HP+ POLICY *Brief*

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# Supporting Standardized Pricing for Viral Load Testing in Indonesia

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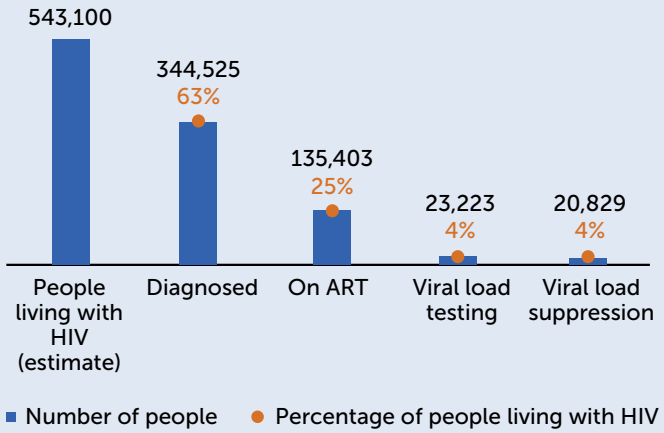
## Background

The government of Indonesia plans to scale up access to HIV services rapidly to achieve ambitious targets for identification, antiretroviral therapy (ART) coverage, and viral load testing under the ART Acceleration Plan (Ministry of Health Circular Letter No. 1822/2019), such that 40 percent of people living with HIV are on ART by the end of 2020. As of June 2020, of the approximately 543,100 people living with HIV, 63 percent (344,525) knew their status, but only 25 percent (135,403) were on treatment (see Figure 1). Since 2013, the World Health Organization has recommended molecular diagnostic viral load testing as the gold standard for monitoring the effectiveness of ART. However, of those on treatment in Indonesia, only 17 percent (23,223) were viral load tested, with 90 percent (20,829) of those tested being virally suppressed.

**Figure 1. Indonesia's HIV Treatment Cascade (June 2020)**




Source: Indonesia Global Fund Grant Quarterly Review Meeting (second quarter, unofficial)

The ART Acceleration Plan explicitly calls for improving viral load testing coverage in Indonesia among people living with HIV who are pregnant or suspected of having failed therapy, as well as routine testing among those on ART (i.e., twice in the first year of therapy and yearly testing after the first year). The strategy for improving viral load testing coverage includes identifying patients on ART who require routine testing, ensuring that health workers carry out viral load tests or refer patients for testing, and encouraging the community to promote viral load testing services. In a concrete step to increase viral load testing in Indonesia, the Ministry of Health's Subdirectorate for HIV carried out a testing campaign from July to December 2020 in 105 districts/cities in Indonesia, targeting 41,000 people living with HIV to check viral load (Kementerian Kesehatan Republik Indonesia, 2020).

One of the challenges in viral load testing in Indonesia is the price of the test, which is relatively expensive compared to other laboratory tests. Pricing of viral load tests are reportedly much higher in Indonesia than other countries, making scale-up much less affordable. For example, the comprehensive cost per viral load test in six countries (Thailand, Kenya, Lesotho, Malawi, Swaziland, and Zimbabwe) in 2013 ranged from USD 24.90 to USD 44.07, whereas the cost per test in Indonesia was estimated to cost an average of USD 95 (MSF, 2013; HP+ and Subdirectorate for HIV, 2018). The government currently relies on the Global Fund to cover nonconsumable costs associated with viral load testing, including sample transportation; this approach is unsustainable as the country anticipates transitions in external financing support for its HIV response in the near term. According to the Subdirectorate for HIV, hospitals report wide variations in viral load testing costs and discrepancies in reimbursement amounts across hospitals.

Patients also pay out-of-pocket fees for viral load testing, especially those who are not registered as patients at the health facility, do not have a referral for viral load testing, want to be tested off schedule, or receive testing at facilities not supported by the government (i.e., private labs). Indonesia's national health insurance, Jaminan Kesehatan Nasional (JKN), covers viral load testing services for those registered as JKN members only when admitted for

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inpatient care. People living with HIV who access viral load tests in hospital outpatient settings do not have their testing covered by JKN, so such patients may face high out-of-pocket costs to access a test even though the national government and donors pay for the machines and reagents, and cover other costs.

