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Sustaining progress in HIV care in Africa with a transition to enabled self-care: a modelling study

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Summary

Background The funding crisis for HIV services in east, central, southern, and west Africa means that innovative strategies for continuing prevention and care for HIV are needed. One such strategy is enabled self-care: the provision of free HIV self-tests, pre-exposure prophylaxis (PrEP), tenofovir–lamivudine–dolutegravir for post-exposure prophylaxis (PEP), and antiretroviral therapy (ART) provided in local pharmacies and by community-based health workers. We modelled the introduction of a policy of transition to enabled self-care compared with continuation of current service provision.

Methods We used an established individual-based model (HIV Synthesis) to simulate HIV epidemics in 1000 setting scenarios representing diversity in setting characteristics across east, central, southern, and west Africa, and uncertainty in parameter values. For each setting scenario, we simulated 100 000 people aged ≥ 15 years between 1989 and 2076. The model incorporates ART access informed by studies of barriers to accessing clinics. Our main outcomes included the number of adults testing for HIV in a 3-month period, PrEP and PEP use, coverage of people on ART, HIV-related deaths, HIV incidence, perinatal transmission, disability-adjusted life-years (DALYs), and costs. We chose a 50-year time horizon to capture the full effects of the policies. For each setting scenario, we performed three replicate runs for each of the two policies and for each policy took the mean across the three runs.

Findings Our model estimated that transitioning to enabled self-care would lead to increases in testing from a median of 5.0% (90% range 2.3–11.5) of adults testing per 3 months to 12.7% (6.6–21.1), an increase in PrEP and PEP use (+0.5% of adults [0.0–2.2]), and an increase in ART coverage for people with diagnosed HIV (+1% [0–3]) with enhanced benefits in those previously without access to PrEP and testing services. Enabled self-care was predicted to result in a median 18% (90% range 4–33) fewer HIV deaths, and a relative rate of 0.73 (0.52–0.94) in terms of HIV incidence per 100 person-years over 10 years. Overall, over a 50-year time horizon, enabled self-care was predicted to cut discounted programme costs by US\$6.0 million (5.6–6.5; a 7% decrease), avert 34 000 (32 200 to 36 000) DALYs, and be cost-effective (at a cost-effectiveness threshold of \$300 per DALY averted) in 95% of setting scenarios. The mean undiscounted annual cost per adult in the population per year across setting scenarios was \$12 (median \$11 [90% range 6–22]). The higher the HIV prevalence was in a setting scenario, the more cost-effective the policy was found to be (odds ratio 1.41 [95% CI 1.25–1.60] per 1% higher HIV prevalence).

Interpretation Introduction of community access to self-tests and antiretroviral drugs through a transition to enabled self-care is very likely to be cost-effective in most settings in east, central, southern, and west Africa; enable incidence declines to be sustained at reduced cost; and increase equity of access to HIV services. Policy makers who wish to consider such a policy will need to evaluate its feasibility in their own country settings.

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Introduction

HIV incidence in east, central, southern, and west Africa has declined over the past 20 years, although approximately 500 000 new infections occur per year.¹ One key reason for the decline has been the improvements in the HIV care cascade, as countries have moved towards achieving the UNAIDS 90:90:90 and, more recently, 95:95:95 targets whereby 95% of people living with HIV know their status, 95% of those diagnosed receive antiretroviral therapy (ART), and 95% of those on treatment reach viral

suppression.² A major challenge now for ministries of health in the region is how to maintain or even accelerate this progress when donor funding is substantially reduced.³ The acute funding crisis comes after a period of positive developments. The introduction of dolutegravir has substantially decreased the risk of resistance development,⁴ and the cost of tenofovir–lamivudine–dolutegravir (TLD) has declined to less than US\$35 per year.⁵ Blood-based HIV self-tests with high sensitivity, which are prequalified by WHO, are also now available at \$1 per test or less.^{6,7} Another

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Research in context

Evidence before this study

HIV incidence in east, central, southern, and west Africa has declined, partly due to progress towards meeting the UNAIDS 95:95:95 targets. A major challenge for ministries of health in the region, however, is how to maintain or even accelerate this progress when donor funding is substantially declining. Innovative strategies are needed. We searched Web of Science with the search query "hiv*" AND "self-test*" AND "pre-exposure" AND "post-exposure" AND "self-care" AND "model*" on April 29, 2026, with no restriction by article type or language, and found no articles. We are not aware of modelling of new proposals for programme prioritisation if substantial funding reductions continue.

Added value of this study

For any newly proposed strategy, quantifying predicted health outcomes and costs is important. We propose, and have modelled

the effects of, a novel policy of transition to enabled self-care compared with continuation of current service provision. We are the first to have proposed and modelled such a policy, whereby self-testing kits and specific drugs for the prevention and treatment of HIV are locally available, for all and for free.

Implications of all the available evidence

Making HIV self-tests and antiretroviral drugs for post-exposure prophylaxis, pre-exposure prophylaxis, and antiretroviral therapy available in community settings has the clear potential to be a highly cost-effective approach to addressing the challenges posed by the reductions in development assistance for HIV programmes in countries in east, central, southern, and west Africa. Policy makers and leaders of pharmacy-based and community-based health worker organisations who wish to consider such a policy will need to evaluate its feasibility in their own country settings.

development is the WHO recommendation to make self-care interventions available to "enhance access to services and to empower individuals to proactively take charge of their health more independently and privately, if and when they choose to do so".⁸ The WHO guidance also states that "community pharmacists play an essential role, assisting individuals on their path to improved health...Due to their proximity and accessibility to individuals and communities, pharmacists are uniquely positioned to provide medicines, education and health services."⁸ Furthermore, TLD post-exposure prophylaxis (PEP) is a highly effective intervention that has been underused, and WHO specifically recommends that pharmacists provide PEP for HIV prevention and also provide emergency contraception, as these resources must be accessed rapidly in order to be effective.^{9,10} Community health workers can also enable HIV self-prevention, testing, and care,¹¹ particularly in areas without suitable local pharmacies. Specific WHO guidance has been published relating to health policy and system support to optimise community health-worker programmes for HIV, tuberculosis, and malaria services.¹²

These developments point to a possible transition towards greater support for individual self-care for HIV prevention, testing, and treatment. Our proposal is to make self-testing, oral pre-exposure prophylaxis (PrEP), and TLD PEP and treatment available for free and without prescription in local pharmacies (and, in settings with no pharmacy, through community-based health workers), together with basic advice and access to educational materials. Given the assumed paucity of funds and the need for health-care workers to prioritise other health-care delivery, HIV testing and provision of PrEP and PEP would replace health-care worker-delivered services. ART in the form of TLD would also be freely available in the same way, but this would be in addition to current clinic service provision, not entirely replacing it. We call the provision of these services

by community-based health workers and pharmacies enabled self-care: a proposed approach to build resilience in the face of potential future threats, particularly due to reductions in funding. A lesson from the funding shock in early 2025 caused by the decrease in US-provided funding (the potential consequences of which have been modelled³) is to build resilience in health systems when possible. We do not propose that enhanced self-care is all that is needed, rather that its provision should be a high priority for countries in east, central, southern, and west Africa.

