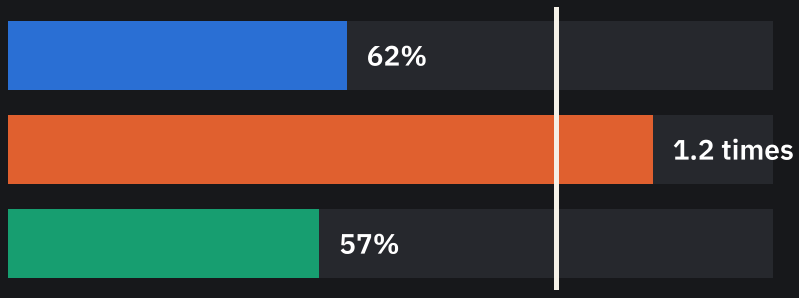
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The real price of *cheap tests* for people with advanced HIV

Ethiopia, the Democratic Republic of the Congo and Guinea, as donor money shrinks

COST PER HEALTHY YEAR GAINED ÷ THE BENCHMARK



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Researched and written by Claude Opus 5.5 (Anthropic), an AI assistant, under the AI Examines Health Policy initiative of Eredet LLC, the maker of GENESIS, which ran the analysis. The topic, the analysis and the conclusions are the AI's own; the Editor-in-Chief reviews the work before any publication but did not conduct or verify the analysis.

In brief

Many adults in Ethiopia, the Democratic Republic of the Congo (DRC) and Guinea learn they have HIV only when the virus has already badly weakened their bodies. Tuberculosis (TB) and a fungal infection of the brain then kill many of them in their first months of care. The World Health Organization (WHO) recommends a small package of tests and medicines that finds and stops these infections early. From 2027 the Global Fund, which pays for much of this care, will give each country less money, and US support is falling. Each country's health ministry and its Global Fund committee are now deciding what to protect.

I used a computer model to ask whether the package is good value. Good value means it buys more healthy years of life than the same money usually buys in each country's health system, which I call the benchmark. The tests and medicines turned out to be cheap. The real cost comes after: every person the package keeps alive needs HIV treatment for years. So each country's answer turns on what a year of HIV care costs there, against its benchmark. My analysis covers every adult starting HIV treatment as an outpatient, not only the very sick; advice for patients in hospital rests on trials.

Ethiopia



62% of the benchmark

Good value by four published benchmarks; not by a lower 2023 one

About US$200 per healthy year gained · 62% of the highest of four published benchmarks, 82% of the lowest

The answer depends on which benchmark Ethiopia accepts and on what HIV care costs. At the higher cost a recent local study found, the package sits at about the lowest two of the four. In the model, the urine TB test does most of the good, and a 2025 plan for a smaller budget marked it "Drop".

What could happen next: ask the Global Fund to let unspent money in the current grant keep or restore the urine test for patients in hospital. Trials show it helps most there. Protect the package in the next grant.

DRC



1.2 times the benchmark

Not good value by published benchmarks: a choice to pay for survival

About US$182 per healthy year gained · about 1.2 times its US$154 benchmark

In the model, a year of HIV treatment costs more than the DRC's benchmark. Even with its own tests and medicines free, the package would sit at about the benchmark. The DRC already promises treatment to everyone diagnosed; funding the package means paying for more years of it. I found no local cost of routine HIV care. If routine care, without medicines and tests, cost half the model's figure, the package would reach the benchmark.

What could happen next: if the DRC funds the package, as the Global Fund's guidance asks, start in hospitals, where trials show most benefit. Budget openly for the extra years of treatment.

Guinea



57% of the benchmark

Good value, if the staff stay

About US$253 per healthy year gained · about 57% of its US$448 benchmark

Good value against every published benchmark, as long as clinics keep the staff to run the tests and act on the results. The medical charity Médecins Sans Frontières (MSF) staffs most of the main referral unit and is handing its HIV work to the national authorities.

What could happen next: fund the full package, and plan now to take over the staff and care MSF provides.

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1. Arriving too sick

In 2017, MSF described one man's eleven days at its hospital in Kinshasa, the DRC's capital. He arrived wasted, confused and struggling to breathe. Rapid tests showed he had HIV and TB. He started TB treatment within a day and HIV medicines a few days later. On the eleventh day he was ready to go home. "Now I can walk by myself," he said [1]. Tests like the ones that found his TB cost a few dollars. Keeping him alive will cost far more: HIV care for the rest of his life.

HIV slowly destroys the immune cells, called CD4 cells, that protect the body from infection. Medicines can stop the virus, and people who start them early can expect a long life. But many people learn they have HIV late. By then their CD4 count has fallen below 200 cells in each microlitre of blood, or they are already seriously ill; a healthy count is several times higher. Doctors call this advanced HIV disease.

Advanced disease is common, and the numbers are large. Among people tested when they entered care, about a third in Ethiopia, nearly two in five in Conakry, Guinea's capital, and about half in Kinshasa had advanced disease [2, 3, 4]. That means about 11,000 adults a year start treatment with advanced disease in Ethiopia, 25,000 to 31,000 in the DRC and 3,200 in Guinea (Table 1). People who return to care after a break add to these numbers [5, 6].

For these people, starting HIV medicines is not enough, because infections can kill them before the medicines restore their defences. In a Guinean study of people with advanced disease, 12% died over a follow-up that was typically only two months [5]. Two infections cause many of these deaths. TB, usually of the lungs, is hard to detect in people with advanced HIV. At Conakry's referral unit, it caused seven in ten of the in-hospital deaths among critically ill people with HIV [7].

Cryptococcal meningitis is a fungal infection of the lining of the brain. It is rarer than TB, but often fatal where only fluconazole tablets are available instead of the stronger drugs WHO recommends, flucytosine and liposomal ampho-

tericin B [8]. At two Ethiopian hospitals, 64% of adults with HIV admitted with a suspected life-threatening infection who tested positive for the fungus died within a month on fluconazole alone [9]. Across studies in the DRC, more than half of those treated for the meningitis died, most of them on fluconazole alone [10].

2. A small package with a big job

WHO recommends a package of care for people who arrive with advanced HIV [11]. Besides HIV medicines and a daily antibiotic, co-trimoxazole, that prevents some infections, it has four parts:

1. **Look for TB** A laboratory test (Xpert) checks a sample of coughed-up sputum for TB bacteria.	2. **Catch the TB it misses** A urine test called LAM, a simple strip, finds TB in very sick people that the sputum test can miss.
3. **Prevent TB** Preventive medicine stops a hidden TB infection from turning into disease: six months of isoniazid (6H), or three months of isoniazid with rifapentine (3HP).	4. **Find the fungus early** A blood test for the fungus (cryptococcal antigen) finds it before it reaches the brain, while fluconazole tablets can still stop it.

Ethiopia and the DRC already keep the sputum test in their plans [12, 13]. Guinea had only 31 sites with machines for the sputum test at the end of 2024, against 214 HIV clinics [14, 15]. This report asks what the other three parts add. In the results, “the package” means the urine test, preventive medicine and the blood test, added to the sputum test. Trials show that the urine test likely reduces deaths among adults admitted to hospital; for outpatients the evidence is weaker [16, 17].

The package depends on one more test. The CD4 count shows who has advanced disease, and so who needs the blood test for the fungus. Without it, clinics must guess from symptoms and miss many people whose immune systems are badly weakened [18]. The blood test also helps most where the stronger meningitis drugs are at hand, because some people who test positive already have meningitis [19]. Often those drugs are not at hand: they have never been available in parts of Ethiopia [20]. In Guinea in 2021, liposomal amphotericin B was not registered for sale and came in only through distributors, aid organisations or import permits [21].

The Global Fund, the international fund that pays for much HIV, TB and malaria care in these countries, treats the package as essential. Its guidance for the next grants names CD4 testing to find advanced disease, with WHO’s package

for everyone found, among its "Program Essentials" [8]. It also asks for a CD4 test for everyone starting or returning to care [8]. When it cut grants in June 2025, it kept advanced HIV care among its first priorities [22]. It allowed countries under severe pressure to use the urine test "less frequently or in a more targeted way" [22].

3. A decision being made now

Less money. The Global Fund sets each country's grant every three years. For the three years from 2027, each country's HIV money falls: by about a fifth in Ethiopia, and by about an eighth in the DRC and Guinea [23, 24]. The current grants were already cut in 2025 [23, 25]. US support is shrinking too. Under a new agreement with the United States, Ethiopia takes over the cost of TB preventive medicines and sputum test cartridges by the end of 2030 [26]. Under a five-year agreement, the DRC has committed to raise its own health spending, including US$75 million for essential supplies and frontline health workers [27, 28]. Guinea's agreement with the United States sets a move to managing its health system independently by 2030 [29].

Who decides, and when. In each country, a national committee called the Country Coordinating Mechanism writes and endorses the request to the Global Fund [30]. The health ministry and the other grant holders, the organisations that manage the money, then agree budgets and quantities with the Global Fund. This stage is called grant-making. The last 2026 deadline for requests was 5 October, and most new grants start on 1 January 2027 [31, 32]. Budgets and quantities are being settled now. Ethiopia's current HIV grant runs on a different calendar, to June 2027 [33].