As viral load testing is scaled up countrywide, it is important to ensure that government payments adequately cover the cost of testing and pricing is standardized across facilities with similar profiles. Viral load testing payment can also support scale-up by incentivizing provision of such tests for all who need them.

# Objectives

In this brief, the Health Policy Plus (HP+) project—funded by the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) and U.S. Agency for International Development (USAID)—in collaboration with the Subdirectorate for HIV, aimed to understand the costs that providers face in performing viral load tests and determine the resources required to significantly scale up test provision in both hospitals and primary care facilities in Indonesia. This cost evidence can be used to inform standardized viral load pricing, which will ensure appropriate and fair payments across facilities and labs with similar profiles, and support the efficient scale-up of testing as outlined in the ART Acceleration Plan. Specific objectives of the analysis included the following:

- Map viral load testing processes and funding sources across sampled facilities and labs
- Calculate unit costs for the full viral load testing process from sample collection to results delivery
- Estimate resources required to scale up viral load testing according to ART Acceleration Plan targets

# Approach

## Facility Sample

HP+ collected viral load testing cost data from seven facilities and labs across Jakarta and Papua, selected in consultation with the Subdirectorate for HIV. Table 1 describes the facility sample.

### Table 1. Facility Sample Characteristics (n = 7)

| Machine Type | Region | Facility Type |
|---|---|---|
| • 4 Abbott (RealTime HIV-1)<br>• 3 GeneXpert (Xpert HIV-1 Viral Load) | • 5 Jakarta<br>• 2 Papua | • Regional Laboratory<br>• 2 Primary Care Clinics<br>• 4 Hospitals |

Note: Facilities were selected by considering region, type and ownership of facility, type of viral load machine, ownership of equipment, and good quality of recording and reporting.

## Data Collection

HP+ costed viral load testing from the facility perspective by using a bottom-up, ingredients-based costing approach. Data were collected through two data collection rounds conducted between August and September 2020. They were collected for each step of the viral load testing process, including sample collection, processing, transportation (when relevant), testing, and results delivery. HP+ collected data on direct costs that providers face in providing viral load testing to calculate a testing unit cost. Direct costs included costs of staff time, materials and consumables, and equipment. HP+ also collected information on viral load financing, including claims submitted to donors and government for cost reimbursement, fees charged to patients, and fees paid for external testing.