Availability of self-testing in pharmacies has been studied and has shown promise.^{13–16} Improving access to HIV services could help to relieve clinics and enable them to concentrate on people with HIV symptoms and a need for viral load testing and regimen switching. Increased local access to HIV services has been shown to improve treatment retention and adherence, especially in men,^{17,18} and pilot studies of pharmacy provision of ART have shown promise.^{19–22} This approach would also provide a means for people who are taking PrEP to continue to access the drug.^{23–25} WHO guidance supports the use of HIV self-tests for PrEP and PEP,²⁶ including new long-acting injectable options. Community-led initiatives to provide these resources are crucial.²⁷

Here we use an existing model to assess the potential positive and negative health impacts and cost-effectiveness of an enabled self-care approach. Given the financial challenges facing HIV programmes in east, central, southern, and west Africa, we sought to identify whether such a policy could be introduced without adding costs to the health system. We previously modelled the potential of an approach for community availability of TLD as PEP and treatment, including in dispensing machines that removed the need to interact directly with a health-care provider or pharmacist,²⁸ and it was predicted to be highly

cost-effective. The proposed transition to enabled self-care builds on this model by additionally introducing wide-scale self-testing availability, replacing health-care worker testing, and assuming that ART provision in clinics would continue to be funded as it is currently, albeit with the additional option of picking up the drug locally.

Methods

Model

Full methods are detailed in the appendix (pp 2–8, 14–126), and here we provide a summary. HIV Synthesis is an individual-based simulation model that has been described previously and used extensively to study policy questions.^{29–32} Each model run generates a simulated population of adults (ie, aged ≥ 15 years; children are not included in the model) from 1989 (taken as the start of the HIV epidemic) to 2076 with variables updated every 3 months, including age; sex; having a primary and/or one or more non-primary condomless sex partners; the number of non-primary condomless sex partners; pregnancy, birth-giving, and breastfeeding status; identification as a female sex worker, a man who has sex with men, or a person who injects drugs; HIV test history; male circumcision status; presence of sexually transmitted infections other than HIV; and use of oral and injectable PrEP. We assumed that 5–25% of female individuals and 5–35% of male individuals overall (resulting in 15.1% [90% range 8.1–22.2] of adults in 2024) have a de facto absence of access to HIV services, including testing (unless symptomatic with HIV), PrEP, PEP, and voluntary male medical circumcision (VMMC). We also assumed that men who have sex with men would have a 30% higher probability of not having access to HIV services than heterosexual men. Reasons for not having access could include distance to services, not having time to attend a clinic, or disability. We assumed, however, that ART is accessible for all people with HIV, guided by generally high proportions of diagnosed people with HIV being on ART according to Population-based HIV Impact Assessment surveys (table 1). In people with HIV, we modelled viral load, CD4 cell count, use of specific antiretroviral drugs, and presence of specific drug-resistance mutations. Risk of death from AIDS in the model depended on an individual's CD4 cell count, viral load, age, and ART status. For a person on ART, the viral load, CD4 cell count, and risk of resistance were primarily determined by pill-taking adherence in each 3-month period, via the sum of the current activity (ie, their activity accounting for resistance) of drugs being taken.

Through sampling of parameter values (appendix p 80) at the start of each model run, we created 1000 setting scenarios reflecting uncertainty in assumptions and a range of characteristics similar to those seen in east, central, southern, and west Africa (table 1). We simulated 100 000 people aged 15 years or older at some point between 1989 and 2076, accounting for population growth (appendix pp 14–126). The median number of simulated adult individuals alive in 2024 in these setting scenarios was 31 940 (90% range 25 548–35 716).

Policy comparison and context

For each setting scenario, we compared outcomes over a period of up to 50 years from 2026 between two policies: the continuation of current service provision and transition to enabled self-care for all people aged 15 years or older. Self-care was defined as local community-based access (ie, through pharmacies or community-based health workers) to HIV self-testing kits and confirmatory testing, oral PrEP, PEP, and TLD for treatment (as well as co-trimoxazole) for people with HIV who prefer to source treatment and tests locally (with treatment and care for people with HIV also remaining available at clinics). Acknowledging concerns in some countries regarding sustainability of viral load monitoring in the newly constrained financial climate, we pessimistically assumed under both policies that viral load monitoring would be replaced in 2026 by a restriction of viral load testing to people with clinical HIV disease symptoms. Likewise, under both policies, we assumed for VMMC a worst-case scenario in which it does not continue beyond 2025. Policies are compared in table 2.

We chose a 50-year time horizon to capture the full effects of the policies. We performed three replicate runs for each of the two policies and for each policy took the mean across the three runs. With transition to enabled self-care, HIV self-testing was assumed to entirely replace testing performed by health-care providers (including in antenatal clinics) with the exception of confirmatory testing in people with a positive self-test result. ART provision by pharmacies and community health workers with the introduction of community self-test and antiretroviral drugs access was envisaged as providing back-up access to treatment, rather than people with HIV no longer being registered with a health-care system clinic. The assumed loss of health-care worker-conducted testing with the transition to enabled self-care resulted from a fear that the funding envelope will be so constrained that paying for health-care staff to conduct tests will preclude health-care workers from having time to deliver more urgent services. We aimed to be realistic about what a fully domestically funded health-care system can deliver. We are not advocating for the cessation of facility-based testing if funds are available to support health-care workers doing tests in addition to other duties. Our aim, however, was to be realistic about the potential difficult decisions resulting from a highly constrained environment. We envisaged that self-tests would be readily available in health-care settings and people would be advised to test there or at home.

Full realisation of the effects of transitioning to enabled self-care can only be expected when local availability of self-test kits and antiretroviral drugs becomes well established and the associated community education and ability to manage self-care have been allowed to develop. As such, data on the effects of the policy will only be available when the policy is introduced widely and sustainably. In our modelling, we incorporated uncertainty in these effects.