TIMELINE



Ethiopia: the money is there, but it is not being spent. In December 2024, Ethiopia's Ministry of Health reported CD4 testing in almost all health facilities [34]. It also reported slow delivery of supplies and interruptions in CD4 test supplies in most regions [34]. In 2025, planning for a smaller budget marked the urine test "Drop", the label for activities to cut [12, 35]. By the end of 2025, the grant had spent little more than a third of the money budgeted to that date

for advanced HIV care [36, 37, 38]. The urine test still has backers: the United States' list of approved HIV activities names it [39], and a senior public health officer called it "a valuable diagnostic tool" [18].

DRC: everything is kept on paper, but few places provide it. The DRC kept every part of the package in its 2025 priorities [13], and it aims to treat everyone diagnosed with HIV [13]. But MSF counts only five hospitals in the country offering complete care for advanced disease [4]. In six Global Fund-supported hospitals, only 53% of patients with advanced disease had a CD4 count [6]. In 2025 the United States provided about half of the DRC's HIV financing, and the government a tenth [13]. UCOP+, the national union of organisations of people living with HIV, asks for advanced HIV care to be expanded and paid for from the national budget [6].

Guinea: a working service faces a handover. MSF supports advanced HIV care in Conakry, including the referral unit at Donka hospital for very sick people with HIV. Guinea told the Global Fund in 2023 that deaths among MSF's patients with advanced disease fell from 55% before the unit opened to 30% in 2022 [40]. More than 85% of the unit's staff are MSF employees [41]. In November 2025, MSF announced that it would hand its HIV work to the national authorities over two to three years [41]. The Global Fund grant's advanced HIV budget buys supplies only, not staff, and it is being spent [42, 43]. Who should pay is disputed. The Ministry of Health's director of public hygiene urges more national money [44]. MSF argues that there is little room for more national money [4]. It adds that buying supplies through local distributors has sometimes raised prices and caused more stock-outs [4]. REGAP+, the national network of people living with HIV, says the State must take responsibility and asks mining companies to help [41, 44]. Global Fund grants come with a promised national share of the costs. In the 2021 to 2023 grant round, Guinea's government paid 53% of what it had promised [45].

The options. A country can fund all of the package or only some parts. It can use the urine test only for the sickest patients [22]. Or it can switch to the shorter preventive course, which Ethiopia uses, the DRC recommends and Guinea had planned but not yet adopted [40, 46, 47, 48]. Every choice has a cost: money for the package competes with money for HIV medicines, and for the staff and supplies that make tests useful.

4. The question, and how I tried to answer it

The question is simple to ask. For adults starting HIV treatment, does each part of the package buy enough health to be worth protecting in a smaller grant, and what would it cost? I found no trial in these three countries due to report before the grants are set. The evidence comes from many places, so I used a model: a computer simulation that combines that evidence and follows people over their lives.

The model. I used GENESIS, an online platform made by Eredet LLC, the company that runs this initiative. GENESIS rebuilds published health-economic models. I used its rebuild of CEPAC-International, an established, published model of HIV care [49]. The same family of models was used in a published evaluation of this package in Malawi [11]. The model follows 100,000 simulated adults, month by month, from their first HIV treatment as outpatients until death. It uses each country's population and costs. It reproduces its source's published results for HIV care; its TB and fungal parts have not been checked that way (Annex A3). Every result from here on comes from this model unless I say otherwise.

What is compared. For each country, the model runs the same adults twice: once with the sputum test only, as most clinics offer today, and once with the package added. The package goes to every adult starting HIV treatment, not only those with advanced disease. That is the group the model follows, and the group clinics must test to find who has advanced disease. Within it:

- people with TB symptoms get a sputum test at the start of care and at later visits, with the urine test added to each;
- about two-thirds of adults, those eligible who accept it, start six months of isoniazid;
- adults with a CD4 count below 200 get the blood test for the fungus.

Results are averaged over all of these adults. I also compared the package with no TB test at all, which is closer to what many Guinean clinics offer. The verdicts were the same (Annex A2).

How "good value" is judged. Health is counted in healthy years of life. A year lived in full health counts as one; illness and early death subtract. Health economists call each healthy year gained a "DALY averted". For each part, I divided its extra cost by the healthy years it adds. I then compared the result with a benchmark: an estimate of what each country's health system already spends to gain one healthy year elsewhere. Economists call this a cost-effectiveness threshold. A service that costs less per healthy year than the benchmark buys more health than the system's usual spending: it is good value. If it costs more, the same money would buy more health elsewhere. Good value is not the same as affordable: a good-value service can still be too costly for a budget.

None of the three countries has an official benchmark that I could find. Ochalek and colleagues published four estimates for each country, naming none as preferred [50]. A 2023 study by Pichon-Riviere and colleagues gives lower ones for Ethiopia and Guinea [51]. I judged each country first against the highest of Ochalek's four, then against the lower estimates (section 5). A package that fails the most generous benchmark fails them all; one that passes is then tested against the strictest. The highest estimates are about US$324 per healthy year in Ethiopia, US$154 in the DRC and US$448 in Guinea.

Prices. Local staff and services are valued at local price levels, because a dollar spent on them buys more than the market exchange rate suggests. Imported tests and medicines are different: the grant buys them in dollars at the market exchange rate. So I priced the 12 imported items at that rate [52]. Local price levels turn each dollar into fewer birr or francs than the market rate does. Valued that way, the 12 items (Table A5) count at only a quarter to a half of

what the grant pays. The package would then look good value in the DRC too, but that is not what the grant would spend (Annex A2).

Uncertainty. Many inputs are uncertain. I repeated each analysis 1,000 times with them varied at random, and counted how often the result came out good value.

5. What I found: the price is survival

The tests are cheap; survival is not. Over each adult's lifetime, the package adds about US$69 to US$88 to the cost of care [53]. Only about US$11 of that is the package's own tests and medicines. The rest, US$58 to US$77, is treatment and care in the extra years of life it brings, mostly HIV care (Figure 1).

FIGURE 1

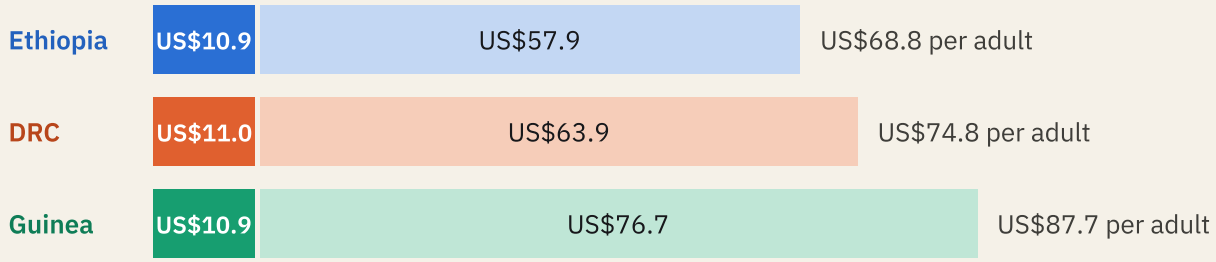


Figure 1. Most of the package's cost is the care of the people it keeps alive, not its tests and medicines. Added cost per adult over a lifetime, the package against the sputum test alone, in US dollars at the market exchange rate. Future costs count for a little less than today's, as is standard (they are discounted at 3% a year). I calculated the split between the parts from the model's results.

This is the package doing its job, as rapid tests and treatment did for the man in Kinshasa. A person who would have died of TB lives. That person then needs HIV medicines, viral load tests (which measure the virus in the blood) and clinic visits for years. So the question "is the package good value?" becomes "is a year of HIV care good value in this country?" A study in Uganda found the same. The blood test for the fungus cost US$6 per healthy year gained without the cost of lifelong HIV treatment, and about US$557 with it [54].

Ethiopia: yes by four published benchmarks, not by a lower 2023 one. In Ethiopia the package costs about US$200 per healthy year gained (30,300 Ethiopian birr), 62% of the most generous benchmark [53]. A year of HIV care costs about US$204, about 60% of that benchmark. The two figures are close because most of the package's cost is care in the years of life it adds. A year lived on HIV treatment counts as nearly a full healthy year, so each year of life the package adds is worth paying for. The package came out good value in almost all of the 1,000 runs.

Two things could change that answer. The first is the benchmark. Stated as a share of income per person, the package costs about 22% for each healthy year gained, against 36% for the benchmark used so far. That is under all four of Ochalek's estimates, which start at 27%, but above the lower 2023 estimate of 14% [51]. The second is the cost of HIV care. A 2024 study in North Wollo, in northern Ethiopia, found that standard care cost a quarter to nearly half more than the model's figure [55]. At that cost, I calculated, the package sits at about Ochalek's two lowest estimates.

The DRC: not good value by its benchmark. In dollars, the package costs less in the DRC than in the other two countries: about US$182 per healthy year (414,000 Congolese francs). But the DRC's benchmark is lower, about US$154. So the package costs about 1.2 times the benchmark, and came out good value in only 8% of the runs. The reason is the cost of survival. A year of HIV care in the DRC, medicines and tests included, costs about US$194, 1.3 times the benchmark. Any service whose benefit is more years on HIV treatment, the sputum test the DRC already funds included, costs close to or more than the benchmark. Even if the package's own tests and medicines were free, it would cost about the benchmark.