# Findings

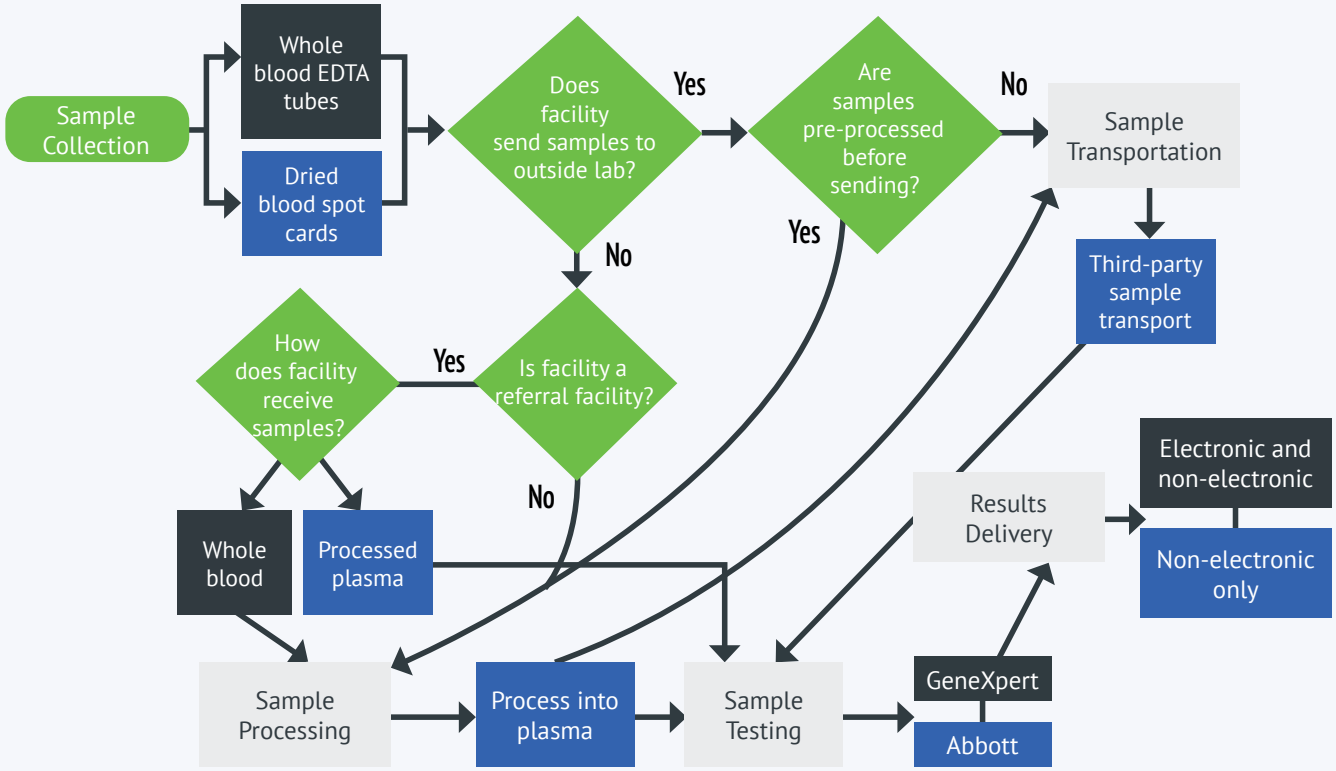
## Viral Load Testing Processes

The overall viral load testing process, including variation in the process, is discussed next and illustrated in Figure 2.

***Sample collection and processing:*** All seven facilities reported collecting their own viral load samples from patients. Of these facilities, the majority collect whole blood samples using EDTA tubes and process blood samples into plasma for testing. One facility also uses dried blood spot cards.

***Sample transportation and testing:*** All seven sampled facilities have their own labs where they test viral load samples. Three facilities act as referral facilities and will process and test samples from outside

**Figure 2. Viral Load Process Map**




facilities. Three other facilities will test only those outside samples that have already been processed. Of the six facilities that test outside samples, four reported that the sending facility covers transportation costs. For health facilities in Jakarta, a third party carries out routine sample transport to referral facilities twice a week. The sample transportation costs are submitted as claims to the Jakarta Provincial Health Office and then reimbursed through USAID's LINKAGES project, which manages the Jak-Transporter program. The one primary care facility that does not accept outside samples for testing sends samples to private and public facilities for the majority of its viral load testing volume.

***Viral load testing machines:*** Regarding viral load testing equipment/machines, three facilities reported using GeneXpert (Xpert HIV-1 Viral Load) machines and four facilities use Abbott (RealTime HIV-1) machines. Most facilities acquired these machines through donations, loans, or other arrangements. Only one facility purchased its own machine. Machine age ranges from a minimum of 24 months to 132 months; the average machine age is 67 months. Abbott machines are being used for SARS-CoV-2 tests in addition to viral load tests.

***Results delivery:*** Four facilities deliver viral load testing results both electronically and non-electronically (i.e., via mail), whereas the remaining three facilities deliver results only electronically (through email and WhatsApp messages).

## Viral Load Financing

Findings related to viral load financing, including revenue streams used for testing and test unit costs, are summarized below.

***Revenue streams used for viral load testing:*** Table 2 lists the revenue streams that facilities reported using to cover the costs of viral load testing. The private primary care clinic, referral hospital, and regional lab reported not using government funding for viral load testing, including none from the national social health insurance agency (BPJS-K). Public primary care clinics reported using local community service agency (BLUD), Global Fund, and USAID funds, whereas public (provincial and district) hospitals reported using subnational government (APBD) and BPJS-K case-based group funds in addition to Global Fund and BLUD funding. Three facilities (one private clinic, one regional lab, and one hospital) reported earmarking specific revenue for viral load testing costs, such as viral load reagent and other consumable procurements.

For viral load commodities and equipment, six facilities (all but the private clinic) reported that the central government covers costs of viral load reagents and consumables, with two facilities reporting that the central government covered the costs of their viral load machines (one GeneXpert and one Abbott machine). Three facilities reported that local governments cover the costs of viral load test consumables (i.e., cartridges from their district health offices).