See Online for appendix

	Model median (90% range)	Examples of observed data by country in east, central, southern, and west Africa*														
		Cameroon	Côte d'Ivoire	Eswatini	Ethiopia	Kenya	Lesotho	Malawi	Mozambique	Namibia	Rwanda	South Africa	Tanzania	Uganda	Zambia	Zimbabwe
HIV prevalence in people aged 15–49 years	9·0% (3·5–22·0) overall, 11·7% (4·3–28·6) in women, and 6·3% (2·6–15·8) in men	2018: 3% in women and 2% in men	2017–18: 4% in women and 1% in men	2021: 32% in women and 16% in men	..	2018: 6·6% in women aged 15–64 years and 3·1% in men aged 15–64 years	2020: 28% in women and 16% in men	2020: 10% in women and 6% in men	..	2017: 15% in women and 8% in men	2019: 2·6%	2022: 16% in women and 9% in men	2023: 5% in women and 2% in men	2020: 7·1% in women and 3·8% in men	2021: 13% in women and 6% in men	2020: 15% in women and 9% in men
HIV incidence per 100 person-years in people aged 15–49 years	0·34 (0·09–1·15) overall, 0·39 (0·10–1·55) in women, and 0·27 (0·07–0·83) in men	2017: 0·40 in women and 0·08 in men	..	2021: 1·45 in women and 0·20 in men	..	2018: 0·14 in those aged 15–64 years	2020: 0·81 in women and 0·33 in men	2016: 0·44 in women and 0·22 in men; 2020: 0·31 in women and 0·15 in men	..	..	2019: 0·08	2022: 0·87 in women and 0·64 in men	2023: 0·29 in women and 0·12 in men	2020: 0·42 in women and 0·21 in men	2021: 0·63 in women and 0·05 in men	2020: 0·67 in women and 0·23 in men
Percentage of HIV positive people diagnosed	91% (85–96) overall, 94% (88–98) in women, and 87% (78–94) in men	2017: 58% in women aged 15–64 years and 51% in men aged 15–64 years	2017–18: 43% in women aged 15–64 years and 24% in men aged 15–64 years	2021: 95% in women and 92% in men	2018: 83% in women aged 15–64 years and 70% in men aged 15–64 years	2018: 83% in women aged 15–64 years and 73% in men aged 15–64 years	2020: 91% in women and 88% in men	2020: 90% in women and 85% in men	2021: 73% in women and 69% in men	2017: 90% in women aged 15–64 years and 80% in men aged 15–64 years	2019: 86% in women and 80% in men	2022: 92% in women and 85% in men	2017: 55% in women and 45% in men; 2023: 85% in women and 78% in men	2021: 84% in women and 76% in men	2021: 90% in women and 87% in men	2020: 88% in women and 84% in men
Percentage of people with diagnosed HIV on ART	96% (90–98) overall, 96% (90–99) in women, and 95% (87–98) in men	2017: 93% in women aged 15–64 years and 94% in men aged 15–64 years	2017–18: 93% in women aged 15–64 years and 71% in men aged 15–64 years	2021: 98% in women and 96% in men	2018: 96% in women aged 15–64 years and 99% in men aged 15–64 years	2018: 97% in women and 95% in men	2020: 98% in women and 96% in men†	2020: 98% in women and 97% in men	2021: 98% in women and 94% in men	2017: 97% in women aged 15–64 years and 95% in men aged 15–64 years	2018: 98% in women and 97% in men	2022: 91% in women and 90% in men	2023: 98% in women and 97% in men	2021: 97% in women and 95% in men	2021: 98% in women and 98% in men	2020: 98% in women and 96% in men
Percentage of people on ART with viral load <1000 copies per mL	95% (90–98) overall, 96% (92–98) in women, and 92% (84–97) in men	2017: 80% in women and 81% in men	2017–18: 78% in women aged 15–64 years and 65% in men aged 15–64 years	2021: 96% in women and 98% in men	2018: 86% in women aged 16–64 years and 91% in men aged 16–64 years	2018: 90% in women and 91% in men	2020: 92% in women and 90% in men	2020: 97% in women and 97% in men	2021: 90% in women and 88% in men	2017: 92% in women and 90% in men	2018: 92% in women and 85% in men	2022: 94% in women and 94% in men	2023: 95% in women and 93% in men	2021: 93% in women and 91% in men	2021: 96% in women and 97% in men†	2020: 91% in women and 89% in men
Percentage of all people with HIV with viral load <1000 copies per mL	81% (72–89) overall, 85% (77–92) in women, and 74% (62–84) in men	2017: 47% in those aged 15–64 years	2017–18: 40% in those aged 15–64 years	2021: 87%	2018: 70% in those aged 15–64 years	2018: 72%	2020: 81%	2020: 87%	..	2017: 77% in those aged 15–64 years	2019: 76%	..	2023: 78%	2020: 75%	2021: 86%	2020: 76%

(Table 1 continues on next page)

Model median (90% range)		Examples of observed data by country in east, central, southern, and west Africa*														
		Cameroon	Côte d'Ivoire	Eswatini	Ethiopia	Kenya	Lesotho	Malawi	Mozambique	Namibia	Rwanda	South Africa	Tanzania	Uganda	Zambia	Zimbabwe
(Continued from previous page)		..	2018: 1.7% in those aged 15–64 years	2021: 3.2%	..	..	2020: 4.3%	2020: 1.2%	..	2017: 2.8% in those aged 15–64 years	..	..	..	..	2021: 1.4%	2020: 3.1% in those aged 15 years and older
Prevalence of HIV viral load >1000 copies per mL among all adults		..	2018: 1.7% in those aged 15–64 years	2021: 3.2%	..	..	2020: 4.3%	2020: 1.2%	..	2017: 2.8% in those aged 15–64 years	..	..	..	..	2021: 1.4%	2020: 3.1% in those aged 15 years and older
Data were modelled on the basis of 1000 setting scenarios. ART=antiretroviral therapy. *All observed data are from Population Health Impact Assessment surveys. ² We show national data from countries, but setting scenarios reflect subsettings within countries as well as countries as a whole. †Adjusted for having a detectable antiretroviral drug in blood. Setting scenarios were restricted to those with an HIV prevalence of <35% in women and <25% in men, an HIV incidence of <1.5 new infections in men and <2.25 new infections in women per 100 person-years, a percentage of people with HIV who have been diagnosed of 75% for women and men, a percentage of those with diagnosed HIV on ART of >85% in women and >80% in men, and a percentage of individuals on ART with viral load <1000 copies per mL of >90%.																

Table 1: Description of setting scenarios in 2024

Table 1: Description of setting scenarios in 2024

Modelling of testing, self-testing, PrEP and PEP, ART interruption and return to care, perinatal transmission, and the supporting evidence behind model assumptions are detailed in the appendix (pp 2–126). Details of costs and cost-effectiveness analysis are also in the appendix (p 3).

Role of the funding source

The funders of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

Our modelled transition to enabled self-care led to increases in testing, PrEP and PEP use, and ART coverage among people diagnosed compared with continuation of existing service provision after 10 years to 2036 (table 3, figure). These findings extend to individuals who have hitherto had no access to HIV prevention and proactive testing services. Table 3 also shows the effects of these increases on HIV incidence, perinatal transmission, and HIV deaths.

A transition to enabled self-care is predicted to lead to similar overall testing costs over 50 years despite the lower cost of self-tests, due to the greater number of tests done, and an increase in PrEP costs and associated community-access costs, but a reduction in costs of clinical care for symptomatic HIV compared with continuation of current service provision (table 4). The transition to enabled self-care was shown to avert disability-adjusted life-years (DALYs) and be cost-saving (table 4) and our findings suggest scope for the policy to remain cost-effective with an additional spend of approximately \$16.2 million per year (with a cost-effectiveness threshold of \$300 per DALY averted). These findings provide reassurance in terms of concerns regarding possible wastage of drugs and self-testing kits. We found that transition to enabled self-care would be cost-effective in 950 (95%) of the 1000 setting scenarios (table 4).

Considering budget impact, we estimated that the median annual total overall HIV programme cost in the context of a setting with 10 million adults was \$208.0 million (90% range 100.1–413.5) in 2019 (figure). With reductions in drug cost and less need for protease inhibitors, this cost fell to an estimated \$171.4 million (85.9–340.6) in 2024. With the assumed but unwelcome discontinuation of viral load testing and VMMC due to funding constraints, the mean undiscounted annual cost over 3 years from 2026 would be \$128.9 million (63.5–250.5) with continuation of current service provision; with transition to enabled self-care, the average annual cost over 3 years would be similar at \$126.1 million (65.3–248.3), a 38% (26–49) decline from 2019, with a small gradual decline predicted over subsequent years (figure). The mean undiscounted annual cost per adult in the population per year across setting scenarios was estimated to be \$12 (median \$11 [90% range 6–22]; figure).