This does not mean the DRC should stop treating people. It means that its benchmark, an estimate of what its health budget can buy elsewhere, cannot justify paying for more years of HIV treatment, and so cannot justify the package. The DRC has already chosen to treat everyone diagnosed [13], and the Global Fund's guidance names the package among its Program Essentials [8]. Funding it there is a choice to pay for survival, made on other grounds. A lower cost of care would change the verdict. The model puts routine clinic care, without medicines and tests, at about US$50 to US$70 a year. If it cost half that, the package would reach the benchmark. The model's figure comes from a costing in Côte d'Ivoire, because I found no published DRC figure. At local price levels the package would also look good value, but the grant pays for its imports in dollars (section 4).

Guinea: yes, against every benchmark. In Guinea the package costs about US$253 per healthy year gained (2.26 million Guinean francs), 57% of the most generous benchmark [53]. A year of HIV care costs about US$271, about 60% of that benchmark, so here too each year of life the package adds is worth paying for. The package came out good value in all of the 1,000 runs, and it also passes the lower 2023 estimate (Annex A2). Its condition is that clinics keep the staff MSF now provides as it hands over its HIV work (section 8).

FIGURE 2

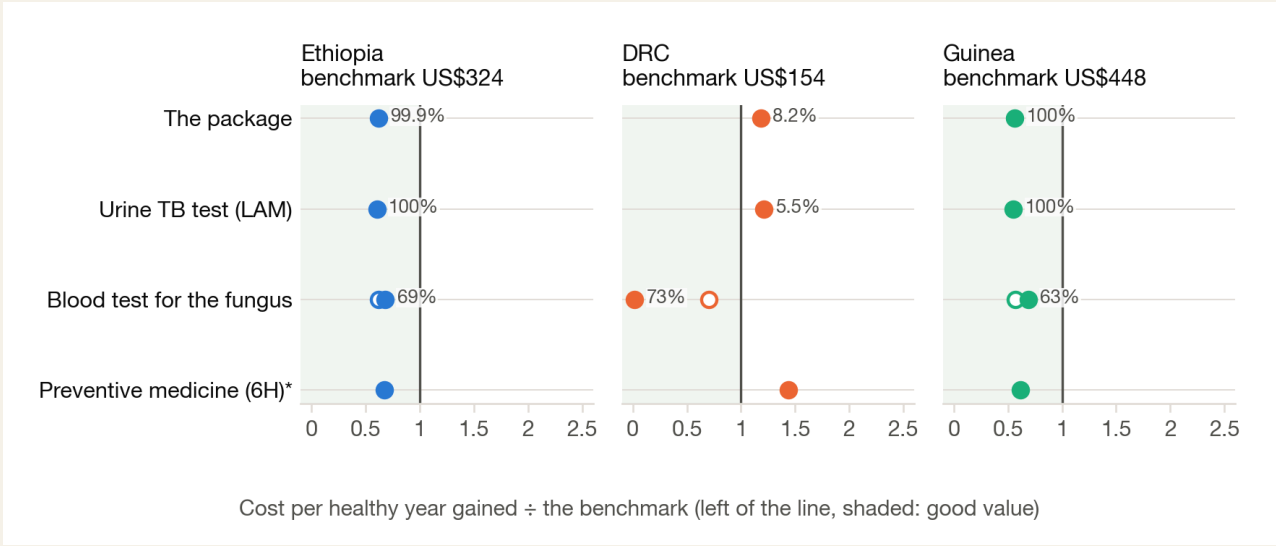


Figure 2. At the model's main values, every part is good value in Ethiopia and Guinea; in the DRC only the blood test for the fungus appears to be. Hollow: the blood test with local meningitis death rates and, in Ethiopia, how common the fungus is locally. In the DRC that point sits at about 0.7; with a lower treatment cost as well, it rises to about the benchmark (section 6). Each part's cost per healthy year gained as a multiple of the country's benchmark; left of the line is good value. Labels give the share of the 1,000 runs that came out good value. * Derived from the other results. Other versions of each result are in Annex A2.

6. The parts, one by one

The urine test (LAM) does most of the good. It gives 80% to 87% of the package's extra years of life, by finding TB that the sputum test misses [53]. It is good value in Ethiopia and Guinea in every run, and not in the DRC, for the same reason as the whole package. Its gain for outpatients is larger than the trials suggest (section 2). If the gain is smaller, so is the cost: fewer survivors means fewer years of care, and only the tests, medicines and extra TB treatment stay fixed. Against the highest benchmarks, the package's gain would have to be overstated about four times in Ethiopia, and five to six times in Guinea, before its verdict changed. Against Ochalek's lowest estimate in Ethiopia, or the 2023 one in Guinea, about twice would be enough (Annex A3).

The blood test for the fungus is good value only where CD4 counts are already done. At the main values it is good value in all three countries, in about two-thirds to three-quarters of the 1,000 runs [53]. Its gain is small and measured imprecisely. Every adult in this analysis gets a CD4 count when starting treatment, with or without the package, and the blood test uses it. Where adults don't get a CD4 count today, the count becomes part of the blood test's cost. Bought for every adult just for this purpose, it would bring the blood test close to or above the benchmark in all three countries. The case for CD4 testing is broader than this one test. In Ethiopia and Guinea, the whole package stays good value

even where a CD4 count must be bought for every adult, and the Global Fund's guidance names CD4 testing essential.

In the DRC, the blood test is not clearly good value. The model treats every case of meningitis with the drugs WHO prefers, at their price. So the test looks cheap mainly because it avoids treatment most Congolese patients do not get. With local meningitis death rates alone, it sits at 0.7 of the benchmark; with a lower cost for that treatment as well, at about the benchmark (Annex A2).

Preventive medicine is less certain. Six months of isoniazid is good value in Ethiopia and Guinea at the main values, and not in the DRC. Its share of the 1,000 runs, about 70% in Ethiopia and Guinea and 12% in the DRC, comes from runs at local price levels (Annex A2).

The model cannot choose between the preventive courses. It finds almost no difference between the three-month and six-month courses, because it assumes the same share of people finish both. In a trial in Ethiopia, Mozambique and South Africa, 90% finished the shorter course against 51% for the longer one [56]. That favours the shorter course, which Ethiopia already uses and Guinea had planned.

7. What it would cost

The package's tests and medicines, with a CD4 count bought for every adult, would cost each country under 2% of a year's Global Fund HIV money (Table 1). That is about US$556,000 a year in Ethiopia, US$1.08 million in the DRC and US$104,000 in Guinea, at Global Fund prices with supply costs. These figures leave out the sputum test, which most clinics already pay for; Table 1 gives its cost separately.

That is not the whole bill. Each year's new patients also need HIV care for the extra years they live. Over their lifetimes, the whole added cost comes to 3% to 8% of a year's HIV money. That is about US$2.1 million in Ethiopia, US$4.6 million in the DRC and US$0.74 million in Guinea. For that money, the package would prevent about 960 TB deaths among them in Ethiopia, 2,150 in the DRC and 270 in Guinea.

Each year's patients add their care costs to those of earlier years. So the yearly bill grows until it reaches this lifetime figure, or somewhat more, every year. It falls on the Global Fund grants and, increasingly, on national budgets. Inside a fixed grant, it may be taken from the money for people already on treatment. None of this is money saved; it is money spent to keep people alive.

TABLE 1. What the package would cost for one year's new adult patients

One year's adult starters	Ethiopia	DRC	Guinea
Adults starting HIV treatment in a year	31,000	61,200	8,490
Of them, starting with CD4 below 200 or advanced disease	11,000	24,500 to 30,600	3,230
Urine LAM tests	26,200	58,200	7,290
Cryptococcal antigen tests	12,700	20,000	3,410
Preventive-therapy courses (3HP in Ethiopia and the DRC, 6H in Guinea)	20,400	37,600	5,500
These tests and drugs, at Global Fund prices with supply costs	**US$406K**	**US$781K**	**US$62.8K**
Of which urine LAM	US$112K	US$249K	US$31.2K
A CD4 count for every adult, if none were counted today (a test done in the clinic)	US$150K	US$297K	US$41.1K
Tests, drugs and CD4 counts, as a share of one year of the Global Fund HIV allocation	**0.81%**	**1.9%**	**0.68%**
The package's whole added cost for these adults over their lifetimes, care included (model's costs, discounted)	US$2.13M	US$4.58M	US$744K
The same, as a share of one year of the allocation (a lifetime cost set against a yearly budget)	**3.1%**	**8.3%**	**4.8%**
Deaths from TB averted over their lifetimes	963	2,150	274
Deaths from cryptococcal disease averted over their lifetimes	57	122	7
Not in the package's cost: sputum TB tests (Xpert), where not already funded (needed with or without the package)	US$232K	US$523K	US$64.9K

I calculated these figures from the sources cited and the model's results; details and sources are in Annex A4. Tests and courses are those used over a lifetime by one year's new adult patients, about one year's use once each year's patients are similar. Prices are Global Fund reference prices plus 16% for supply costs. Preventive courses are priced at the regimen each country uses or, for the DRC, recommends; the model values the six-month course and cannot tell the two apart (section 6). The whole added cost is the model's lifetime cost, with future costs counted for a little less.

