults. *AIDS*. 2003; 17(Suppl 3):S103-S108. doi:10.1097/00002030-200317003-00014
70. Menzies NA, Berruti AA, Berzon R, et al. The cost of providing comprehensive HIV treatment in PEPFAR-supported programs. *AIDS*. 2011;25:1753-1760. doi:10.1097/QAD.0b013e3283463eec
71. El-Sadr WM, Holmes CB, Mugyenyi P, et al. Scale-up of HIV treatment through PEPFAR: a historic public health achievement. *J Acquir Immune Defic Syndr*. 2012;60(Suppl 3):S96-S104. doi:10.1097/QAI.0b013e31825eb27b
72. Moon S, Erickson E. Universal medicine access through lump-sum remuneration – Australia's approach to hepatitis C. *N Engl J Med*. 2019;380:607-610. doi:10.1056/NEJMp1813728

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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