In table 5, we show the association between the baseline characteristics of settings and the parameters determining

	Continuation of current service provision*	Transition to enabled self-care†
Testing access	Health-care worker-delivered testing continues to be available, except for individuals without access to services; self-testing availability is very low	No health-care worker-delivered testing is done beyond confirmatory testing; self-testing is widely available locally from pharmacies and community-based health workers, including for a proportion of people previously without access to services
ART access	ART continues to be available through existing clinics only	ART continues to be available through existing clinics and TLD is available locally from pharmacies and community-based health workers
PrEP and PEP access	PrEP access through dedicated PrEP clinics continues; PEP is not available; PrEP and PEP are not widely available from local pharmacies and community-based health workers nor available for people without access to regular services	PEP and oral‡ PrEP are widely available locally from pharmacies and community-based health workers, and available for people without access to regular services
Viral load monitoring	Viral load monitoring is reduced to testing in symptomatic people only	Viral load monitoring is reduced to testing in symptomatic people only
VMMC	VMMC is discontinued	VMMC is discontinued
Free condom availability	Free condoms are available	Free condoms are available

ART=antiretroviral therapy. PEP=post-exposure prophylaxis. PrEP=pre-exposure prophylaxis. TLD=tenofovir-lamivudine-dolutegravir. VMMC=voluntary male medical circumcision. *With the continuation of current service provision, we did not directly factor in service reduction due to funding disruption, except for the cross-policy cuts in viral load monitoring and VMMC. †Parameters, their values, and the motivation for the distribution are described in the appendix (p 102). ‡Could in time be expanded to injectable PrEP.

Table 2: Comparison summary of modelled policies

	Continuation of current service provision	Transition to enabled self-care	Difference (90% range)
Number of HIV tests done per 3 months*†	565 000 (260 000–1 302 000)	1 448 000 (740 000–2 420 000)	Absolute difference +852 000 (–39 000 to 1 680 000)
Percentage of people tested per 3 months	5% (2–12)	13% (7–21)	Percentage point difference +7.6% (–0.4 to 15.1)
Percentage of people with HIV who are diagnosed	93% (87–97)	96% (93–98)	Percentage point difference +3% (0 to 7)
Percentage of people with HIV and no previous access to services who are diagnosed	86% (79–92)	91% (85–95)	Percentage point difference +5% (1 to 10)
Percentage of people diagnosed with HIV who are on ART	96% (91–99)	97% (93–99)	Percentage point difference +1% (0 to 3)
Percentage of people with HIV and no previous access to services on ART	96% (91–99)	97% (93–99)	Percentage point difference +1% (0 to 3)
Percentage of people with HIV on ART with viral load <1000 copies per mL	97% (93–98)	96% (92–98)	Percentage point difference –<1% (0 to 0)
Percentage of people with HIV on ART with no previous access to services and viral load <1000 copies per mL	96% (93–98)	96% (92–98)	Percentage point difference +0% (–1 to 0)
Percentage of people with HIV with viral load <1000 copies per mL	84% (76–91)	89% (82–93)	Percentage point change +4% (1 to 8)
Percentage of people with HIV with viral load >1000 copies per mL	1.5% (0.5–4.0)	1.1% (0.3–2.9)	Relative prevalence 0.73 (0.57 to 0.90)
Percentage of people aged 15–64 years on PrEP or PEP	0.7% (0.2–2.7)	1.2% (0.3–4.9)	Percentage point difference +0.5% (0.0 to 2.2)
Percentage of people with an indication for PrEP or PEP who are taking PrEP or PEP	21% (11–33)	39% (20–55)	Percentage point difference +17% (3 to 25)
Percentage of people taking PrEP or PEP who have an indication for either and previous lack of access to services	0% (0–0)	19% (6–40)	Percentage point difference +19% (6 to 40)
Number of HIV-related deaths per year‡	10 100 (3700–23 500)	8300 (3000–18 800)	Percentage difference –18% (4 to 33)
HIV incidence per 100 person-years in people aged 15–49 years	0.29 (0.06–1.06)	0.21 (0.04–0.79)	Relative rate 0.73 (0.52 to 0.94)
Number of children with HIV acquired at birth or through breastfeeding per year	3500 (600–19 100)	2900 (500–14 900)	Percentage difference –16% (–45 to 7)

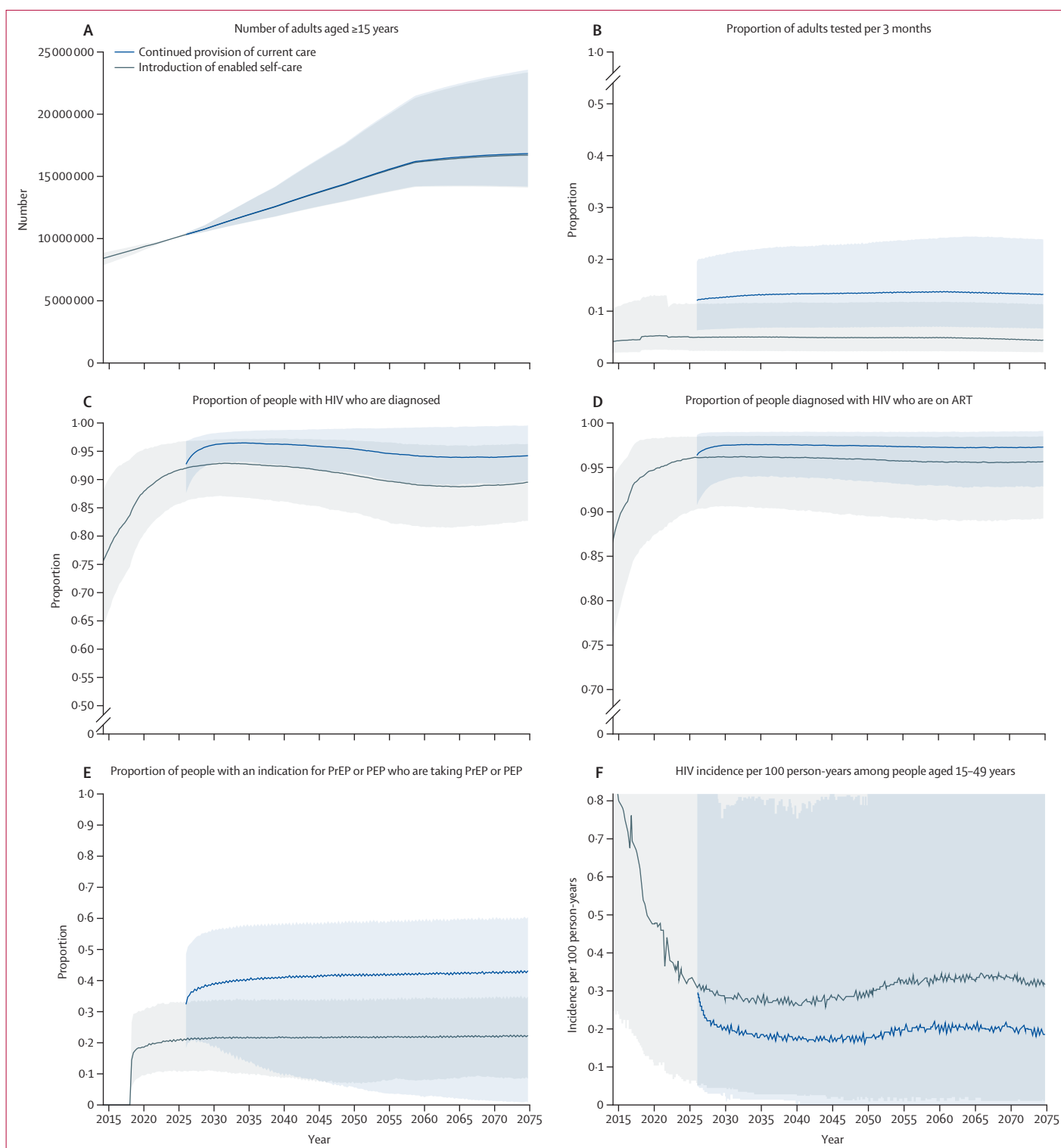
Data are median (90% range) over setting scenarios unless otherwise specified. People are aged 15 years or older unless otherwise specified. ART=antiretroviral therapy. PEP=post-exposure prophylaxis. PrEP=pre-exposure prophylaxis. *Under a transition to enabled self-care, all tests (with the exception of confirmatory tests in people who test positive via self-test) are self-test kits. With continuation of current service provision, almost all tests (with the exception of confirmatory tests and a very small number of self-tests) are done by a health-care provider using regular rapid antibody tests. †In the context of a setting with population of 10 million adults.