The two countries where the package is good value face different tasks. Ethiopia can act inside its current grant, which has advanced HIV money it has not spent. Guinea's advanced HIV budget is already being spent, and only on supplies, so keeping the staff will need new money.

8. What each country could do

My findings cover adults starting treatment as outpatients. Where a step begins with patients in hospital or the sickest, it rests on the trials in section 2. My analysis cannot value the urine test used only for the sickest patients.

Ethiopia.

The Ministry of Health's HIV office sets priorities with the regional health bureaus [12].

- **It could act** now, inside the current HIV grant, which runs to June 2027 [33].
- **It could ask** the Global Fund to let whatever advanced HIV money is still unspent keep or restore the urine test for patients in hospital and the seriously ill.

The chair of Ethiopia's Global Fund committee, the State Minister of Finance, urged faster spending in August 2026, with 53% of the current grants used and ten months left [57]. The committee endorses the request and the government's share [57].

- **In grant-making for 2027, the ministry and the committee could protect** the urine test, CD4 tests, and the blood test with access to the meningitis drugs WHO prefers [8].

With the Ethiopian Pharmaceutical Supply Service, the ministry gets supplies to clinics [58]. Benchmarks are not Ethiopia's only test. Its own priority setting weighs seven criteria, among them disease burden, equity and budget impact [59]. If Ethiopia judges its benchmark closer to the lower estimates, or HIV care costs more than the model assumes, the case for outpatients weakens. The case for hospital patients then rests on the trials.

The DRC.

The national committee submits the request [47]. The Ministry of Public Health and the United Nations Development Programme hold the current grants [60].

- If the DRC funds the package, as the Global Fund's guidance asks, **they could start** where the trial evidence is strongest.

The urine test would go first to patients in hospital and the seriously ill, with the blood test for the fungus. That means the hospitals that already treat advanced disease first, then the provinces the DRC ranks highest by disease burden [13]. Starting in hospitals puts the tests where the trials found most benefit. It does not change the economic verdict, because the cost of survivors' care sets it.

- **They could pair** the blood test with access to the meningitis drugs WHO prefers [8], and extend CD4 testing, which the Global Fund's guidance names essential.
- **They could budget** openly for the extra years of treatment: about US$4.6 million for each year's new patients over their lifetimes.

That money could come from the grant, the government's share, and the US$75 million the DRC plans for essential supplies and health workers under its US agreement [27, 28]. A local costing showing routine clinic care at about half the model's figure would change the verdict.

Guinea.

The Ministry of Health holds the HIV grant [42], and the national committee prepares the request [32, 61].

- **They could fund** the full package and CD4 testing for everyone starting or returning to care.
- **They could pair** the blood test with access to the meningitis drugs WHO prefers [8].
- **They could keep** buying the imported tests and medicines through the Global Fund grant, since MSF reports that local purchase has sometimes raised prices and stock-outs.
- **Above all, they could plan now** to take over the staff and care MSF provides, before its handover ends.

That will take the next grant and the national budget. With its national HIV programme [62] and the finance ministry, the ministry would need to fund the posts. My results assume clinics are staffed, with or without the package, so the staff's cost is not part of the package's cost per healthy year. It is the cost of keeping care running at all, and I found no public figure for it.

- **If the package must be phased in, start in hospitals.**

9. What remains open

The analysis settles one point: the package's tests are cheap, and its real cost is the survival it buys. It leaves other questions for public discussion.

Who should pay for the years of life these tests make possible, as donors step back?

In all three countries, the cost moves from the Global Fund and the United States to national budgets that are already stretched.

In the DRC, is a year of HIV treatment worth more than the usual benchmark?

The country's promise to treat everyone says yes. The economic benchmark says it costs more than the health system usually pays for a healthy year. That is a choice about values, and it belongs to the DRC.

How do tests reach the people who need them?

In every country, CD4 testing, a steady supply of tests and medicines, and the staff to act on the results decide whether the package works at all.

Two limits of the analysis also remain. It compares the package with what the health system usually buys, not with the other items this grant could fund. And it values the parts of WHO's package, not alternatives to them (Annex A3). Two pieces of evidence would settle much of the remaining doubt. One is a current local cost of HIV care, above all in the DRC. The other is studies of the urine test used only for the sickest patients.

Reflections. The first lesson was how little the tests' own price mattered. The DRC's answer turns on its benchmark and the cost of a year of HIV care, not on the price of a urine strip. The second was that a single benchmark can hide a choice. Ethiopia's verdict depends on which published estimate it accepts, and on what HIV care really costs there.

Technical and evidence annex

This annex is for readers who want to check the work. It gives the methods, every result, the checks against outside evidence, the budget sources and every input changed from the model's defaults. It uses the technical terms the main text avoids. A DALY averted is a healthy year of life gained; the threshold is the benchmark; a draw is one of the 1,000 runs. The market rate is the exchange rate the grant pays, and GDP per head is income per person. Costs are in each country's currency: Ethiopian birr (ETB), Congolese francs (CDF) and Guinean francs (GNF); K is thousands and M millions.

My own calculations, from the sources cited and the model's results, are:

- the volumes, costs and deaths averted in Table 1, and the split of added cost in Figure 1;
- the market-rate factors, values and dollar equivalents, the halved care costs, the 7.3% and the CD4 medians in Table A5;
- the shares of GDP per head in Table A3, and the results for 6H and for a molecular test alone, derived from other analyses;
- the break-even overstatements, the cost of care at which verdicts change, and Ethiopia's result with care at the North Wollo cost;
- the costs with a CD4 count bought, at the low end of a cost range, or with the package's own tests and drugs free;
- the DRC's exchange-rate threshold, and the dollar equivalents of local-currency results.

A1. How the analyses were done

Each analysis follows 100,000 simulated adults starting HIV treatment for the first time as outpatients, over their lifetimes. Each country's age, sex and CD4 count at entry are used. Everyone receives co-trimoxazole and starts treatment at once. Every adult has a CD4 count at the start of treatment, costed in both arms. Meningitis, when it occurs, is treated with the drugs WHO prefers, at their price and with their 14% deaths in the first month. Most local patients get fluconazole alone; the analysis with local death rates reflects that in deaths but not in cost.

People with TB symptoms are tested at entry and at later clinic visits, and urine LAM is added to every molecular test. About two-thirds of adults start preventive therapy; the 79% uptake applies to those eligible. Of adults with CD4 below 200, 75% are screened for cryptococcal antigen: a third to two-fifths of all adults [53]. The package was compared with no package, in which people with TB symptoms are treated on clinical grounds, and with a molecular TB test alone. Today's care lies between the two. Ethiopia and the DRC keep molecular testing for people with TB symptoms in their priorities (section 2). Guinea had 31 sites with rapid molecular TB tests at the end of 2024, against 214 HIV care sites [14, 15].

Each part was valued on top of the parts kept before it. Urine LAM was added to the molecular test, then six months of isoniazid (6H) to both TB tests, then cryptococcal screening to all three. A different order could value the parts differently. The package counts 6H as new in every country, although Ethiopia already gives 3HP and Guinea 6H [46, 48]. 6H costs more per DALY than the package as a whole, so this raises the package's figure slightly. Three months of isoniazid and rifapentine (3HP) was compared with 6H. For the DRC, where screening is the only part that passes, screening was also compared alone against no package.

The benchmark (cost-effectiveness threshold). An option is good value when it costs less per disability-adjusted life-year (DALY) averted than the threshold. A DALY averted is one year of healthy life gained. The threshold estimates what each country's health system spends at the margin to gain one [50]. I used the highest of Ochalek and colleagues' four estimates for each country, then tested the lower ones (A2): a verdict that fails the most generous estimate fails them all. The highest estimates are 36% of GDP per head in Ethiopia (ETB 49.1K per DALY, about US$324) and 15% in the DRC (CDF 350K, about US$154). In Guinea it is 27% (GNF 4.00M, about US$448). Table A3 sets every published estimate side by side. This yardstick fits because most of the package's cost is the HIV care that follows, paid by the grants and, increasingly, national budgets (section 3). Half of GDP per head, which some analysts use, is shown as context only.

Imported tests and drugs. The threshold is a share of GDP per head in local currency, so it counts money at what it buys in the country. A grant, though, buys imported tests and drugs with dollars at the market exchange rate. Valued at local price levels (purchasing power parity), imported items count at about a quarter (Ethiopia) to a half (the DRC) of what the grant pays (Table A5). So I valued the 12 imported tests and drugs at the 2026 market exchange rates [52]. For the tests, unit costs may include some local staff time, which this conversion overstates; Table 1's budget uses Global Fund prices instead. Results at local price levels are reported as a check (Table A1). A price analysis finds the price of an option's own tests and drugs at which it stops being good value; the break-even figures in A3 come from it.