## Table 2. Revenue Streams Used to Cover Costs of Viral Load Testing by Facility Type

| Revenue Stream | Primary Care Clinic | | Hospital | | Regional Laboratory |
|---|---|---|---|---|---|
| | Public | Private | Provincial and District Hospitals | National Cancer Referral Hospital | |
| APBD | | | ✓ | | |
| BPJS-K case-based groups | | | ✓ | | |
| BLUD | ✓ | | ✓ | | |
| Global Fund | ✓ | | ✓ | | ✓ |
| USAID | ✓ | ✓ | | | |
| Other private | | | | ✓ | |
| Out-of-pocket | | ✓ | | ✓ | |

***Claims and reimbursement:*** Public facilities that receive support for viral load testing from donors reported submitting claims to district or provincial health offices, which subsequently submit the information to the Ministry of Health. In turn, the Ministry of Health submits claims to donors (mainly the Global Fund). The reported reimbursement amount that public facilities receive from government/donors ranges from Indonesian Rupiah (IDR) 350,000 to 450,000 per viral load test, with an average reimbursement of IDR 425,000. The private clinic reported submitting testing claims to LINKAGES and the Global Fund's subrecipient directly at a rate of IDR 700,000 per test.

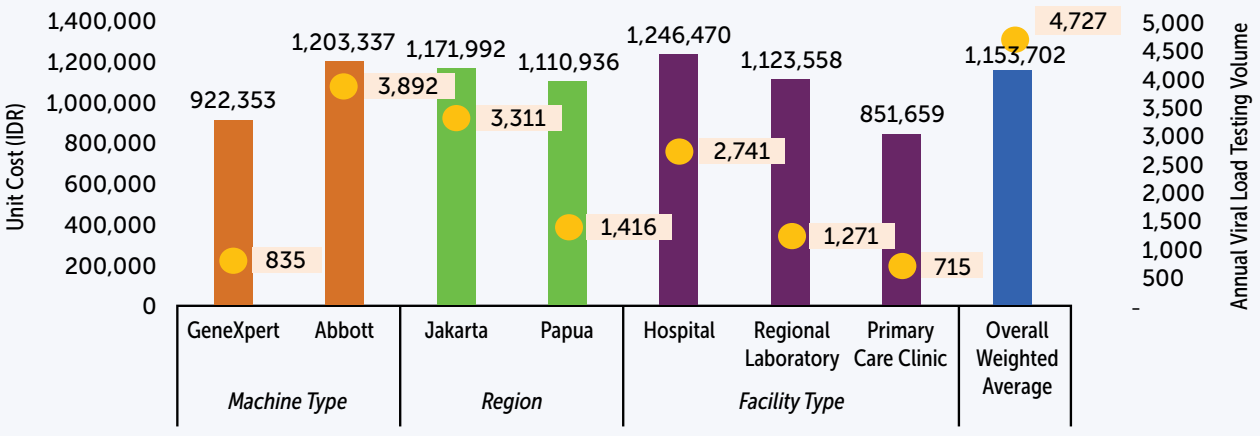
***Patient fees:*** Only two facilities (one private clinic and one referral hospital) reported ever charging patients directly for viral load testing. The private clinic charges only those patients who seek testing without a referral, at IDR 700,000 per test. The referral hospital charges IDR 450,000 per test regardless of whether they are internal or referral patients.

***Referral fees:*** Out of the six facilities that test viral load samples from other facilities, only the private clinic reported charging the referral clinic directly (at a rate of IDR 700,000 per sample). The remaining facilities (except one that does not submit any claims) submit for reimbursement from government and/or donors for these outside samples. Puskesmas reported paying IDR 977,500 when sending samples to a private lab and IDR 450,000 to the public lab (referral hospital lab) for testing.

## Viral Load Costs

***Costs per viral load test (unit cost):*** The overall weighted average cost (i.e., weighted by annual viral load volume) per viral load test in the sample was IDR 1.15 million (see Figure 3). By machine type, viral load testing unit costs were highest among facilities that used Abbott machines (IDR 1.20 million) compared to GeneXpert (IDR 922,353). Hospitals had higher testing unit costs (IDR 1.25 million) compared to the regional laboratory (IDR 1.12 million) and primary care clinics (IDR 851,659). There were minimal