Table 3: Predicted effects of transition to enabled self-care over 10 years

the policy effects on testing, ART coverage, and PrEP and PEP use and the odds of transition to enabled self-care being cost-effective. The strongest determinant of cost-effectiveness was the prevalence of HIV (in 2024). The other strong predictor of cost-effectiveness was the percentage of people diagnosed with HIV who are on ART, with greater cost-effectiveness when there was greater room for improvement. We note also that although we assumed an overall increase in testing with transition to

enabled self-care, the cost-effectiveness of the intervention was not affected by the effect of the enabled self-care policy on the proportion of people with HIV who are diagnosed (odds ratio 1.04 [95% CI 0.95–1.14]; $p=0.41$).

Each individual component of the enabled self-care policy resulted in a substantial reduction in DALYs and some saving in overall costs (appendix p 9). We also performed the main evaluation in the context of viral load monitoring continuing under both policies with very similar results



(Figure continues on next page)

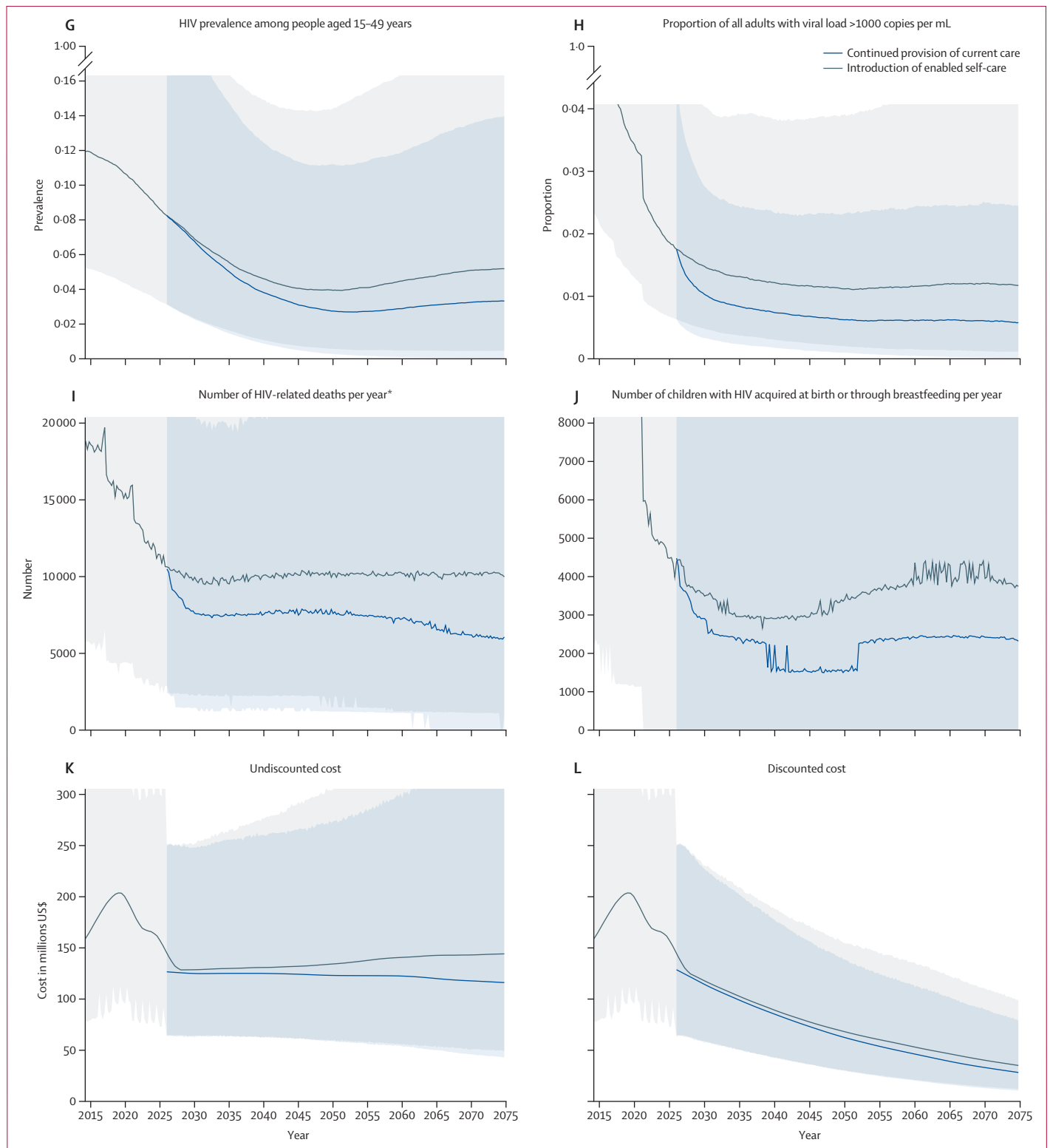


Figure: Median outcomes over 50 years by policy

Note that the y-axes in B, C, D, G, and H include an axis break and that the scales on the axes differ from one another and from the other plots showing proportion. Shaded areas indicate 90% range. ART=antiretroviral therapy. PEP=post-exposure prophylaxis. PrEP=pre-exposure prophylaxis. *In the context of a setting with population of 10 million adults.