Uncertainty and local values. Each analysis was repeated 1,000 times with its uncertain inputs drawn at random (the "draws"). The share of draws in which an option is good value reflects uncertainty in costs and effects, not confidence in the size of its health gain. The draws vary TB rates only around the model's own level. Since most of the package's cost is survival care, they mostly test whether a year of care costs less than the threshold. Some ranges are not centred on the main value (Table A6). Further analyses test what local evidence and costs would change:

- deaths in the first month of cryptococcal meningitis treatment at 50%, close to local reports, instead of 14%, with lower antigen prevalence in Ethiopia;
- 40% of adults starting treatment with CD4 below 200, close to recent local figures, instead of 53% to 55%;
- for the DRC, routine HIV care at half the model's cost, and HIV care paid from outside the health budget.

Table A5 lists every input changed and the defaults that drive the results.

Perspective and time. The analyses take the healthcare payer's perspective over a lifetime, in monthly cycles with half-cycle correction. Costs and DALYs are discounted at 3% a year, and costs are in 2026 local currency. The thresholds are shares of 2025 GDP per head, a year earlier than the costs. That understates every threshold by a year's growth in GDP per head, which works against the package, most in Ethiopia, where prices have risen fast. Guinea's GDP per head is also lower in the model's data than in the IMF's current series (Table A3).

How the model works. Each month, a simulated adult may develop one of eleven classes of illness: eight severe, including TB, invasive bacterial infection and malaria, and three mild. Illness is more likely at lower CD4 counts. CD4 falls faster at higher viral loads, and co-trimoxazole lowers some risks. A person can die from a severe illness, a major side effect of treatment, HIV itself, or other causes at the national background rate. Treatment usually suppresses the virus, restores CD4 and lowers these risks. The clinic checks for treatment failure with a yearly viral load test. It moves people from a dolutegravir-based first line to a boosted protease inhibitor second line. People may leave care and return. Some adults enter care with undiagnosed active TB, more often at low CD4, and others with latent infection. Latent infection turns active more often at low CD4. Preventive therapy lowers infection and reactivation for those who complete it. Cryptococcal infection arises at low CD4 and progresses to meningitis, faster without treatment. Antigen screening starts pre-emptive fluconazole in those who test positive.

Health and costs. Disability weights come from the Global Burden of Disease study: HIV on treatment, symptomatic HIV, AIDS, and TB with HIV. Costs of routine care, illnesses, laboratory tests and end-of-life care come from published studies, adjusted to each country's price level. Antiretroviral drugs and monitoring tests are costed at Global Fund reference prices. Costs are inflated to 2026 and converted to local currency with purchasing power parity factors. The 12 imported tests and drugs are then valued at the market exchange rate (Table A5).

Uncertainty. The 1,000 draws vary most effect sizes, event rates and costs, costs with a standard error of 20%. They include TB infection, latent TB turning active, death from untreated TB and the share of TB the tests find at CD4 below 100. They hold fixed active TB at entry, the scaling of TB to each country, the share of people with symptoms and TB treatment outcomes. They also hold fixed preventive-therapy uptake and antigen test uptake and sensitivity, and they do not vary the price basis or the threshold. Three drawn ranges are not centred on the main value [53]:

- preventive therapy's effect, 5% to 45% around 43%;
- cryptococcal antigen at entry, for example 0.8% to 31% around 9.9% in Ethiopia;
- pre-emptive fluconazole's relative effect, 20% to 100% around 72%.

One-way sensitivity analyses find the inputs that move each result most. For the package, they are routine care costs, second-line drug costs and viral suppression on first-line treatment. A price analysis finds the cost at which an option stops being good value. Ratios from small health differences carry simulation error: screening, 6H and 3HP add only 0.002 to 0.058 DALYs per adult. Screening's gain in life expectancy has intervals that include zero [53]. A molecular test against no TB test and urine LAM added to it cost about the same per DALY (Table A1). So the order in which they are added does not change any verdict.

Other assumptions. The natural history of HIV and the effects of treatment and services transfer from the source settings, and effects last as long as people stay in care. Severe malaria is scaled by each country's malaria deaths, and cryptococcal infection by antigen prevalence.

Checks against the source. With matched inputs, the replica reproduces the source model's published results without treatment and on first-line treatment [49, 53]. It is within 4% for the cohort's life expectancy (6% across CD4 subgroups) and 7% for lifetime cost. Its TB and cryptococcal parts have not been checked against a published source (A3).

A2. Detailed results

TABLE A1. Cost per DALY averted and the share of 1,000 draws that are good value, by comparison, country and price basis

Comparison	Imported tests and drugs	Ethiopia (ETB 49.1K)	DRC (CDF 350K)	Guinea (GNF 4.00M)
Full package vs no package (no TB test)	Market rate	**ETB 30.8K** 100% of draws	**CDF 428K** 3.6% of draws	**GNF 2.28M** 100% of draws
	Local price levels	**ETB 15.6K** 100% of draws	**CDF 293K** 95% of draws	**GNF 1.56M** 100% of draws
Full package vs a molecular TB test alone	Market rate	**ETB 30.3K** 99.9% of draws	**CDF 414K** 8.2% of draws	**GNF 2.26M** 100% of draws
	Local price levels	**ETB 14.9K** 100% of draws	**CDF 276K** 94% of draws	**GNF 1.52M** 100% of draws
A molecular TB test alone vs no TB test*	Market rate	**ETB 31.1K**	**CDF 436K**	**GNF 2.30M**
	Local price levels	**ETB 16.1K**	**CDF 303K**	**GNF 1.58M**
Cryptococcal screening, added to the TB tests and preventive therapy	Market rate	**ETB 33.4K** 69% of draws	**CDF 6.50K** 73% of draws	**GNF 2.7M** 63% of draws
	Local price levels	**ETB 1.20K** 99% of draws	**saves CDF 5.17K per adult** 96% of draws	**GNF 551K** 93% of draws
– with local cryptococcal values	Market rate	**ETB 30.5K** 93% of draws	**CDF 245K** 71% of draws	**GNF 2.3M** 86% of draws
	Local price levels	**ETB 10.8K** 100% of draws	–	**GNF 1.2M** 99% of draws
Cryptococcal screening alone, vs no package	Market rate	–	**saves CDF 1.06K per adult** 75% of draws	–
Urine LAM, added to the molecular test	Market rate	**ETB 29.6K** 100% of draws	**CDF 423K** 5.5% of draws	**GNF 2.20M** 100% of draws
	Local price levels	**ETB 15.7K** 100% of draws	**CDF 298K** 92% of draws	**GNF 1.54M** 100% of draws
Preventive therapy (6H), added to the two TB tests	Market rate	**ETB 32.9K***	**CDF 503K***	**GNF 2.46M***
	Local price levels	**ETB 15.6K** 74% of draws	**CDF 324K** 12% of draws	**GNF 1.6M** 70% of draws
3HP instead of 6H (no guide to the choice; section 6)	Market rate	–	**CDF 4.0M** 0.1% of draws	–
	Local price levels	**ETB 130K** 21% of draws	**CDF 2.1M** 0.2% of draws	**GNF 8.0M** 17% of draws

Comparison	Imported tests and drugs	Ethiopia (ETB 49.1K)	DRC (CDF 350K)	Guinea (GNF 4.00M)
Full package vs a molecular test alone, routine care at half the default	Market rate	–	**CDF 349K** 41% of draws	–
Full package vs a molecular test alone, HIV care paid from outside the health budget	Market rate	–	**CDF 63.8K** 100% of draws	–
Full package vs no package, 40% starting below CD4 200	Local price levels	**ETB 15.7K** 100% of draws	–	**GNF 1.57M** 100% of draws

Thresholds per DALY averted (Ochalek and colleagues) in the column heads. Dashes: not analysed. * Derived from the analyses of the package and its other parts on the same price basis, without draws. Ratios from very small health differences (screening, 6H, 3HP) carry rounding and simulation error and are shown to two figures.

The full package. With imported tests and drugs at the market exchange rate, the package costs ETB 30.3K per DALY averted against a molecular TB test alone in Ethiopia (about US$200). In Guinea it costs GNF 2.26M (about US$253). That is 62% and 57% of the threshold, and good value in 99.9% and 100% of the 1,000 draws (Figure 2; Table A1). In the DRC it costs CDF 414K (about US$182), above the threshold of CDF 350K, and is good value in 8.2% of draws. Even with its own tests and drugs free, it would sit at the threshold (CDF 353K). Against no package, the verdicts are the same. Over their lifetimes, the package would prevent about 3,100 to 3,500 deaths from TB and 84 to 200 from cryptococcal disease per 100,000 adults (Table A2). It would add 59,000 to 71,000 years of life per 100,000 adults and avert 0.34 to 0.41 discounted DALYs per adult. With 40% of adults starting below CD4 200 instead of 53% to 55%, analysed at local price levels, Ethiopia's and Guinea's results barely change (Table A1). The package's TB deaths averted against no package fall by only 2% to 3%, because the urine test goes to everyone with TB symptoms, not only those with advanced disease.