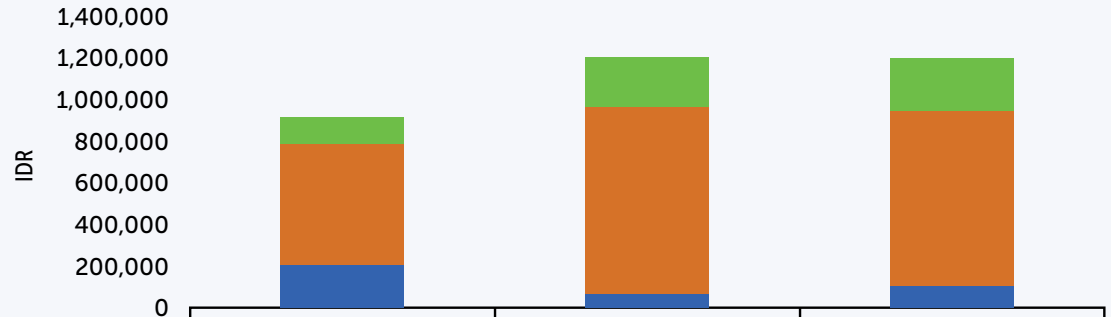
### Figure 3. Viral Load Testing Unit Costs and Annual Viral Load Volume, by Machine Type, Region, Facility Type, and Overall



differences in unit costs between facilities in Jakarta and Papua. Differences in viral load test unit costs are driven by the machine type used for testing (see Box 1); thus, test unit costs are disaggregated by machine type in the rest of this brief.

***Staff, materials, and equipment costs per viral load test:*** Materials contribute more to viral load testing unit costs compared to staff or equipment costs overall and vary by testing machine (see Figure 4). Materials (i.e., consumables) costs account for 75 percent of the overall weighted average unit cost per viral load test (75.9 percent of costs for facilities using Abbott machines and 67.1 percent of costs for facilities using GeneXpert machines). The high materials costs are a result of high costs for machine test kits and reagents (see Box 1).

**Figure 4. Staff, Materials, and Equipment Costs, by Machine Type and Overall**




| | GeneXpert | Abbott | Overall Weighted Average |
|---|---|---|---|
| Equipment Costs | 135,431 | 226,863 | 210,712 |
| Materials Costs | 576,708 | 913,115 | 853,691 |
| Staff Costs | 210,214 | 63,359 | 89,300 |

*Machine Type*

Staff costs represent only 8 percent of overall weighted average unit costs. Staff costs for facilities account for 23 percent and 5 percent of costs using GeneXpert and Abbott machines, respectively. Facilities using GeneXpert machines reported that their staff spend significantly longer per sample in the sample testing step compared to facilities using Abbott machines.

## Box 1. Costs of Materials for GeneXpert versus Abbott Machines

The high materials and sample testing costs across all facilities are driven by high costs for test kits (Abbott machines) and test cartridges (GeneXpert machines). The variation in materials and sample testing costs is driven by differences in costs for these sample testing materials by machine type (see Table 3).

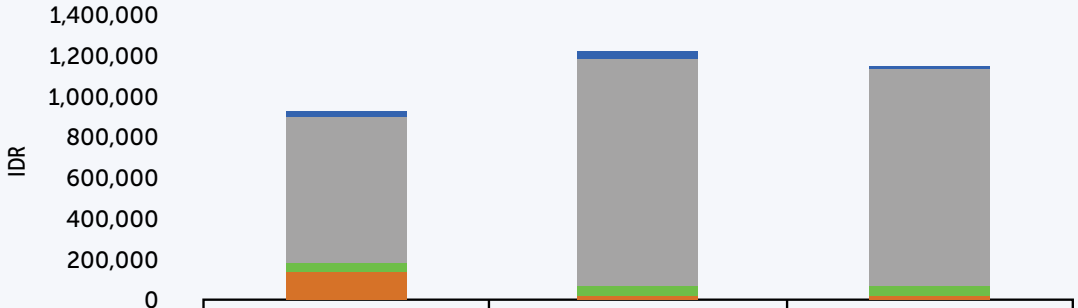
### Table 3. GeneXpert vs. Abbott Materials Costs

| | GeneXpert | Abbott |
|---|---|---|
| Materials | Xpert HIV-1 Viral Load Cartridge | Test kits (amplification, control, extraction, and calibrator kits) |
| Cost per viral load sample | IDR 445,000 | IDR 728,000—753,000* |

* Depending on viral load testing volume.
Note: Listed costs for materials do not include costs of all consumables required to run the test.