	Continuation of current service provision	Transition to enabled self-care	Difference (95% CI)
Number of HIV-related deaths per year	12 400 (11 900–12 900)	9100 (8700–9400)	–3300 (–3500 to –3100)
DALYs per year over 50 years	2 053 000 (2 034 000–2 071 000)	2 019 000 (2 002 000–2 035 000)	–34 000 (–32 200 to –36 000)
Discounted annual costs over 50 years			
ART	\$26·3 million	\$24·7 million	..
ART clinic visits or community pick-up	\$11·9 million	\$11·0 million	..
Viral load tests*	\$0·2 million	\$0·2 million	..
CD4 count tests	\$0·4 million	\$0·3 million	..
Clinical care for symptoms due to HIV	\$17·2 million	\$14·3 million	..
HIV testing (including self-testing)	\$10·9 million	\$9·7 million	..
PrEP or PEP	\$2·4 million	\$4·5 million	..
PrEP pharmacy, community-based health worker, and clinic visits	\$2·4 million	\$1·9 million	..
VMMC*	\$0·0 million	\$0·0 million	..
Sex worker programme	\$0·5 million	\$0·5 million	..
Condom availability	\$6·9 million	\$6·9 million	..
Care for children with HIV	\$3·4 million	\$2·5 million	..
Total discounted cost	\$82·6 million (80·1–85·0)	\$76·5 million (74·3–78·7)	–\$6·0 million (–5·6 to –6·5); 7% decrease
Net DALYs per year over 50 years†	2 328 000 (2 302 000–2 353 000)	2 274 000 (2 250 000–2 297 000)	–54 200 (–51 400 to –57 100)
Percent of setting scenarios for which policy has the lowest net DALYs (ie, is cost-effective)†	5%	95%	..
Percent of setting scenarios for which policy is cost-saving	..	82%	..

Data are mean across setting scenarios or mean across setting scenarios (95% CI), unless otherwise specified. All monetary values are in US\$. ART=antiretroviral therapy. DALY=disability-adjusted life-year. PEP=post-exposure prophylaxis. PrEP=pre-exposure prophylaxis. VMMC=voluntary medical male circumcision. *Due to funding restrictions, we assumed that from 2026, viral load testing would be restricted to people with clinical HIV symptoms and VMMC would be almost completely ceased. †Based on a cost-effectiveness threshold of \$300.

Table 4: HIV-related deaths, DALYs and costs over 50 years, and cost-effectiveness analysis

(appendix p 10). Reanalysing our primary results with a 5% discount rate or with a 10-year time horizon resulted in lower net DALYs averted but the transition remained cost-saving overall with both changes (appendix p 10).

Discussion

In this modelling study, we found that enabled self-care (ie, making HIV self-tests and PEP, PrEP, and ART available in community settings, with ART also continuing to be available in existing clinics) has a clear potential to be a cost-saving approach that leads to a decline in HIV incidence. The overall cost savings are largely driven by the reduced number of people predicted to develop advanced HIV disease, which can often incur expensive care costs, including hospitalisations, often borne by domestically funded parts of the health-care system. We found the policy to be cost-effective, at a \$300 per DALY averted cost-effectiveness threshold in 95% of setting scenarios. The policy is consistent with existing WHO recommendations on self-care interventions and on local community availability of PEP

and emergency contraception.^{9,10} When resources are scarce, and health-care worker time is more valuable than ever, making the necessary drugs and diagnostics widely and freely available with robust supply chains should be prioritised. Self-care should be available for all, including for those previously without access to services, as it leads to a reduction in existing inequalities, even if time will be required for people to become accustomed to fully engaging with self-care. There is little incentive to learn self-care approaches unless the necessary drugs and diagnostics are widely freely available. Full community engagement at every stage of implementation, along with community-led and accessible HIV health education, will be crucial. We are not arguing that a transition to enabled self-care is an optimal approach, but that this transition provides the fundamental foundations for supporting HIV prevention and people living with HIV that must be prioritised to ensure sustainability of the HIV response. The policy is especially cost-effective in populations in which HIV prevalence is higher and the percentage of people

	Odds ratio (95% CI)	p value
HIV prevalence in people aged 15–49 years (per percentage point higher)	1.41 (1.25–1.60)	p<0.0001
Percentage of all people aged ≥15 years living with HIV who have been diagnosed (per percentage point higher)	1.04 (0.95–1.14)	p=0.41
Percentage of people diagnosed with HIV who are on ART (percentage point higher)	0.75 (0.64–0.87)	p=0.0002
Percentage of people on ART with viral load <1000 copies per mL (percentage point higher)	0.87 (0.73–1.03)	p=0.11
The extent to which the propensity to want to take oral PrEP or PEP is increased as a result of enabled self-care (per 0.01 unit higher)	0.86 (0.83–1.01)	p=0.062
The extent to which enabled self-care leads to people who could not otherwise easily access services being able to do so (per 0.1 unit higher)	1.08 (0.92–1.26)	p=0.36
The effect on the propensity to restart ART in people with diagnosed HIV who have interrupted or never started ART (per 1 unit higher)	0.91 (0.26–3.18)	p=0.89
The effect on the propensity to stop taking ART in people with diagnosed HIV who are taking ART (per 0.1 unit higher)	0.84 (0.59–1.22)	p=0.36
The rate of self-testing under a policy of local pharmacy-based and community health worker-based access to free self-test kits (per 1% percentage point higher)	0.92 (0.85–0.99)	p=0.038
The degree to which HIV self-testing is better targeted towards people having condomless sex since last test than existing clinic-based testing (per log higher)	0.54 (0.30–0.97)	p=0.039
Population adherence pattern (per category higher, meaning lower population adherence)	0.81 (0.61–1.07)	p=0.14
The probability that if a self-test gives a positive result the person will go to a clinic to have a confirmatory test and be given a diagnosis within the health-care system (per 1% percentage point higher)	0.97 (0.94–1.01)	p=0.16

Parameter names and more details are provided in the appendix (pp 80–103). ART=antiretroviral therapy. PEP=post-exposure prophylaxis. PrEP=pre-exposure prophylaxis.

Table 5: Multivariable logistic regression model of associations between baseline characteristics in 2024 and cost-effectiveness of the transition to enabled self-care

diagnosed with HIV who are on ART is lower, as it provides something of an insurance when HIV programme performance is weaker.

We assumed in our model that self-testing replaces health-care worker administered testing and that self-testing is generally more closely aligned with having had condomless sex since last testing, as people need to take the initiative rather than in some cases the health-care worker offering an HIV test without accurate knowledge of sexual behaviour. We account for potential drawbacks of self-testing such as potentially slightly lower sensitivity than tests used in clinics, and the fact that it does not necessarily lead to diagnosis in those testing positive. We find there is scope to absorb substantial wastage of self-test kits and antiretroviral drugs, that might be a concern with such widespread free provision, and for the policy to remain cost-effective. The test we used as an example is blood-based,⁶ but oral tests with low cost and high sensitivity will hopefully also become available. We recognise that the effect of easy, free availability of self-tests with community education on HIV testing when such a programme is introduced and sustained at scale is unknown until such programmes are in place.

Cost-effectiveness of HIV self-testing in various contexts has been evaluated and it has generally been found to be promising as a cost-effective intervention,^{28,29,33–37} although these studies have generally examined additional self-testing rather than replacement of all testing with self-testing. Test

costs have reduced since many of these evaluations were conducted. Much of the costs of previous self-testing interventions were for human resources that enabled the tests to be offered. In our model, we assumed passive availability of free self-testing kits in pharmacies and through other community outlets whereby the pharmacist would receive funding for providing this service, assumed to be from a 50% add-on to the test cost.