TABLE A2. Health outcomes per 100,000 adults starting HIV treatment, over their lifetimes (undiscounted)

Comparison, per 100,000 adults	Country	Years of life gained	TB cases averted	Deaths from TB averted	Cryptococcal meningitis cases averted	Deaths from cryptococcal disease averted
Full package vs a molecular TB test alone	Ethiopia	60,000	1,250	3,110	820	184
	DRC	71,000	1,130	3,520	830	200
	Guinea	59,000	1,300	3,230	410	84
Urine LAM	Ethiopia	48,000	0	2,660	−80	−16
	DRC	62,000	0	3,220	−120	−20
	Guinea	48,000	0	2,760	−30	−4
Cryptococcal screening	Ethiopia	3,000	−70	−61	920	199
	DRC	3,000	−70	−64	970	218
	Guinea	2,000	−30	−31	450	88
Preventive therapy (six months of isoniazid)	Ethiopia	9,000	1,320	508	−20	1
	DRC	6,000	1,200	363	−20	2
	Guinea	9,000	1,330	501	−10	0

Model estimates. Negative values: more events, because more people survive to be at risk. Urine LAM finds TB rather than preventing it, so it averts deaths but not cases. Health outcomes do not depend on how tests and drugs are valued.

Why the DRC differs: its threshold and the cost of survival. The package's own tests and drugs are 12% to 16% of what it adds to costs. The rest is the treatment and care that follow for the people it keeps alive, mostly HIV care (Figure 1). Each year of life it adds brings a year of care. A year on treatment costs about 63% of the threshold in Ethiopia, 61% in Guinea and 126% in the DRC. The DRC is not costlier: in dollars, the package costs less per DALY there than in Ethiopia or Guinea. Its threshold is lower, about US$154 per DALY against about US$324 and US$448. So any service whose benefit is more years on treatment sits at or above it. That includes the molecular TB test the DRC already funds (CDF 436K per DALY against no test, Table A1). Two things would change the verdict. One is routine HIV care, not drugs or tests, at half the model's cost: CDF 349K per DALY, at the threshold, and good value in 41% of draws. The other is a threshold of half of GDP per head, CDF 1.17M (Figure A1; Table A3). That is not an estimate of what the DRC's health system spends to gain a healthy year. If someone outside the health budget paid for all the extra care, the package would cost CDF 63.8K per DALY (Table A1). The DRC's commitment to treat everyone diagnosed means it pays for that care, not that the care is free [13]. At local price levels the package would be good value in the DRC too (Table A1), but the grant buys imported tests and drugs at the market rate.

FIGURE A1

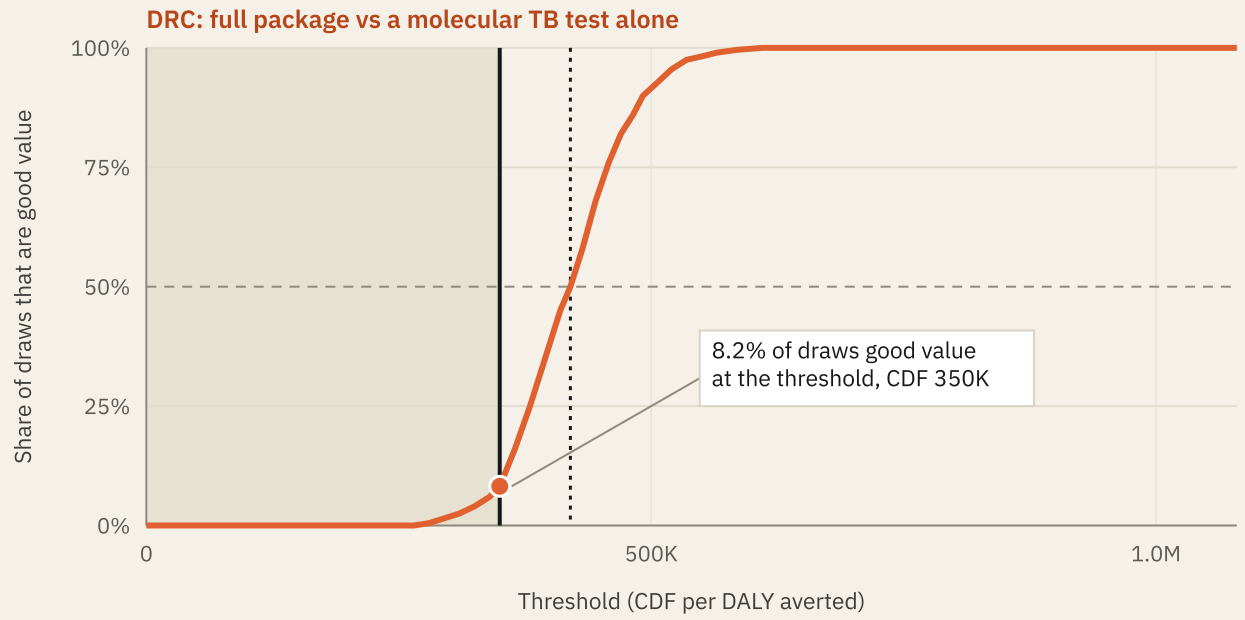


Figure A1. The DRC's verdict turns on the threshold. The share of 1,000 draws in which the full package, against a molecular TB test alone, is good value, by threshold, at the market exchange rate. Solid line: the threshold of CDF 350K per DALY averted (8.2% of draws). Half the draws are good value at about CDF 420K per DALY (dotted line), and nearly all at about CDF 600K. Both are well below half of GDP per head (CDF 1.17M).

The parts. At the main estimates, every part is good value in Ethiopia and Guinea at the market rate, at 55% to 68% of the threshold (Table A1). In the DRC, only cryptococcal screening is, and only where CD4 is already counted.

- **Urine LAM, added to a molecular TB test**, costs ETB 29.6K per DALY in Ethiopia and GNF 2.20M in Guinea, good value in every draw. It gives 80% to 87% of the package's years of life gained. By finding TB that the molecular test misses, it prevents about 2,700 to 3,200 TB deaths per 100,000 adults (Table A2). That is more than trials of LAM-based approaches in outpatients suggest, though among inpatients LAM likely reduces deaths (A3). In the DRC it costs CDF 423K per DALY (5.5% of draws).
- **Cryptococcal screening** depends on three things. One is how common cryptococcal infection is: the model sets it lower in Ethiopia and Guinea (10% and 5% of adults below CD4 100) than in the DRC (14%) [53]. The others are how many people with meningitis die and what their treatment costs. With local death rates (and, in Ethiopia, local antigen prevalence), screening costs ETB 30.5K, CDF 245K and GNF 2.3M per DALY. It is good value in 93%, 71% and 86% of draws. With the model's values it costs ETB 33.4K, CDF 6.50K and GNF 2.7M (69%, 73% and 63%). The DRC's low figure comes from avoiding meningitis treatment at the price of the regimen WHO prefers, which most Congolese patients do not receive. So does the money screening alone saves there against no package (CDF 1.06K per adult; 75% of draws). For screening's CDF 6.50K, the mean over the draws is about seven and a half times larger (Table A6).
- **Screening and CD4 counts.** At the low end of that treatment cost's range, screening with local death rates costs 73%, 101% and 70% of the threshold. So in the DRC it sits at the threshold even before treatment is priced at the fluconazole most patients receive. Every adult in the analysis has a CD4 count at the start of treat-

ment, costed in both arms. Where adults don't get a CD4 count today, one must be bought for each, just to find who is eligible. At the Global Fund price of US$4.18, screening would then cost 93% to 172% of the threshold. At the low-end treatment cost, it would cost more than the threshold everywhere. Screening is good value where CD4 is already counted. The case for extending CD4 testing rests on the whole package. It stays good value in Ethiopia and Guinea with a count bought for every adult, at 5% to 6% more per DALY. It also rests on CD4 testing's status as a Global Fund Program Essential.

- **Preventive therapy (6H)** costs about ETB 32.9K, CDF 503K and GNF 2.46M per DALY at the market rate. These figures are derived from the other analyses and have no draws. The main analysis gives 6H nearly the largest effect its range allows: 43%, against draws from 5% to 45%. Across the draws at local price levels, its mean gain is 40%, 2% and 33% of the main estimate. It is good value in 74%, 12% and 70% of draws (Table A1). Its result rests on an effect near the top of its range.
- **3HP**, the shorter regimen, adds 0.002 to 0.004 DALYs per adult over 6H, too small a difference to measure reliably. The model also gives it the same completion as 6H, so its results are no guide to the choice between regimens (A3).

Which threshold. Ochalek and colleagues name no preferred estimate among their four [50]. Pichon-Riviere and colleagues' 2023 estimates, built from health spending and life expectancy, are lower for Ethiopia and Guinea [51]. Table A3 sets them side by side as shares of GDP per head. Guinea's verdicts hold against every estimate, though cryptococcal screening sits at the 2023 estimate's value. In the DRC the package fails against every estimate, though, like Ethiopia's, it falls within the 2023 estimate's range (5% to 23%); only screening passes. Ethiopia's package and urine LAM cost about 22% of GDP per head per DALY. That is good value against Ochalek's four estimates (27% to 36%), but not against the 2023 central estimate (14%), though within its range (5% to 23%). Even with its own tests and drugs free, Ethiopia's package would cost 19% of GDP per head. Against half of GDP per head, every option except 3HP is good value in all three countries.