***Costs by viral load testing step:*** Sample testing accounts for the highest proportion of costs per viral load test (see Figure 5). It accounts for 91 percent of the weighted average unit cost, ranging from 80 percent of costs for facilities using GeneXpert to 93 percent for facilities using Abbott machines. The variation in sample testing costs is due to differences in costs between using the two machines (see Box 1). Sample collection, sample processing, and results delivery account for only 3 percent, 4 percent, and 2 percent of the weighted average unit cost, respectively.

## Figure 5. Sample Collection, Processing, Testing, and Results Delivery Costs, Overall and by Facility



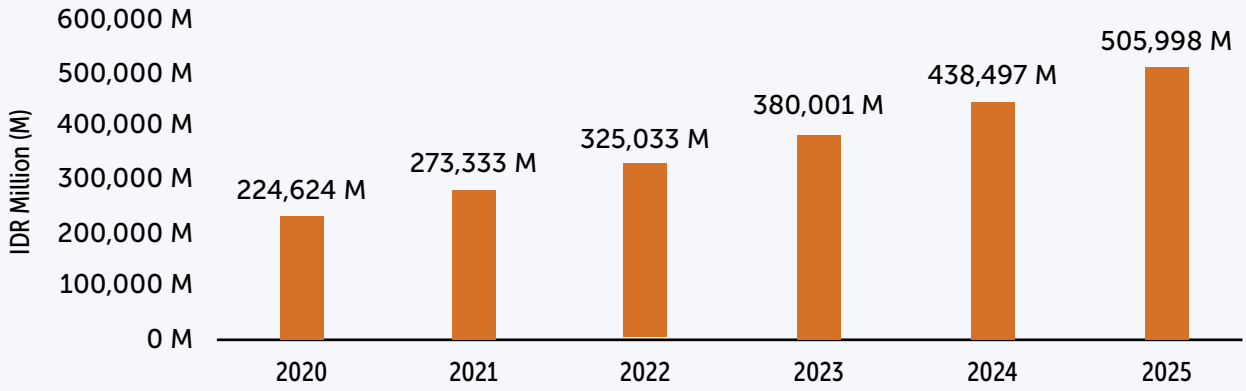

| | GeneXpert | Abbott | Overall Weighted Average |
|---|---|---|---|
| Results Delivery | 20,329 | 16,830 | 17,448 |
| Sample Testing | 739,929 | 1,119,239 | 1,050,999 |
| Sample Processing | 36,598 | 49,741 | 47,420 |
| Sample Collection | 132,498 | 17,527 | 37,836 |

*Machine Type*

## Resource Requirements for Scale-Up of Viral Load Testing

Assuming continued scale-up in ART coverage under Indonesia's ART Acceleration Plan, Indonesia would increase the number of people on ART from 194,698 in 2020 to 438,586 in 2025 (HP+ and Sub-Directorate for HIV, 2018). Assuming each person living with HIV receives one viral load test per year, total resource requirements for viral load testing from 2020–2025 is over IDR 2.15 trillion. IDR 225 billion is required in 2020, increasing to IDR 506 billion in 2025 (see Figure 6).

## Figure 6. Viral load Testing Resource Requirements under ART Scale-Up, 2020–2025




Note: This estimate assumes one viral load test per person living with HIV on ART per year.

# Limitations

There are several limitations to consider when interpreting these results. First, the sample size for this costing exercise was small (n = 7), meaning the unit costs are likely not representative of facilities across the country. The sample in this analysis was selected purposively to better understand potential cost drivers for viral load testing; however, a greater number of facilities should be included in future costing studies to calculate representative average unit costs across various facility types. HP+ cautions about drawing overall conclusions on drivers of variations in unit costs from this limited data sample.

Second, estimates of staff time spent on various viral load testing steps were based on self-report by facility staff. HP+ did not measure the actual time staff spent on each step; thus, estimates of staff costs are subject to measurement error. A time-motion costing study should be conducted to compare costs for this testing.

Third, limited indirect costs were captured in the viral load unit cost calculation. HP+ captured only indirect costs related to staffing (including staff benefits). Most facilities did not report any training costs specific to viral load testing, and HP+ did not cost out any additional facility overhead. Last, HP+ did not include additional costs required to scale up testing capacity to be able to conduct the required volume under the projection scenario.