Policy makers who wish to consider such a policy will need to evaluate its feasibility in their own country settings and find ways to navigate their country's drug and diagnostic kit regulations (eg, to avoid requirements for a prescription to collect PEP, PrEP, or treatment, or for people on PrEP to have health-care provider-conducted testing). We hope that regulators are able to balance the overall population risks and benefits of their policies if communities and ministries of health wish to take this public health approach. Country programmes will also need to ensure a robust and reliable supply chain to pharmacies and community-based health workers, and consider approaches to supporting and training pharmacists and community-based health workers in performing their roles. Various initiatives have piloted provision of PrEP, PEP, ART, and self-tests by community-based health workers and pharmacists.^{19–22} These roles must be easy to perform if the policy is to prove feasible; any job requirements that lower the number of community-based health workers and pharmacists willing to provide enabled self-care services could negatively affect public health. Countries vary in terms of involvement of community-based health workers in health-service delivery, the ways in which such health workers are organised, and whether and how they are funded, so implementation approaches will vary. The few countries without community-based health workers or pharmacies would need to consider whether alternative means could be used to make HIV drugs and tests locally available. Part of country-specific implementation planning would be to decide whether an age or weight limit (eg, >30 kg) is required to access the regular adult dose of TLD.

Country policy makers will also need to decide on the amount of training required to be a community-based provider of HIV self-tests and treatment. As the role involves facilitating access with no gatekeeping responsibility, the role should be able to be carried out by lay providers with basic training. Furthermore, educational material should be easily accessible. WHO has long recommended lay provider and decentralised delivery, for example, for PrEP,³⁸ and a range of options are available to change what types of providers, as well as how providers, deliver services. Supportive strategies to maximise uptake of enabled self-care (eg, videos and educational material on display in pharmacies, providing aids to visually interpret test results, and having chatbots freely available on the internet) can be considered once enabled self-care strategies are implemented.³⁹

Collecting ART in local settings (eg, pharmacies and community groups) could reduce stigma for people with

HIV compared with attending clinic and hospitals. Shorter waiting times and flexible refill schedules provided by pharmacy-based services could improve retention on ART. A review suggests that most HIV, sexually transmitted infection, and contraceptive interventions can be safely and effectively delivered through community health-care workers, mobile outreach, or in community pharmacies.⁴⁰ Our assumption of no reduction in ART clinic visit costs might be conservative; as with other efficiencies with self-care and other virtual and simplified delivery options, these costs are likely to decrease.

A limitation of this work is that although enabled self-care could make a large contribution to a sustainable and effective HIV response, it does not solve all problems of the current funding crisis and does not in itself lead to any immediate reduction in costs. We pessimistically modelled the new policy in the context of a cut in viral load monitoring and VMMC, but hopefully such cuts will not be necessary. VMMC has been recently shown to remain a cost-effective intervention.⁴¹ Furthermore, we assumed rapid effects of the transition on testing rates, PrEP use, and PEP use, but communities becoming educated on how to use the drugs and test kits could take time. Enabled self-care could lead to beneficial effects if pharmacies and community-based health workers are able to provide lenacapavir PrEP as well as oral PrEP; given the new proposed price, this provision should be possible.⁴²

In conclusion, our model suggests that making HIV self-tests and antiretroviral drugs for PEP, PrEP, and ART available in community settings has the clear potential to be a highly cost-effective approach to overcome the challenges posed by the reductions in development assistance for HIV programmes in east, central, southern, and west African countries.

Contributors

All authors contributed to contextual discussions of policy approach, comments on modelling approach, input into manuscript draft, and approval of final version. Coding of the HIV Synthesis model was done by ANP, JS, LB-M, and VC. The first draft of the manuscript was written by ANP. ANP, JS, VC, and LB-M accessed and verified the data. All authors had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Declaration of interests

ANP reports grants to his institution from the Gates Foundation, the National Institute for Health and Care Research, Wellcome, and the EU, and personal consulting fees from WHO. LB-M reports grants to her institution from the Gates Foundation, Wellcome, and the EU, and personal consulting fees from WHO. EM reports a grant to her institution from Wellcome. VC reports a grant from UK Research and Innovation to her institution and personal consulting fees from Source Market Access. JS reports a grant from the Gates Foundation to her institution. All other authors declare no competing interests.

Data sharing

ANP, JS, VC, and LB-M have had full access to code and model outputs. The model code is available on Figshare.

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References

- UNAIDS. 2024 global AIDS report — the urgency of now: AIDS at a crossroads. July 22, 2024. <https://www.unaids.org/en/resources/documents/2024/global-aids-update-2024> (accessed April 29, 2026).
- PHIA Project. Surveys. <https://phia.icap.columbia.edu/surveys/> (accessed April 30, 2026).
- ten Brink D, Martin-Hughes R, Bowring AL, et al. Impact of an international HIV funding crisis on HIV infections and mortality in low-income and middle-income countries: a modelling study. *Lancet HIV* 2025; 12: e346–54.
- WHO. HIV drug resistance – brief report 2024. Feb 29, 2024. <https://www.who.int/publications/i/item/9789240086319> (accessed April 30, 2026).
- Clinton Health Access Initiative. 2025 HIV market impact memo. April 1, 2025. <https://www.clintonhealthaccess.org/report/2025-hiv-market-impact-memo-clinton-health-access-initiative/> (accessed April 30, 2026).
- Clinton Health Access Initiative. New agreement secures historic \$1 price for HIV self-test. July 27, 2022. <https://www.clintonhealthaccess.org/news/new-agreement-secures-historic-us1-price-for-hiv-self-test/> (accessed April 30, 2026).
- InTec. WHO prequalification of InTec HIV self-test—now PQ listed and available. Aug 7, 2025. https://www.intecasi.com/who-prequalification-of-intec-hiv-self-test-now-pq-listed-and-available_n123 (accessed May 8, 2026).
- WHO. Implementation of self-care interventions for health and well-being: guidance for health systems. July 17, 2024. <https://www.who.int/publications/i/item/9789240094888> (accessed April 29, 2026).
- WHO. WHO recommendations on self-care interventions: making over-the-counter emergency contraceptive pills available without a prescription. April 24, 2024. <https://www.who.int/publications/i/item/9789240089945> (accessed April 30, 2026).
- WHO. Guidelines for HIV post-exposure prophylaxis. July 22, 2024. <https://www.who.int/publications/i/item/9789240095137> (accessed April 30, 2026).
- WHO. Supporting community-based health workers (CHWs). 2024. <https://www.who.int/activities/supporting-community-based-health-workers> (accessed April 30, 2026).
- WHO. Health policy and system support to optimize community health worker programmes for HIV, TB and malaria services: an evidence guide. 2020. <https://iris.who.int/bitstream/handle/10665/340078/9789240018082-eng.pdf?sequence=1> (accessed April 30, 2026).
- De Schacht C, Lucas C, Paulo P, et al. Reaching men and young adults in a pharmacy-based HIV self-testing strategy: results from an acceptability study in Mozambique. *AIDS Res Hum Retroviruses* 2022; 38: 622–30.
- Ortblad KF, Kwach B, Zhang S, et al. Measuring the performance of HIV self-testing at private pharmacies in Kenya: a cross-sectional study. *J Int AIDS Soc* 2023; 26: e26177.
- Nsengimana A, Biracyaza E, Manirakiza A, et al. Expanding HIV self-test kits via community pharmacies in Rwanda has improved availability, but affordability remains an issue. *Integr Pharm Res Pract* 2024; 13: 243–57.
- Magak E. HIV self-testing in Africa: is the private sector key to reducing undiagnosed HIV? Dec 13, 2023. <https://www.aidsmap.com/news/dec-2023/hiv-self-testing-africa-private-sector-key-reducing-undiagnosed-hiv> (accessed April 30, 2026).
- Barnabas RV, Szpiro AA, van Rooyen H, et al. Community-based antiretroviral therapy versus standard clinic-based services for HIV in South Africa and Uganda (DO ART): a randomised trial. *Lancet Glob Health* 2020; 8: e1305–15.
- Bajunirwe F, Ayebazibwe N, Mulogo E, et al. Effectiveness of a mobile antiretroviral pharmacy and HIV care intervention on the continuum of HIV care in rural Uganda. *AIDS Care* 2020; 32: 1111–15.
- President's Emergency Plan for AIDS Relief, US Agency for International Development, EpiC: Meeting Targets and Maintaining Epidemic Control. DDD 101: community pharmacy ART distribution models. July 30, 2020. https://www.differentiatedservicedelivery.org/wp-content/uploads/community_pharmacy_art_distribution_models_7.30.20.pdf (accessed April 30, 2026).