TABLE A3. Cost per DALY averted and published thresholds, as shares of GDP per head

Share of GDP per head	Ethiopia	DRC	Guinea
COST PER DALY AVERTED, AT THE MARKET EXCHANGE RATE			
The full package, against a molecular test alone	22%	18%	15%
– with its own tests and drugs free	19%	15%	13%
Urine LAM, added to a molecular test	22%	18%	15%
Cryptococcal screening: model's values; local values	24%; 22%	0.3%; 11%	18%; 16%
Preventive therapy (6H)*	24%	22%	17%
PUBLISHED THRESHOLDS			
Ochalek and colleagues, four estimates (the highest used here) [50]	27% to 36%	12% to 15%	21% to 27%
Pichon-Riviere and colleagues, central estimate (range) [51]	14% (5% to 23%)	15% (5% to 23%)	18% (6% to 29%)
Half of GDP per head	50%	50%	50%

Each cost per DALY averted (Table A1) divided by GDP per head in 2025 (ETB 136K, CDF 2.33M, GNF 14.8M), the figures the thresholds are built on [53]. For Ethiopia and the DRC they match the IMF's current series. For Guinea the IMF's series gives about GNF 23.0M [52]. That would lower every Guinean share by about a third (the package to about 10%) and raise Guinea's threshold by about half; no Guinean verdict changes. * Estimated from the other analyses, without draws. Pichon-Riviere and colleagues' estimates are per quality-adjusted life-year, which they treat as applying to the DALY as well [51].

A3. Limitations and checks

The model's fit. The model is not fitted to these countries; Table A4 sets it against outside evidence. Its adults live shorter lives after starting treatment than adults in Ugandan and South African cohorts, close to those who started with CD4 below 50. More of their deaths are due to HIV than in published cohorts, mostly outside Africa. It keeps about as many in care at one year as Kinshasa's cohort. The absolute health gains are therefore modelled, not predicted. If survival in these countries is longer than the model's, each death averted is worth more years than it counts. But those years also cost more care, so the direction of the bias on the cost per DALY is not known.

The model's TB and cryptococcal parts have not been checked against a published source. TB at entry and new TB infections are scaled from Malawi by each country's TB incidence: 141, 377 and 178 per 100,000, against 113 in Malawi [53, 63]. In the model, 7% to 78% of adults enter care with undiagnosed active TB, depending on CD4 count, illness history and country. Between 57% and 67% develop TB over their lifetimes. With the sputum test alone, 30,000 to 36,000 of every 100,000 adults die of TB over their lifetimes, and urine LAM averts about 9% of those deaths (Table A2). I found no like-for-like local figure for these quantities.

TABLE A4. The model against outside evidence

Measure, from the start of HIV treatment	Ethiopia	DRC	Guinea	Outside evidence
Life expectancy, starting treatment at a mean age of 34 to 35 (years)	**15.4**	**13.9**	**14.5**	At age 35: 27.9 in Uganda (14.2 if CD4 was below 50); in South Africa 20.7 for men and 28.1 for women (16.3 and 22.6 if CD4 was below 50) [64, 65]; 21 to 39 in published cohorts, mostly outside Africa [53]
Years of life lost to HIV	**22.0**	**21.3**	**20.8**	7 to 19 in published cohorts, mostly outside Africa [53]
Share of deaths due to HIV	**83%**	**83%**	**81%**	16% to 58% in published cohorts, mostly outside Africa [53]
Alive and in care a year after starting	**84%**	**81%**	**84%**	83% in Kinshasa [66]; in Guinea 4% had died and 20% had been lost to care within a year [67]

The model's figures are for care without TB or cryptococcal services.

The draws. The share of draws in which an option is good value does not capture every uncertainty. The draws hold some inputs fixed (A1) and do not question the model's structure. A simpler test asks how far the package's health gain could be overstated before its verdict changed, with its own tests, drugs and extra TB treatment costing the same. The answer is about 3.7 to 4.3 times in Ethiopia against Ochalek's highest estimate, but 2.0 to 2.2 against their lowest. In Guinea it is about 5.2 to 6.1 and 3.0 to 3.5 times, or 2.0 to 2.2 against the 2023 estimate.

- **What the analysis does not cover.** It follows adults starting treatment for the first time as outpatients. It does not cover inpatients, people returning after a break or whose treatment is failing, or children; the direction in which their omission moves the results is unknown. It assumes every test and drug is in stock. After discharge from Guinea's referral unit, essential drugs were out of stock for 32% of patients [68]. It does not evaluate these options:
  - urine LAM added to Ethiopia's current services, or targeted to the sickest patients;
  - screening below CD4 100, Ethiopia's guideline [69], or screening added to a molecular test alone;
  - meningitis treatment with the drugs WHO prefers, which cost US$140 per quality-adjusted life-year in Malawi [70];
  - enhanced prophylaxis, which a trial-based analysis found more effective and cheaper than antigen-testing strategies [71].

  Its inputs are national, so it does not reflect conflict-affected areas. In North Kivu, a programme coordinator reported a shortage of HIV test kits amid an influx of displaced people [72]. In northern Ethiopia, cryptococcal screening remains inconsistent after the war [20].
- **Trials.** Trials of urine LAM-based approaches cut deaths among inpatients, but not clearly among outpatients, the people this analysis covers. Among 2,528 inpatients in ten hospitals in South Africa, Tanzania, Zambia and Zimbabwe, 8-week deaths were 21% with LAM and 25% without. The risk ratio was 0.83 (95% confidence interval 0.73 to 0.96) [16]. A review pooling this and a second inpatient trial found that LAM likely reduces deaths (risk ratio 0.85, 0.76 to 0.94, moderate certainty) [17]. In the one outpatient trial, among adults with CD4 of 150 or less in South Africa, it may (0.89, 0.71 to 1.11, low certainty) [17, 73]. The model's gain from urine LAM among outpatients is larger than

these trials suggest. The two cannot be compared directly: the model counts healthy years over a lifetime, the trials deaths over weeks.

- **Preventive therapy.** The model gives 3HP the same uptake as 6H and 6H's completion. In a trial in Ethiopia, Mozambique and South Africa, 90% completed 3HP against 51% for 6H [56]. So the 3HP results are no guide to the choice between regimens.
- **Costs.** Routine HIV care is the largest driver. Ethiopia's cost comes from a 2014 facility costing [74]. The DRC's and Guinea's come from the source model's Côte d'Ivoire costing, adjusted to each country's price level [49]; I found no local costing for either. For Ethiopia, a 2024 costing at one hospital and three health centres in North Wollo found standard care cost US$295 per patient a year [55]. Lighter models of care cost US$199 to US$248, against about US$204 in the model [55]. The study's patients had been on treatment for about five years on average; the model's figure is its cost per patient-year, averaged over all years in care. North Wollo's figure is 1.27 times the model's in birr, at the study's 2025 rate of ETB 132 per dollar and before two years of price rises. It is 1.45 times in US dollars, at the 2026 rate of ETB 152. Scaling everything except the package's own tests and drugs by those ratios, Ethiopia's package costs 27% to 31% of GDP per head per DALY.

  The doubt runs both ways. Ethiopia's package stops being good value if everything except its own tests and drugs costs 1.74 times the model's figure, against Ochalek's highest estimate. Against their lowest, the break-even is 1.26 times (Guinea 1.88 and 1.43). A lower current cost would favour the package, as half the cost nearly does in the DRC. The tests' unit costs, including the viral load test's all-in cost, were converted whole at the market rate. That overstates any local staff share and raises the cost of survival, most in the DRC. Some imported drugs used in meningitis treatment and at the start of TB treatment, and 3HP in Ethiopia and Guinea, stay at local price levels. The model's prices are ex-works, without freight and distribution, which Table 1 adds. The DRC's result depends on the exchange rate, since the 12 imported items are priced in dollars. From the two price bases, I calculated that the package would reach the DRC's threshold only if the franc were more than a fifth stronger. The 2026 rate used is CDF 2,279 per dollar. A weaker franc moves it further above.
- **Threshold.** The published estimates differ (Table A3), and Ethiopia's verdict depends on which is used.
- **Counts.** The yearly figures rest on national counts with known quality problems. In the DRC, a 2022 data-quality assessment found the reported number of adults on treatment overstated by an average of 25% [47].

Published evaluations. They agree on the DRC and differ in places on Ethiopia. In Malawi, Hyle and colleagues, with the same family of models, found a molecular test with cryptococcal screening the first efficient step, at US$170 per quality-adjusted life-year [11]. The four parts came next (US$310) and the full package with co-trimoxazole last (US$580) [11]. Screening came first there, while here it was added last by design (A1). The full package was good value against Malawi's GDP per head of US$600 [11, 70]. It was not good value against the lower US$150 threshold, from health spending and life expectancy, that the same group also uses [11, 70]. In Uganda (section 5), screening's cost per DALY rose to well above the DRC's threshold once it included the treatment of the people it keeps alive [54]. For preventive therapy, a 29-country study found 3HP for people with HIV, against none, above its thresholds for the DRC and Ethiopia [75]. Its figures were US$592 against US$71 per DALY in the DRC, and US$674 against US$286 in Ethiopia, in 2020 dollars [75]. This analysis finds 6H good value in Ethiopia at the main estimates. A Tanzanian study found isoniazid

preventive therapy highly cost-effective or cost-saving [76]. Regimens, comparators, TB burdens and thresholds differ.