## Key Findings

***The overall weighted average unit cost for viral load testing in the sample is IDR 1.15 million.*** Average reported reimbursement from government and/or donors is IDR 425,000, meaning facilities are responsible for the remaining IDR 725,000 of direct costs per viral load test. However, this value does not consider the in-kind contributions facilities receive, including reagents and cartridges (significant contributors to sample testing and materials costs) from the national and subnational governments. Additionally, most facilities reported that their viral load test machine was donated or on loan. Facility reimbursement rates should consider cost variations in machine type and incentivize providers to perform such testing on all ART patients.

***Sample testing is the highest-cost step in the viral load testing process, with materials/consumables costs contributing the most (75 percent) to overall test unit costs compared to equipment and staff costs.*** High materials costs are driven by high costs for reagents and test kits. They are recurring costs for which facilities will need to be reimbursed.

Costs per viral load test are lower among facilities using GeneXpert machines (IDR 922,353) compared to Abbott machines (IDR 1.20 million). Lower costs for facilities using GeneXpert machines are due to the lower cost of test cartridges for these machines compared to Abbott reagent costs. Although near-point-of-care (POC) GeneXpert testing was cheaper per test than high-throughput Abbott machines, universal use of GeneXpert machines for testing scale-up is not recommended. The Subdirectorate for HIV should undertake a separate analysis to determine the appropriate distribution of viral load testing platforms across Indonesia based on cost optimization and the criteria listed in Box 2.

GeneXpert benefits include lower costs per test and the ability of less skilled individuals to run viral load tests; however, GeneXpert batch volume is limited. Sampled facilities reported maximum batch volume on GeneXpert to be three to four viral load samples, with an average run time of 2 hours; Abbott machines have a maximum batch size of 93–96 samples, with an average run time of 6.75 hours. As a result, areas with high viral load testing demand may need to use high-throughput machines like Abbott to allow testing results to be returned to the patient in a timely manner, particularly those not responding well to treatment. However, if demand is low, near-POC machines like GeneXpert may be more cost-effective for scaling up such testing. In reality, a combination of near-POC and high-throughput machines will likely be necessary to meet demand in Indonesia. The efficiency of viral load testing is also dependent on using machines at capacity. Placement of viral load machines and their subsequent throughput impacts cost per test. Larger machines, like those from Abbott, should stay centralized to maintain high efficiency and lower prices, whereas POC machines like GeneXpert can serve areas with lower throughput demands (MSF, 2013).

The government of Indonesia should also leverage the scale-up and roll-out of GeneXpert machines under the tuberculosis program to hospitals and Puskesmas

### Box 2. Choosing Viral Load Testing Platforms

Countries can choose between high-throughput centralized machines, near-POC machines, and true POC machines for viral load testing. High-throughput machines like Abbott machines require more infrastructure and skilled human resources than POC machines. Viral load testing platform choice must be context specific and will depend on the ability to prepare and transport samples, the sample throughput demand, and clinical urgency of the test.

Criteria to consider are as follows:

- Is phlebotomy feasible?
- Is sample transport for plasma feasible?
- How many sites send viral load samples and what is their forecasted weekly throughput, both by site and as a collective? Which platforms or combination of platforms may meet demand?
- Considering both centralized and near-POC machines, what infrastructure/space and human resources requirements will be needed to meet demand?
- What and how many other sample types are sent from the area served that may also be run on a given platform?
- Are all samples of equal clinical priority?

Source: MSF, 2016

around the country, particularly machines not operating at full capacity for tuberculosis screening and able to handle current and planned increases of HIV patients on ART needing annual viral load tests. Test reagents would need to be quantified, procured, and managed to ensure they are in facilities when needed to minimize risk of expiration and stock-outs. For both GeneXpert and Abbott machines, ensuring they are used at full capacity will contribute to reduced costs per test.

***Significant resources are required to scale up viral load testing to meet testing requirements under Indonesia's ART Acceleration Plan.*** HP+ estimates that more than IDR 2.15 trillion will be needed to pay for one viral load test per person living with HIV on ART (assuming Indonesia meets the plan's targets). However, it is likely an underestimate, as the estimate excludes the costs of scaling up sample transport networks, leasing and/or buying and distributing new machines to meet increased testing demand, training laboratory staff, and other additional scale-up costs.

## Acknowledgements

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