For the model code see <https://doi.org/10.6084/m9.figshare.31405968>

- 20 Buyinza R, Agaba C, Tri C, Mugumya L. Optimizing the community retail pharmacy drug distribution points (CrPDDP) to sustain treatment continuity & viral suppression among stable clients. December, 2022. <https://cquin.icap.columbia.edu/wp-content/uploads/2022/12/B25.-Optimizing-the-Community-Retail-Pharmacy-Distribution-Points.pdf> (accessed April 30, 2026).
- 21 AIDS Control Programme of Uganda. Community led drug distribution point (CLDDP) implementation toolkit. July, 2021. <https://dsduganda.com/wp-content/uploads/2021/08/clddp-toolkit-20210726.pdf> (accessed April 30, 2026).
- 22 Africa's Public Health Supply Chain Institution. Expanding alternative drug distribution models in Uganda. <https://africaresourcecentre.org/2024/05/08/expanding-alternative-drug-distribution-models-in-uganda/> (accessed April 30, 2026).
- 23 Kuo AP, Roche SD, Mugambi ML, et al. The effectiveness, feasibility and acceptability of HIV service delivery at private pharmacies in sub-Saharan Africa: a scoping review. *J Int AIDS Soc* 2022; **25**: e26027.
- 24 Omollo V, Asewe M, Mogere P, et al. The fidelity of a pharmacy-based oral HIV pre-exposure prophylaxis delivery model in Kenya. *J Acquir Immune Defic Syndr* 2023; **93**: 379–86.
- 25 Ortblad KF, Mogere P, Omollo V, et al. Stand-alone model for delivery of oral HIV pre-exposure prophylaxis in Kenya: a single-arm, prospective pilot evaluation. *J Int AIDS Soc* 2023; **26**: e26131.
- 26 WHO. Countries take up new WHO recommendations on self-testing for PrEP and PEP. July 19, 2024. <https://www.who.int/news-room/feature-stories/detail/countries-take-up-new-who-recommendations-on-self-testing-for-prep-and-pep> (accessed April 30, 2026).
- 27 Kuguyo O, Mancitshana L, Mangenah C, et al. Developing and evaluating a community-driven intervention to promote uptake of HIV and contraception services among students enrolled in colleges and universities in Zimbabwe. *J Int AIDS Soc* 2025; **28** (suppl 1): e26461.
- 28 Phillips AN, Bansi-Matharu L, Shahmanesh M, et al. Potential cost-effectiveness of community availability of tenofovir, lamivudine, and dolutegravir for HIV prevention and treatment in east, central, southern, and west Africa: a modelling analysis. *Lancet Glob Health* 2023; **11**: e1648–57.
- 29 Cambiano V, Ford D, Mabugu T, et al. Assessment of the potential impact and cost-effectiveness of self-testing for HIV in low-income countries. *J Infect Dis* 2015; **212**: 570–77.
- 30 Cambiano V, Johnson CC, Hatzold K, et al. The impact and cost-effectiveness of community-based HIV self-testing in sub-Saharan Africa: a health economic and modelling analysis. *J Int AIDS Soc* 2019; **22** (suppl 1): e25243.
- 31 Phillips AN, Bershteyn A, Revill P, et al. Cost-effectiveness of easy-access, risk-informed oral pre-exposure prophylaxis in HIV epidemics in sub-Saharan Africa: a modelling study. *Lancet HIV* 2022; **9**: e353–62.
- 32 Phillips AN, Venter F, Havir D, et al. Risks and benefits of dolutegravir-based antiretroviral drug regimens in sub-Saharan Africa: a modelling study. *Lancet HIV* 2019; **6**: e116–27.
- 33 Maheswaran H, Clarke A, MacPherson P, et al. Cost-effectiveness of community-based human immunodeficiency virus self-testing in Blantyre, Malawi. *Clin Infect Dis* 2018; **66**: 1211–21.
- 34 Lu JJ, Silhol R, d'Elbée M, et al, and the ATLAS Team. Cost-effectiveness analysis of community-led HIV self-testing among key populations in Côte d'Ivoire, Mali, and Senegal. *J Int AIDS Soc* 2024; **27**: e26334.
- 35 Matsimela K, Sande LA, Mostert C, et al. The cost and intermediary cost-effectiveness of oral HIV self-test kit distribution across 11 distribution models in South Africa. *BMJ Glob Health* 2021; **6** (suppl 4): e005019.
- 36 Indravudh PP, Fielding K, Sande LA, et al. Pragmatic economic evaluation of community-led delivery of HIV self-testing in Malawi. *BMJ Glob Health* 2021; **6** (suppl 4): e004593.
- 37 Nichols BE, Offorjebe OA, Cele R, et al. Economic evaluation of facility-based HIV self-testing among adult outpatients in Malawi. *J Int AIDS Soc* 2020; **23**: e25612.
- 38 WHO. WHO implementation tool for pre-exposure prophylaxis of HIV infection: provider module for oral and long-acting PrEP. July 11, 2024. <https://www.who.int/publications/i/item/9789240097230> (accessed April 30, 2026).
- 39 Roche SD, Ekwunife OI, Mendonca R, et al. Measuring the performance of computer vision artificial intelligence to interpret images of HIV self-testing results. *Front Public Health* 2024; **12**: 1334881.
- 40 Meyer-Rath G, Jamieson L, Mudimu E, et al. Who pays and what pays off in sexual and reproductive health? A review of the cost and cost-effectiveness of interventions and implications for future funding and markets. *Lancet* 2025; **406**: 2152–67.
- 41 Bansi-Matharu L, Mudimu E, Martin-Hughes R, et al. Cost-effectiveness of voluntary medical male circumcision for HIV prevention across sub-Saharan Africa: results from five independent models. *Lancet Glob Health* 2023; **11**: e244–55.
- 42 UNAIDS. Press release: UNAIDS welcomes the announcement of new deals to make new HIV prevention medicines available and affordable for people in need. Sept 24, 2025. https://www.unaids.org/en/resources/presscentre/pressreleaseandstatementarchive/2025/september/20250924_hiv-prevention-medicines (accessed April 30, 2026).