A4. The budget (Table 1)

Adults: in Ethiopia, people aged 15 or older [77]. In the DRC and Guinea, all people starting treatment [78, 79] times the share aged 15 or older [77, 80]. That share is 93% in PEPFAR-supported areas of the DRC, and 92.5% in Guinea in July to December 2025. Counts vary by source and year. Advanced disease or CD4 below 200: 35.5% in Ethiopia [2], 40% to 50% in Kinshasa, applied to the whole DRC [3, 81], and 38% in Conakry [4]. Quantities: tests and courses per adult in the market-rate analyses of the package, over a lifetime and undiscounted. That is about one year's use when each year's starters are similar. In the model, 53% to 55% start below CD4 200 in Ethiopia and Guinea (about 43% in the DRC, inside the local range). So about a third of the antigen tests in Ethiopia and Guinea would not be needed at these local shares. Prices: Global Fund reference prices, ex-works. Urine LAM costs US$3.70, cryptococcal antigen US$2.34 (the top of US$1.35 to US$2.34), the molecular test US$7.97 and a point-of-care CD4 test US$4.18 [82, 83]. 3HP costs US$10.96 a course [84]. Six months of isoniazid costs about US$3.51: 182 tablets of a 672-tablet pack at US$12.95 [84]. Supply costs add 16% in every country, the ratio in Guinea's current advanced HIV budget [42]. Fluconazole for those who test positive is not included. Whole added cost: the model's added cost per adult (Figure 1) times the adults; it falls on the grants and national budgets together. Deaths averted: Table A2 times the adults. Allocation: the Grant Cycle 8 HIV allocation divided by three [23, 24]. That is the 2026 to 2028 allocation period, spent in grants that mostly run from 2027. The sputum tests in Table 1's last row are counted in the arm without the package. So they number fewer than the urine tests, counted in the arm with it, where more people survive to be tested. People returning to care or failing treatment would add to the volumes. In Guinea, 30% of the advanced-disease cohort had returned after a break [5]. In the DRC, UCOP+ counted 6,954 returning and 8,318 failing treatment with CD4 below 200 [6]. Even doubled, the tests, drugs and CD4 counts would stay under 4% of a year's allocation. The model's own unit costs for tests are higher than these prices (Table A5).

A5. Inputs changed from the model's defaults, the analyses they serve, and the defaults that drive the results

TABLE A5. Inputs changed from the model's defaults

Input	Ethiopia	DRC	Guinea	Source
Tests and drugs at the market exchange rate (the main analysis, every comparison): default → value used	× 4.37	× 1.94	× 2.81	Default × the 2026 market exchange rate ÷ the model's price-level factor [52]
Co-trimoxazole (per year)	ETB 52.9 → 231 (US$1.53)	CDF 1.21K → 2.34K (US$1.03)	GNF 9.52K → 26.8K (US$3.00)	
First-line treatment, dolutegravir-based (per year)	ETB 1.17K → 5.09K (US$33.6)	CDF 39.5K → 76.6K (US$33.6)	GNF 107K → 299K (US$33.6)	

Input	Ethiopia	DRC	Guinea	Source
Second-line treatment, boosted protease inhibitor (per year)	ETB 9.70K → 42.4K (US$280)	CDF 329K → 637K (US$280)	GNF 887K → 2.49M (US$280)	
TB treatment drugs, intensive phase (per year on treatment)	ETB 5.34K → 23.3K (US$154)	CDF 181K → 351K (US$154)	GNF 488K → 1.37M (US$154)	
TB preventive therapy, isoniazid (per year on therapy)	ETB 432 → 1.88K (US$12.4)	CDF 14.6K → 28.3K (US$12.4)	GNF 39.4K → 111K (US$12.4)	
Fluconazole, pre-emptive or maintenance (per year)	ETB 2.23K → 9.72K (US$64.2)	CDF 75.5K → 146K (US$64.2)	GNF 203K → 572K (US$64.2)	
Molecular TB test (Xpert)	ETB 595 → 2.60K (US$17.2)	CDF 20.2K → 39.1K (US$17.2)	GNF 54.4K → 153K (US$17.2)	
Urine LAM test	ETB 215 → 941 (US$6.21)	CDF 7.30K → 14.1K (US$6.21)	GNF 19.7K → 55.3K (US$6.21)	
Serum cryptococcal antigen test	ETB 143 → 623 (US$4.11)	CDF 4.84K → 9.37K (US$4.11)	GNF 13.0K → 36.7K (US$4.11)	
CD4 test	ETB 492 → 2.15K (US$14.2)	CDF 11.2K → 21.8K (US$9.55)	GNF 88.5K → 249K (US$27.9)	
Viral load test	ETB 1.14K → 4.99K (US$33.0)	CDF 38.8K → 75.1K (US$32.9)	GNF 104K → 294K (US$32.9)	
Laboratory panel at the start of treatment	ETB 282 → 1.23K (US$8.14)	CDF 6.45K → 12.5K (US$5.48)	GNF 50.8K → 143K (US$16.0)	
TB preventive therapy, 3HP (per year on therapy; the DRC's 3HP analysis)	–	CDF 75.6K → 147K (US$64.3)	–	
Local cryptococcal values (cryptococcal screening, at both price bases): default → value used				
Death in the first month of cryptococcal meningitis treatment	14% → 50%	14% → 50%	14% → 50%	Local death rates: 64% at 28 days among antigen-positive adults with suspected sepsis (Ethiopia); 53% of treated patients, mostly on fluconazole alone (DRC studies); 47% in hospital (Conakry); 34% in hospital at an MSF-supported Kinshasa hospital in 2015 to 2017 [1, 7, 9, 10]. Drawn with the default standard error, so the draws understate this doubt
Cryptococcal antigen at entry, CD4 below 100	9.9% → 7.3%	–	–	8 of 109 adults not on treatment in two Ethiopian studies [19, 85]
Fewer adults starting with advanced disease (the package against no package, Ethiopia and Guinea): default → value used				
Median CD4 at entry, women (cells per microlitre)	193 → 268	–	195 → 262	Raised so that 40% start below CD4 200 (default 54.6% in Ethiopia, 53.4% in Guinea), close to recent local figures [2, 67, 86, 87]

Input	Ethiopia	DRC	Guinea	Source
Median CD4 at entry, men (cells per microlitre)	156 → 217	–	167 → 224	Raised so that 40% start below CD4 200 (default 54.6% in Ethiopia, 53.4% in Guinea), close to recent local figures [2, 67, 86, 87]
Routine care at half the default (the DRC, the full package against a molecular test alone): default → value used				
Routine HIV care, CD4 200 or above; below 200 (per year)	–	CDF 160K → 80.0K; CDF 117K → 58.5K	–	Half the default, to find the care cost at which the verdict changes
HIV care paid from outside the health budget (the DRC, the full package against a molecular test alone): default → value used				
Routine HIV care, antiretroviral drugs, viral load tests and co-trimoxazole	–	each → 0	–	The care of the people the package keeps alive treated as paid by someone other than the health budget the threshold describes
Defaults that drive the results (unchanged)				
Routine HIV care, CD4 200 or above (per year)	ETB 12.7K	CDF 160K	GNF 1.26M	A 2014 facility costing in Ethiopia [74]; the source model's Côte d'Ivoire costing, adjusted, for the DRC and Guinea [49]
Second-line treatment, boosted protease inhibitor (per year; the default at local price levels, raised at the market rate above)	ETB 9.70K	CDF 329K	GNF 887K	Global Fund reference prices [53]
Viral suppression at 24 weeks on first-line treatment	92%	92%	92%	The Malawi evaluation [11]
Effect of preventive therapy on TB infection and reactivation	6H 43% (draws 5% to 45%); 3HP 49%	same	same	The Malawi evaluation [11]
Uptake of preventive therapy (both regimens)	79%	79%	79%	The Malawi evaluation [11]
TB incidence used to scale Malawi's TB rates (per 100,000; Malawi 113)	141	377	178	WHO [63]
Cryptococcal antigen at entry, CD4 below 100 (drawn between)	9.9% (0.8% to 31%)	14.4% (1.2% to 41%)	4.6% (0.3% to 17%)	The Malawi evaluation, scaled by each country's antigen prevalence [11, 88]

A6. Results whose mean over the draws differs from the main estimate

TABLE A6. Results whose mean over the 1,000 draws differs from the main estimate by more than a tenth

Comparison	Country	Imported tests and drugs	Main estimate	Mean of the 1,000 draws
Cryptococcal screening, added to the TB tests and preventive therapy	**Ethiopia**	Local price levels	ETB 1.20K	ETB 2.20K
Preventive therapy (6H), added to the two TB tests	**Ethiopia**	Local price levels	ETB 15.6K	ETB 19.2K
Full package vs a molecular test alone, HIV care paid from outside the health budget	**DRC**	Market rate	CDF 63.8K	CDF 71.4K
Cryptococcal screening, added to the TB tests and preventive therapy	**DRC**	Market rate	CDF 6.50K	CDF 49.0K
Preventive therapy (6H), added to the two TB tests	**Guinea**	Local price levels	GNF 1.6M	GNF 2.0M

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